

# The UK Mortgage Market: Taking a Longer-Term View

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Interim Report  
Information, Incentives and Pricing

David Miles  
December 2003



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# Contents

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		Page
Foreword	Letter to the Chancellor of the Exchequer	1
Section 1.	<b>Aim and scope of the Review</b>	<b>5</b>
	An overview of the UK mortgage market	5
	A guide to the Interim Report	15
Section 2.	<b>Fundamental characteristics to borrowers of fixed and variable-rate mortgages</b>	<b>21</b>
	The risk of variable and fixed-rate mortgages under different scenarios	22
	Optimal mortgage contracts	32
Section 3.	<b>Consumer behaviour</b>	<b>39</b>
	Key factors in mortgage choice	39
	Misunderstanding of interest rate risk	40
	Perceived inflexibility of longer-term fixed-rate mortgages	46
	The role of intermediaries and advice	49
	The regulation of mortgage sales	50
Section 4.	<b>Pricing structure in the UK mortgage market</b>	<b>53</b>
	The current structure of pricing in the UK	53
	Sustainability of the current pattern of mortgage pricing	58
	Implications for longer-term fixed-rate mortgages	61

<b>Section 5.</b>	<b>Funding and pricing of fixed-rate mortgages</b>	<b>65</b>
	The current situation: variable-rate mortgages are largely funded by variable rate deposits	65
	Possible ways to fund fixed-rate mortgages	68
	Potential obstacles to funding longer-term fixed-rate mortgages	72
	Regulatory issues	82
<b>Section 6.</b>	<b>Macroeconomic implications of fixed and variable-rate mortgages</b>	<b>91</b>
	Volatility in the housing market and in the wider economy	91
	The sensitivity of the UK economy to interest rate changes	97
	The impact of interest rate changes under alternative forms of mortgage finance	100
	Implications for monetary policy	113
<b>Section 7.</b>	<b>Conclusions</b>	<b>115</b>
<b>Annex A</b>	<b>Consultation list</b>	<b>117</b>
<b>References</b>		<b>121</b>

# Letter to the Chancellor of the Exchequer

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The Rt Hon Gordon Brown MP  
Chancellor of the Exchequer

*Dear Chancellor*

In April 2003 you asked me to:

- undertake analysis of supply and demand side factors limiting the development of the longer-term fixed-rate mortgage market in the UK to establish why the share of longer-term fixed-rate mortgages is so low compared to the United States and many other EU countries;
- consult with key stakeholders to establish views and inform analysis;
- examine whether there has been any market failure that has held back the market for longer-term fixed-rate mortgages and consider associated opportunities, risks and potential costs; and
- deliver an interim report by autumn and a comprehensive report and recommendations by Budget 2004.

My Interim Report is attached. In it I analyse why there is little mortgage lending in the UK at rates fixed for more than a few years – the overwhelming part of mortgage lending in the UK is either at variable rates or at rates fixed for no more than a couple of years. I assess whether there are obstacles to the development of a larger market in mortgages where interest rates are fixed for longer periods than is currently common. My Interim Report assesses whether there are factors that might be preventing the emergence of a thicker market in types of mortgages that would bring benefits to both borrowers and lenders. My Final Report, which you will have by the next Budget, will make recommendations on how obstacles can be removed.

This report does not pre-suppose that mortgages where interest rates are fixed for ten years or more are intrinsically superior to mortgages where rates vary in ways that borrowers cannot predict. Nor does it pre-suppose that there is some form of market failure in the UK. Fixed-rate mortgages have different risk characteristics to variable-rate mortgages. The report begins by analysing those characteristics in Section 2. It finds that for many households – particularly those borrowing a great deal and those whose incomes are uncertain (a group likely to contain a significant proportion of first-time buyers) the advantages of fixing the level of repayments for several years are substantial. Yet few of such households take out longer-term fixed-rate mortgages. Three factors play a major role in accounting for this:

- First, there is evidence that when choosing between mortgages a great many households attach enormous weight to the level of initial monthly repayments. Consideration of where short-term interest rates might move in the future seems to play a far smaller role than it would if households considered the likely overall costs of borrowing over the life of a loan.
- Second, most borrowers have a poor understanding of risk. On average longer-term fixed-rate mortgages are likely to have interest rates slightly above those on variable-rate products because the yield curve, on average, is likely to slope gently upwards. But the

added certainty over the profile of payments is worth something – it can give homeowners insurance against the impact of unexpected changes in the level of interest rates. Unexpected rises in interest rates can cause hardship for homeowners and in the extreme lead to repossession. If risk is not well-understood by households, as I believe it is not, this will not be appreciated. Currently, the information and advice given to consumers during the sales process often does not help them much in understanding risk. These two factors are discussed in Section 3.

- Third, the structure of mortgage pricing means that for new borrowers variable-rate products and short-term (two-year) fixed-rate mortgages look very much cheaper than longer-term fixed-rate products. This is not an indication that longer-term fixed-rate mortgages are excessively expensive. On the contrary, some lenders offer longer-term fixed-rate mortgages that are very competitively priced at tight margins over the relevant cost of funds. But discounted variable-rate mortgages and short-term fixed-rate deals are available from many lenders at rates that are probably beneath the cost of funds. These deals are feasible for many lenders because other borrowers – existing customers – are paying Standard Variable Rates that are far in excess of the cost of funds. This cross-subsidisation is, in itself, an undesirable feature of the market in the UK. It has, as a by-product, meant that longer-term fixed-rate mortgages *appear* expensive when judged against the initial cost of many discounted variable-rate deals available to new borrowers. This factor is discussed in Section 4.

These factors have a major impact upon the pattern of borrowing. But they should not be taken as a sign that lenders operate in an uncompetitive market. In fact the market for new lending is highly competitive. Indeed the prevalence of cross-subsidisation is a reflection of those pressures; many lenders probably feel compelled to offer products with very low initial levels of mortgage payments since if they did not they would lose market share in new lending.

It is not the message of this report that the UK mortgage market is deeply and fundamentally flawed. Yet the evidence for the three factors listed above seems to me to be strong. It would be strange to accept that evidence and maintain that the UK mortgage market is the envy of the world. There is no evidence of classical anti-competitive behaviour, but I am concerned that some features of the market are not working as well as they should and in the interests of all borrowers. In addition to my continuing consultation with market practitioners and others, I now intend to have detailed discussions with the FSA and the OFT. In the light of these discussions I will consider whether in my Final Report I should include among my wider recommendations, a recommendation for action from the FSA or the OFT under their respective powers.

Whether a deeper market for longer-term fixed-rate mortgages will emerge will depend on how the three factors listed above can be changed, something that I will consider in my Final Report.

It will also depend on the efficiency with which lenders are able to tap the savings markets. The central issue here is the cost of raising funds to finance longer-term fixed-rate mortgages in a way that makes risk willingly and knowingly held. Many factors will bear on that fundamental issue. They are considered at length in Section 5 of this report. The nature of new regulations on capital adequacy of financial institutions (the Basle II proposals) may affect the cost of different funding mechanisms and the pricing of different types of mortgage. The liquidity in markets for interest rate derivatives will be a factor. The accounting treatment of positions that lenders take in derivatives to handle interest rate risk will influence the strategies and cost of various techniques to fund longer-term fixed-rate lending. Opportunities available to lenders in the UK to fund mortgages by issuing certain forms of debt (covered bonds) may be influenced by the UK legal framework. The initial

limited extent of data on prepayment behaviour will affect pricing. Legislative limits on building societies may come to pose problems for some lenders. Certain sorts of redemption charges on fixed-rate mortgages may be hard to enforce, even though they could be useful for both lenders and borrowers. These issues are analysed in this Interim Report. In the light of on-going consultation on these funding issues, specific recommendations will follow in my Final Report.

The way in which households choose mortgages, and the way mortgages are priced and funded, is the focus of the first five sections of this report. It is in the light of that analysis of the microeconomics of the market that macroeconomic issues are considered in this Section 6. It is natural that an assessment of the overall economic impact of the structure of housing finance, and of how it might change were there to be more lending at longer-term fixed-rates, should follow my analysis of how decisions are made by individual households, financial advisors and lenders. The tendency that households have had in the UK to focus on the initial cost of mortgages, and the pressures that lenders have felt from this to compete by offering deals with artificially low initial costs, have adverse aggregate implications. In the last part of this report those aggregate implications are examined.

I find that house prices are unusually sensitive in the UK to temporary movements in short-term rates of interest. That sensitivity has implications for how monetary policy operates. It means that a given change in short-term interest rates has had much of its effect through the impact it has on the housing market. This is a two-edged sword. It means that the impact of a change in rates set by the central bank is likely to be stronger than it would be if a high proportion of mortgages were at longer-term fixed rates. It also means that when conditions in the UK housing market are either far more buoyant, or far more depressed, than conditions in the wider economy the central bank faces a difficult problem: a rate change that would be desirable in its overall impact upon the economy might become undesirable precisely because of the sensitivity of housing market conditions to temporary changes in the short-term interest rates. Demand in the economy can become seriously unbalanced and volatility in the housing market can be increased as a result of the excess sensitivity of the housing market to temporary changes in short-term interest rates.

This can generate problems for the central bank. Clearly the Bank of England pays a great deal of attention to conditions in the UK housing market. Given the volatility in those conditions there have probably been occasions when the level of short-term interest rates that might have been judged appropriate given the overall level of demand in the economy has been different from the level of rates chosen because of the state of the housing market. The sensitivity of the housing market in the UK to short-term interest rates may at times exacerbate imbalances in the economy. Were the UK to adopt the euro it is obvious that the European Central Bank would, quite rightly, not attach as much weight to conditions in the UK housing market as the Bank of England is able to do now. The problems that might arise from this are likely to be much reduced if households in the UK were encouraged and helped to take a more forward-looking approach to assessing how much to borrow and what house they can afford to buy. That is something that is clearly desirable in its own right, whatever the decision on the euro.

I do not believe there is a tension between the factors that will guide my recommendations on the UK mortgage market and the issues raised by the possible adoption of the euro. Many of the factors that I believe have made the take up of longer-term fixed-rate mortgages in the UK so low are factors that make the UK market work less well than it could. It is those factors that my final recommendations will seek to address. Addressing those issues is desirable in and of itself. Doing so will also, I believe, generate fewer monetary policy problems, whether or not the UK adopts the euro.

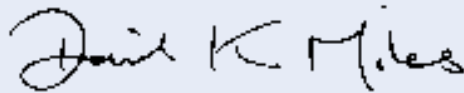
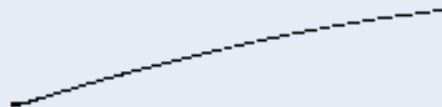
**Consultation:**

In writing this Report I have had extensive discussions with a wide range of organisations and individuals, both in the UK and in other countries. A list of those with whom I have had discussions is given in Annex A to this report. These meetings with lenders, regulators, financial advisors, central banks, investors, investment banks, academics and trade associations have contributed enormously to this Review. In the process of writing my Final Report and forming my recommendations I will continue to consult widely.

**Acknowledgements:**

Finally, I would like to thank the members of my team who have worked closely with me on this report. Ana Lasasosa, Andrew McKay and Adrian Richards have worked with great skill and dedication. I am pleased they will continue to help me in preparing my Final Report.

Yours sincerely,

A handwritten signature in black ink that reads "David K Miles". The signature is written in a cursive style with a large initial 'D'.

David Miles  
December 2003

# 1

## Aim and scope of the Review

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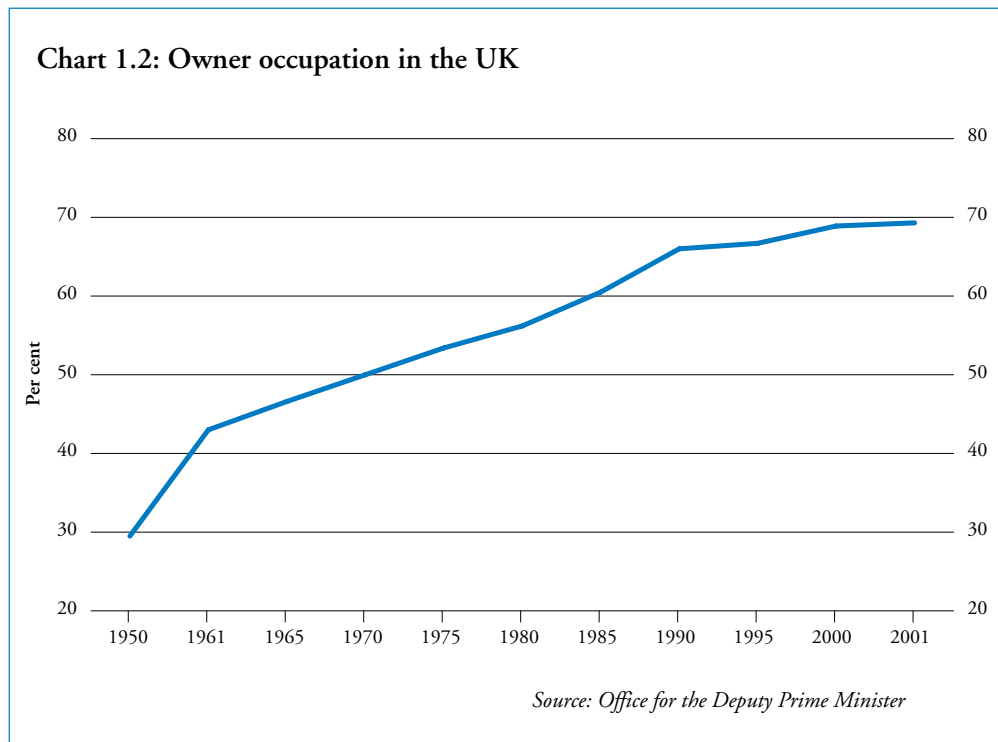
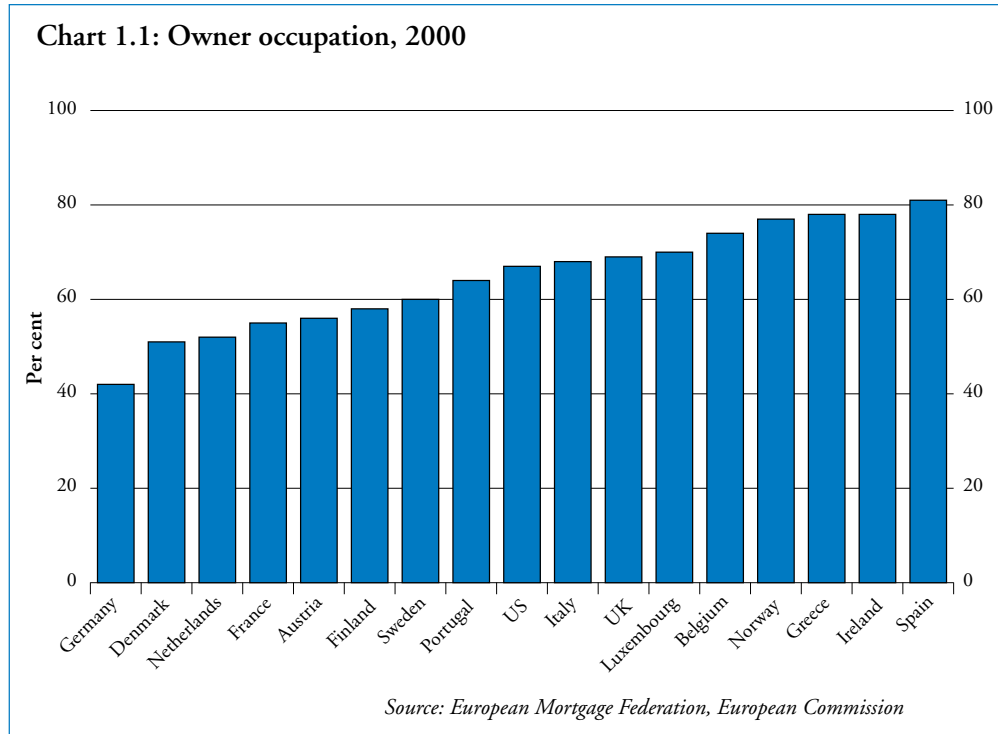
1.1 Unlike in many other developed economies, in the UK there is very little mortgage debt that is at interest rates fixed for more than a few years. The aim of this Review is to understand why this is so, and assess whether there are obstacles to the development of a larger market in mortgages where interest rates are fixed for longer periods than is currently common. It may be that there are no obstacles and that the heavy reliance upon variable-rate mortgages is optimal given the current structure of the UK economy. The purpose of this Interim Report is to present evidence on this fundamental issue. It assesses whether there are factors that might be preventing the emergence of a thicker market in types of mortgages that would bring benefits to both borrowers and lenders. A Final Report will be presented around the time of the next Budget. That report will make recommendations on how any obstacles to the development of a thicker market in longer-term fixed-rate mortgages can be removed.

1.2 This report does not presuppose that fixed-rate mortgages are superior to variable rate mortgages. Their risk characteristics are different, as is the way such mortgages are funded and priced – all factors that the Review will analyse in detail. Nor is there any clear line that separates variable and fixed-rate mortgages. Rates can be fixed for varying periods so that in terms of the degree of certainty over the future profile of nominal payments there is a continuum of types of mortgage. The UK is currently at one end of that spectrum with a large stock of mortgage debt whose servicing costs are more sensitive to movements in short-term interest rates than in most countries. The purpose of this Interim Report is not to map out a road which might take the economy to a particular end point on that spectrum. Rather, it is to assess whether the market for mortgages operates in as efficient a way as it might. The aim is to explore ways that the market can be made to work better. How markets function depends upon the legal, regulatory and fiscal structure. The scope for government to do good by improving that structure – and to do harm by making it worse – is substantial. The Final Report of the Review will set out recommendations on how that structure can be improved.

### **AN OVERVIEW OF THE UK MORTGAGE MARKET**

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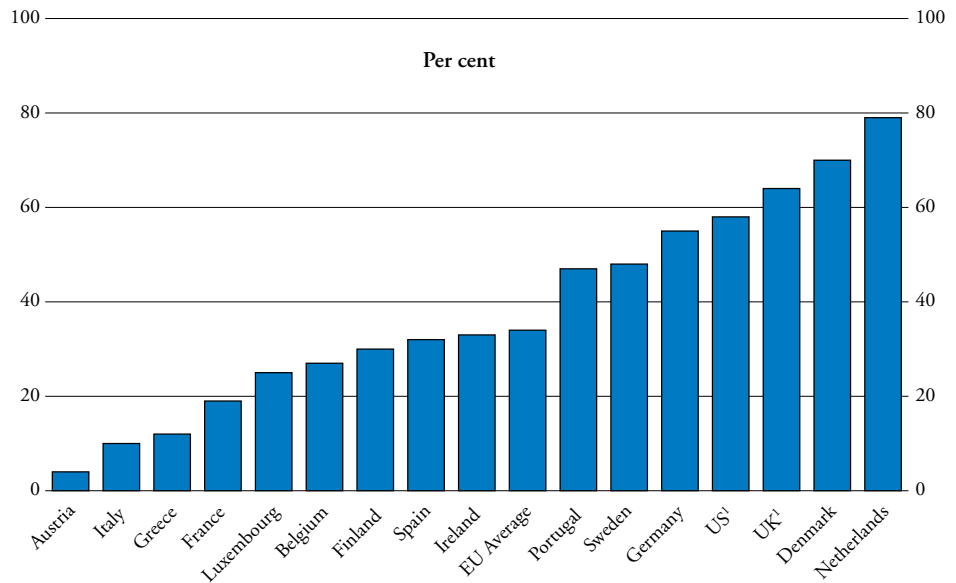
1.3 The UK mortgage market is large and the market for new lending is highly competitive; there is great diversity in the types of lending and in the sources of funding. In very many ways the UK mortgage market has served the economy well. The UK has an above average level of owner-occupation amongst developed economies (Chart 1.1). Homeownership has been rising for fifty years and is not confined to the relatively well-off (Chart 1.2). Mortgages are offered by a large number of lenders who finance loans from a diverse pool of savings.



1.4 Charts 1.3-1.6 show the stock of mortgage debt and the proportion of borrowing which is at fixed rates in the UK and in other developed countries. Several features stand out from the tables and charts. First, the UK has a large stock of mortgage debt relative to GDP. Second, an unusually large proportion of that debt is at variable rates of interest (or at rates of interest which are fixed for only a few years). Countries that are, in many other respects, very similar to the UK – in terms of GDP per capita, demographic and industrial structure, the degree of development of

capital markets – have very different housing finance systems. The differences revealed in Chart 1.4 are particularly marked. In the UK around 90 per cent of new mortgage lending is currently either at variable rates or at rates fixed for no more than a few years. The stock of outstanding mortgages is overwhelmingly made up of mortgages where rates are variable or fixed for no more than two or three years. At times in recent years the flow of new lending on mortgages with rates fixed for some period has been high – sometimes over 50 per cent (Chart 1.6). But a very large proportion of such loans have rates fixed for only two years and there is little lending where rates are fixed for more than five years.

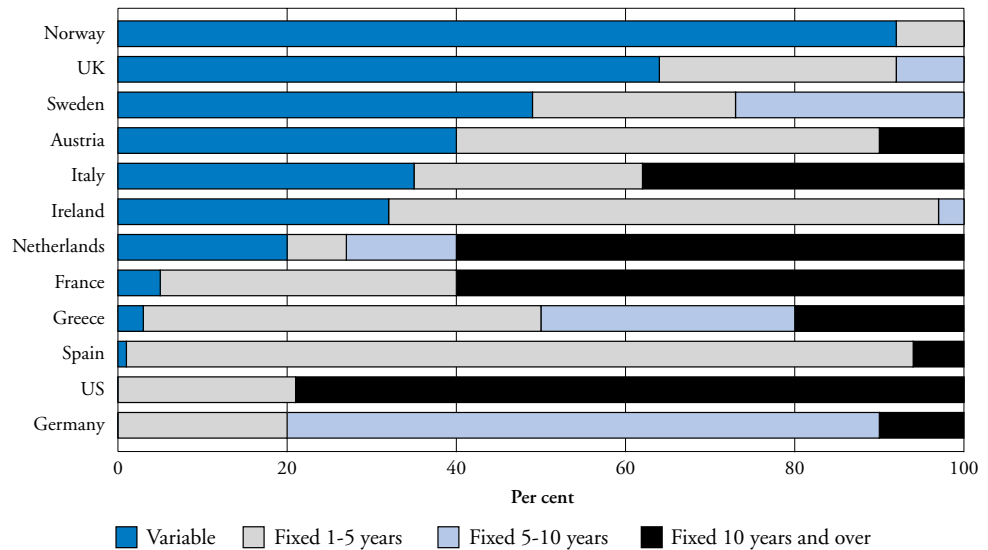
**Chart 1.3: Ratio of outstanding residential mortgage debt to GDP, 2001**



<sup>1</sup> 2002

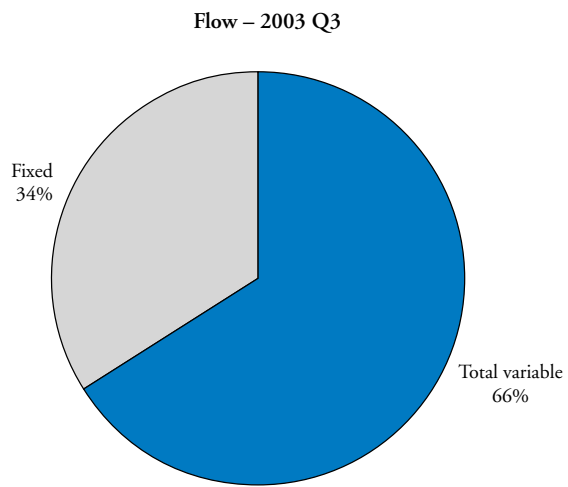
Source: European Mortgage Federation, Federal Reserve (US)

**Chart 1.4: Interest rate applicable on new mortgages, 1999**



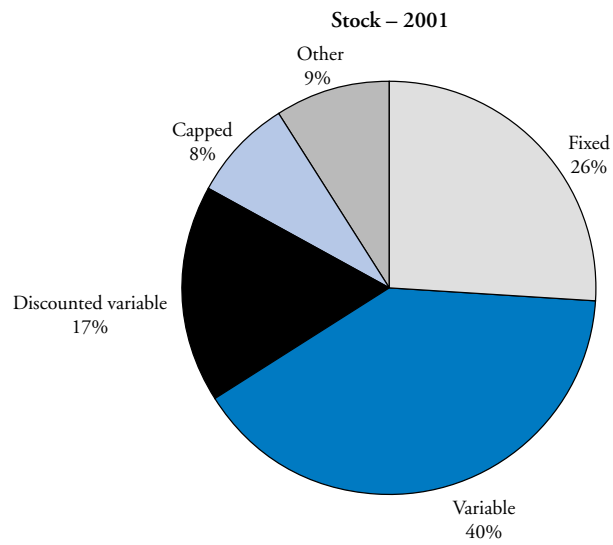
Source: European Mortgage Federation, Federal Reserve (US)

Chart 1.5a: Proportion of mortgages fixed or variable

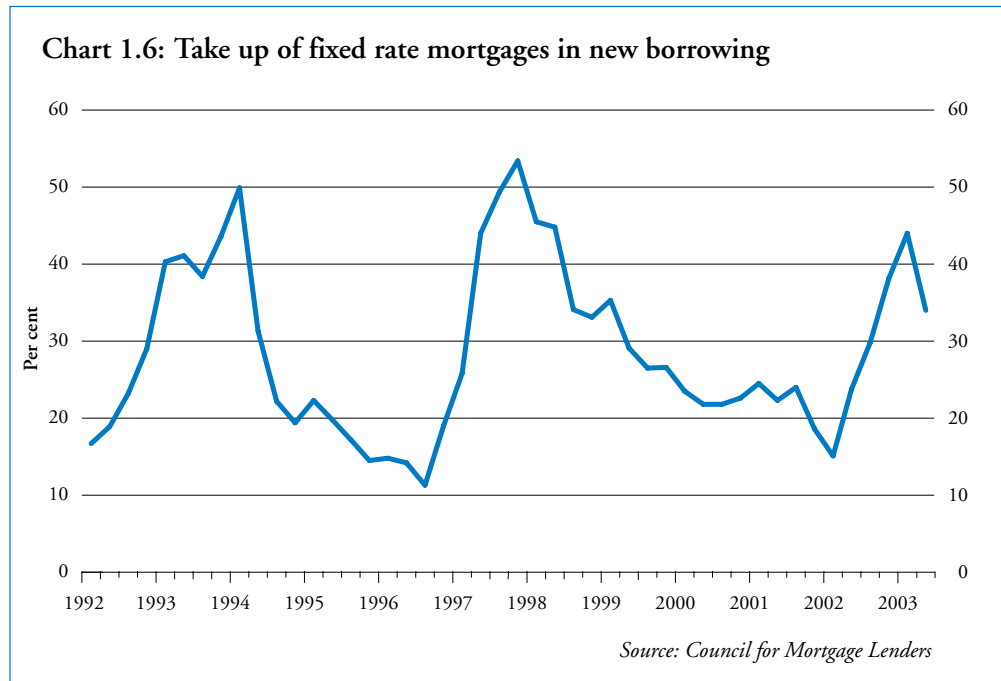


Source: Council for Mortgage Lenders

Chart 1.5b: Proportion of mortgages fixed or variable

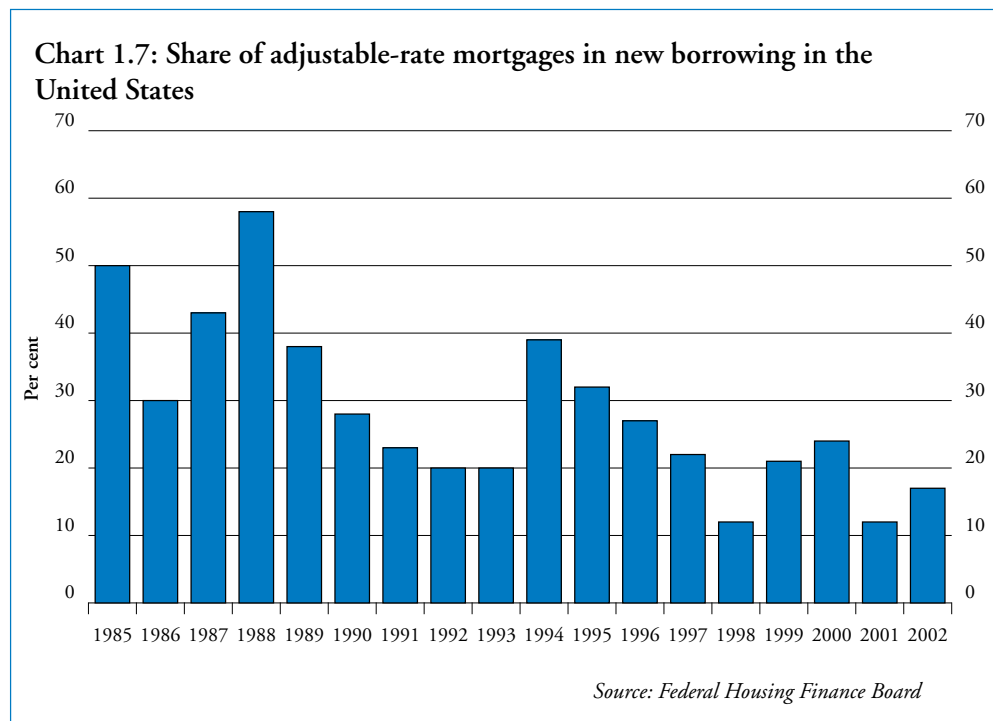


Source: Council for Mortgage Lenders



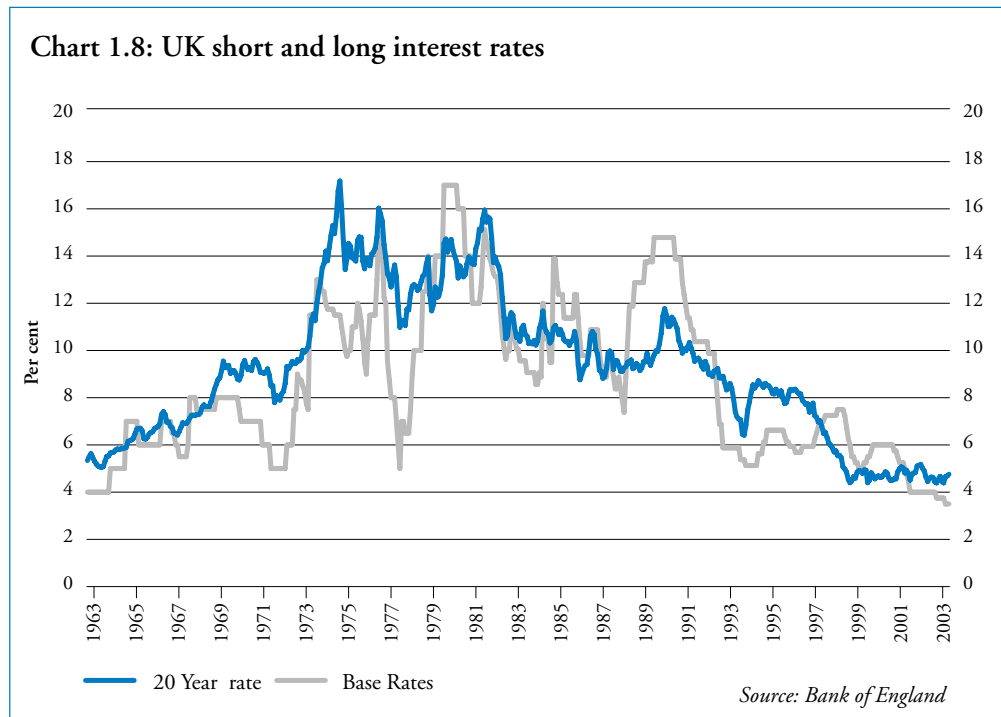
1.5 Although at times the share of variable-rate mortgages has risen in some other countries that have historically seen the great part of lending at long-term fixed rates, the contrast with the UK remains sharp. In fact it is often misleading to compare what appear to be variable-rate mortgages in many other countries with UK variable-rate mortgages. In the UK, interest rates on variable-rate mortgages can be reset often and will tend to move when the central bank changes its repo or base rate (with base rate tracker mortgages this adjustment becomes automatic). In the US, adjustable-rate mortgages (ARMS) are a type of variable-rate lending and one that has, at times, been popular. In fact ARMS and hybrid ARMS are really a form of shorter-term fixed-rate lending: rates are often only reset once a year and then can usually only be changed up to a certain maximum amount in any one year (annual caps are typically between 1 per cent and 2 per cent); there is often also a limit on the amount by which the rate can move from its initial rate at any point over the term of the mortgage. Hybrid ARMS – although often considered a form of variable-rate lending in the US – have an initial fixed rate period which can be several years. In Denmark – which, like the US, is a country where the dominant mortgage product has been a long-term fixed-rate loan – adjustable-rate mortgages are also available. However, as in the US, it is normal for these types of mortgage to have rates move only with an agreed frequency – often once a year, though the prevalence of three and five year re-sets is growing.

1.6 Even in the US the trend has, over the longer term, clearly been away from adjustable-rate mortgages, as Chart 1.7 reveals.



1.7 The differences between the UK system of housing finance and those in many other countries are therefore significant. Such differences reflect many forces, but one factor that seems implausible as an explanation of cross-country differences is substantial variation in the average degree of risk aversion of households. It does not seem very plausible that UK households prefer to take on mortgages with an unusually high degree of uncertainty about the profile of nominal mortgage payments because, on average, they have very different attitudes to risk than households in the USA or Germany or Denmark (three countries where longer-term fixed-rate mortgages are the norm). It is not plausible that UK households are more willing to accept uncertainty about the profile of monthly repayments because they are less concerned about certain sorts of risk than US households.

1.8 How much uncertainty UK households accept as a result of holding largely variable-rate mortgages, and what the average cost implications of this are, depends upon the pattern of interest rates and the amounts borrowed. Tables 1.1, 1.2 and Chart 1.8 show that the behaviour of short-term and longer-term interest rates is different. 20 year gilt yields have been less volatile than short rates (either base rate or three month LIBOR) though all rates have moved very substantially over the past 40 years. The volatility of the month-to-month change in nominal rates varies substantially over time; it was far higher in the 1980s than in the 1990s. The period since 1997 has been one of unusually low volatility in short and long rates. The volatility of the change in short-term nominal interests rates is generally higher than the volatility of the change in longer-term nominal rates, but the last five years has been a period of exceptional low volatility in short rates. Short and long rates tend to move in the same direction, but longer rates typically move less than short rates.



**Table 1.1: Volatility of the monthly change in long-term and short-term nominal interest rates in the UK**

	20 year <sup>1</sup>	10 year <sup>1</sup>	5 year <sup>1</sup>	Base rate	Overall average mortgage rate <sup>2</sup>
<b>1963–2003</b>					
Largest monthly increase	1.38			4.38	2.5
Largest monthly decrease	-1.59			-2.5	-2
Average monthly change	0			0	0
Standard Deviation of changes	0.35			0.62	0.38
Average level	9.24			8.63	9.51
<b>1963–1972</b>					
Largest monthly increase	0.72			2	0.88
Largest monthly decrease	-0.72			-1	-0.5
Average monthly change	0.04			0.04	0.02
Standard Deviation of changes	0.19			0.41	0.14
Average level	7.48			6.31	7.38
<b>1973–1982</b>					
Largest monthly increase	1.38			4	2.5
Largest monthly decrease	-1.59			-2.5	-2
Average monthly change	0.01			0.01	0.01
Standard Deviation of changes	0.55			0.91	0.56
Average level	13.39			11.73	11.71
<b>1983–1992</b>					
Largest monthly increase	0.74	1.36	1.8	4.38	2.44
Largest monthly decrease	-1.01	-1.15	-1.18	-1.5	-1.19
Average monthly change	-0.02	-0.03	-0.02	-0.03	-0.01
Standard Deviation of changes	0.31	0.39	0.47	0.72	0.48
Average level	10.05	10.19	10.25	11.09	12.24
<b>1993–2002</b>					
Largest monthly increase	0.64	0.7	0.82	0.5	0.31
Largest monthly decrease	-0.6	-0.62	-0.63	-1	-0.44
Average monthly change	-0.04	-0.03	-0.03	-0.02	-0.03
Standard Deviation of changes	0.21	0.25	0.27	0.2	0.12
Average level	6.38	6.38	6.31	5.78	6.95
<b>June 1997–2003</b>					
Largest monthly increase	0.31	0.46	0.44	0.25	0.31
Largest monthly decrease	-0.53	-0.62	-0.57	-0.5	-0.39
Average monthly change	-0.04	-0.04	-0.04	-0.03	-0.03
Standard Deviation of changes	0.17	0.21	0.23	0.17	0.12
Average level	5.03	5.12	5.29	5.52	6.38

<sup>1</sup> Yield on UK government securities.

<sup>2</sup> Up to January 1984, the series is the Building Society Association recommended mortgage rate. From January 1984, the series is the Building Society average mortgage rate. The series is the weighted average of individual lenders own weighted average rates on their residential loan book. Therefore, the series is a weighted average of variable and fixed rates.

Source: Bank of England, Financial Services Authority, Building Societies' Association.

Table 1.2: Cross correlation of change in rates, 1982–2003

	20 year <sup>1</sup>	10 year <sup>1</sup>	5 year <sup>1</sup>	Base rate	Overall average mortgage rate <sup>2</sup> (lagged one month) <sup>3</sup>
20 year <sup>1</sup>	1				
10 year <sup>1</sup>	0.67	1			
5 year <sup>1</sup>	0.66	0.90	1		
Base rate	0.39	0.31	0.41	1	
Overall average mortgage rate <sup>2</sup> (lagged one month) <sup>3</sup>	0.32	0.17	0.23	0.56	1

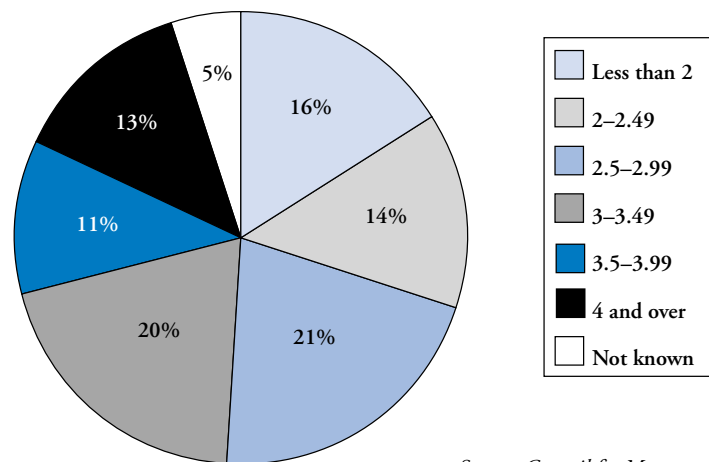
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<sup>3</sup> Lagged as lenders do not typically react immediately to changes in base rates.

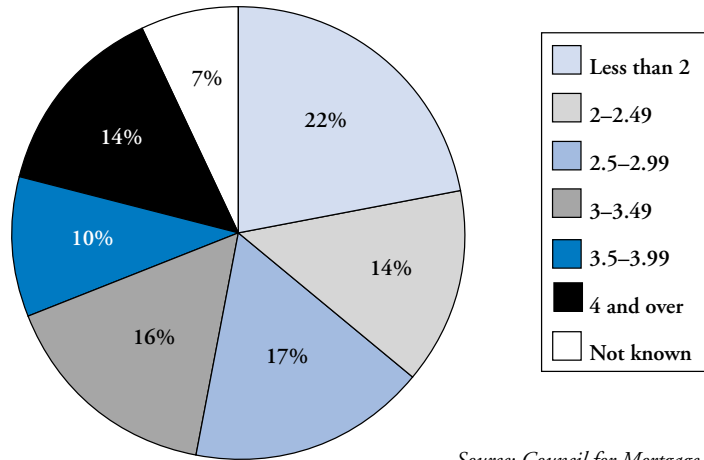
1.9 Lending for first-time buyers is often at three times gross income or more. Charts 1.9 and 1.10 show the distribution of loan-to-income ratios for first-time buyers and existing homeowners at 2003 Q3. At that time over 40 per cent of borrowers had a loan-to-income of three or more. Because of this, volatility in interest rates can generate big swings in the ratio of mortgage payments to income for many of those with variable-rate mortgages or who have mortgages with the rate fixed for only a few years. Charts 1.11 and 1.12 show that many UK households – particularly first-time buyers – borrow a high proportion of the value of their homes. Recently just over 40 per cent of first-time buyers borrowed 90 per cent or more of the value of their home in the UK. This fraction has fallen as house prices relative to income have climbed.

Chart 1.9: Income multiples for First-Time Buyers, 2003 Q3



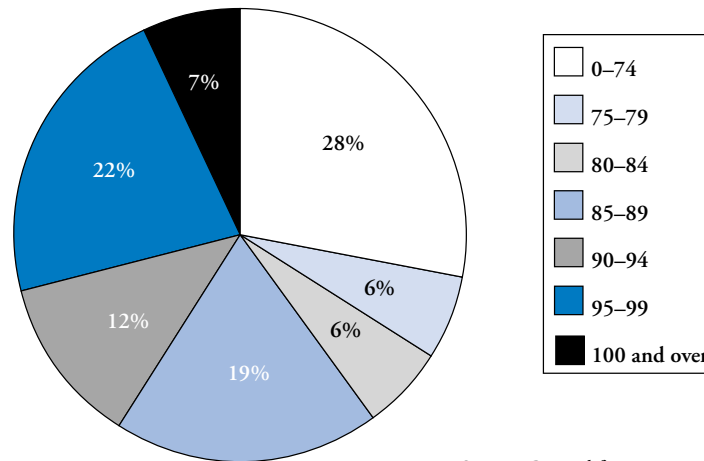
Source: Council for Mortgage Lenders

Chart 1.10: Income multiples for Movers, 2003 Q3



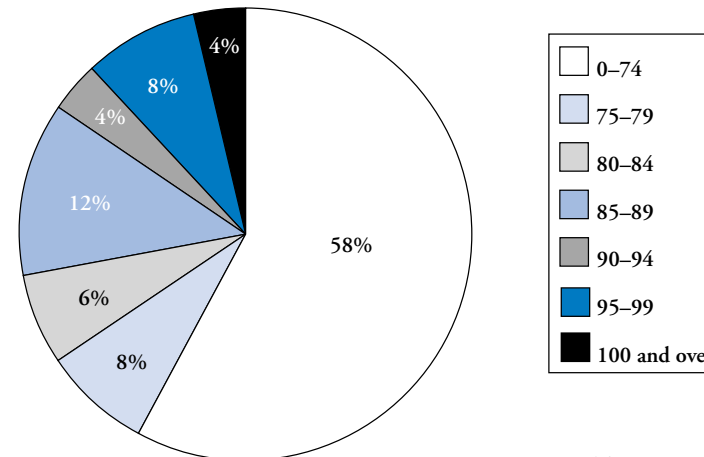
Source: Council for Mortgage Lenders

Chart 1.11: Distribution of loan-to-value ratios for new borrowing by First-Time Buyers, 2003 Q3



Source: Council for Mortgage Lenders

Chart 1.12: Distribution of loan-to-value ratios for new borrowing by Movers, 2003 Q3

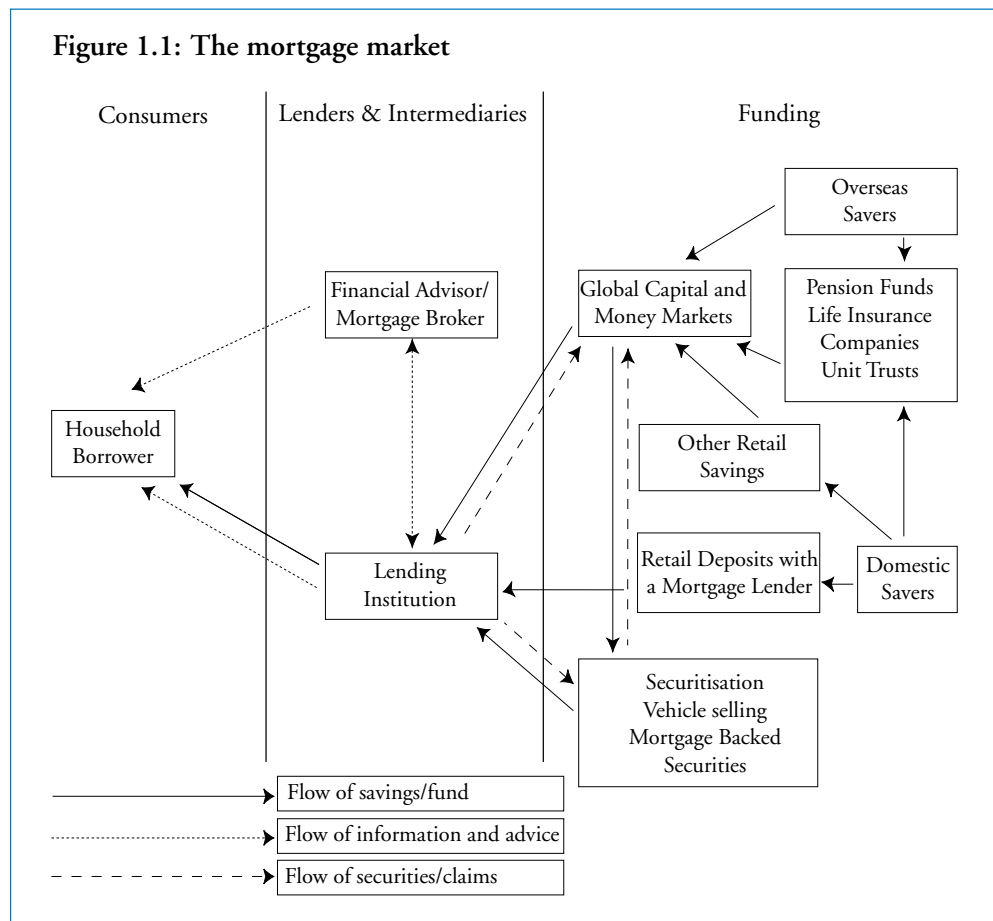


Source: Council for Mortgage Lenders

**1.10** In seeking to understand why UK households accept an above average degree of uncertainty about the path of nominal mortgage servicing costs the Review does not consider differences in the national appetite for risk convincing. Differences in the wider economic environment – the degree of volatility in incomes, prices, interest rates and their co-movement – are, however, certainly relevant to the type of mortgages that match households’ underlying preferences. How mortgages with different payment characteristics match preferences of households in an environment of uncertainty over inflation, incomes and interest rates is a subtle and complex issue. It is also fundamental to this Review and it is the natural starting point. It is the focus of section 2 of this report. The way in which households assess characteristics of mortgages, and the information and advice they are given about them, are also central to the choices actually made. A great deal of this interim report focuses on those issues.

## **UNDERSTANDING THE NATURE OF UK MORTGAGE DEBT – A GUIDE TO THE INTERIM REPORT**

**1.11** To understand the nature of the stock of mortgages held by households in the UK one needs to consider the entire mortgage chain. That chain is illustrated in Figure 1.1. At one end we have a household – someone wants to buy a house and finance some part of it by borrowing. At the other end, perhaps thousands of miles away, there is a saver – someone prepared to postpone consumption to a future date with the prospect of earning a return in the interim. In between the two there are a range of financial institutions, advisors and regulators. To understand how the pattern of mortgage borrowing evolves, each stage in the chain need to be analysed. In this Interim Report the way in which decisions are made at each stage of the process is considered. Section 2 considers the risk characteristics of different mortgages. Section 3 considers how households make decisions about the size and type of mortgage debt they take on. The focus here is on individual decision making: how decisions are made in the light of the information that households are presented with on different products, and given the prices of those products. This section also considers the way in which lenders and other intermediaries (including financial advisors and mortgage brokers) guide households’ in making decisions. In Section 4 the way mortgages are priced is considered. In Section 5 issues connected with the funding of mortgages are analysed. In Section 6 macroeconomic implications of the structure of housing finance are considered.



1.12 This report does not describe in detail the housing finance systems in a large number of other countries and then take a view on which is the best. While much can be learned from aspects of other countries housing finance systems, and the Review does draw upon evidence from many countries, the strategy of picking a “winning model” and then trying to make the UK look like it is deeply flawed. This Review does not follow that strategy.

1.13 The aim of this report is to assess whether at each stage in the mortgage chain in the UK there might be obstacles that make markets work less well than they might. The report does not pre-suppose that such problems exist. But in analysing the different parts of the market illustrated in Figure 1.1 evidence will emerge of features of the UK market that are problematic:

- Borrowers seem to attach excessive weight to the level of initial repayments on loans and pay too little attention to how the affordability of loans would be affected by changes in interest rates.
- Many borrowers seen to have a poor understanding of the risk characteristics of different types of mortgage.
- There is significant cross-subsidisation between different types of borrowers: many borrowers with discounted variable rate mortgages are being subsidised by existing borrowers paying higher Standard Variable Rates (SVR). This affects the demand for fixed-rate mortgages.
- The reason why redemption charges on fixed-rate mortgages exist is not well understood and can give rise to borrowers feeling they are being cheated if they are asked to pay them. Lack of financial awareness could make certain types of penalty – for example symmetric mark-to-market penalties – effectively unenforceable.

- Building societies may run up against legislative limits if wholesale funding or securitisation of mortgages emerged as the most effective means to fund fixed-rate mortgages.
- Accounting rules may make lenders uncertain over how hedging of certain types of interest rate risk can be done in a way that avoids significant fluctuations in reported profits.

1.14 A significant part of this report focuses on such issues. It is natural that it should. But it is not the message of this report that the UK mortgage market is fundamentally broken. It is not. The market is innovative, flexible and intensely competitive for new business. There is a wide range of products on offer including some longer-term fixed-rate mortgages. Figures 1.2 and 1.3 shows the results of a recent European Mortgage Federation survey on the mortgage markets of Europe<sup>1</sup>. In terms of the range of products on offer the UK ranks very high. But only a very superficial assessment of the market would draw the conclusion from this that the UK has the best of all possible market structures. What matters is how the range of products is priced and whether households are able to make informed decisions about them and not just what the range of products is. It is these issues that are central to the Review and a large part of the Interim Report is devoted to them.

Figure 1.2: Borrower type and mortgage purpose

Market	Loan To Value		Borrower								Purpose				
	Typical	Maximum	Young Household <30	Older Household >50	Low Equity	Self Certify Income	Previously Bankrupt	Credit Impaired	Self Employed	Government Sponsored	Second Mortgage	Overseas Holiday Home	Rental	Equity Release	Shared Ownership
Denmark	80%	80%	●	●	○	○	◐	◐	●	◐	●	●	●	●	●
France	67%	100%	◐	◐	●	○	○	◐	◐	●	◐	●	●	○	◐
Germany	67%	80%	●	◐	◐	○	○	○	●	◐	●	◐	●	◐	◐
Italy	55%	80%	◐	◐	○	○	○	◐	●	◐	●	●	●	●	◐
Netherlands	90%	115%	◐	●	◐	◐	○	◐	◐	◐	●	◐	●	●	◐
Portugal	83%	90%	●	◐	◐	○	○	○	●	●	●	○	●	○	●
Spain	70%	100%	●	◐	◐	◐	○	◐	●	◐	●	○	●	◐	○
UK	69%	110%	●	●	●	◐	◐	●	●	◐	●	●	●	●	●

Key ● Readily Available ◐ Limited Availability ○ No Availability

Note: Readily Available means that products are actively marketed with high public awareness. Limited Availability means that only a small subset of lenders provide this product, often with additional conditions, while No Availability means that no lenders surveyed offered the product.

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<sup>1</sup> Mercer Oliver Wyman (2003).

Figure 1.3: Product variation by country

	Market							
	Denmark	France	Germany	Italy	Netherlands	Portugal	Spain	UK
Rate structure								
Variable	●	●	●	●	●	●	●	●
Variable (referenced)	●	●	○	●	●	●	●	●
Discounted	○	●	○	◐	○	○	●	●
Capped	●	●	◐	◐	●	○	◐	●
Range of fixed terms (years)								
2-5	●	●	●	●	●	◐	◐	●
5-10	●	●	●	●	●	◐	◐	◐
10-20	●	●	●	◐	●	○	◐	◐
20+	●	◐	◐	◐	◐	○	◐	○
Repayment structures								
Amortizing	●	●	●	●	●	●	●	●
Interest only	◐	●	●	◐	●	○	○	●
Flexible	◐	●	○	◐	●	○	◐	●
Fee free redemption*	●	○	○	○	○	○	○	◐
Full yield maintenance fee*	●	◐	●	◐	●	◐	◐	◐

Key ● Readily Available    ◐ Limited Availability    ○ No Availability

\* On fixed rate products only.

Note: Readily Available means that products are actively marketed with high public awareness.

Limited Availability means that only a small subset of lenders provide this product, often with additional conditions, while No Availability means that no lenders surveyed offered the product.

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1.15 Many of the macroeconomic issues can only be assessed in the light of these microeconomic questions about how mortgages are priced and how households make choices. A concrete example of why this is so is helpful. The issue of whether the UK housing market has been more volatile because of the reliance upon predominantly variable-rate mortgages is a macroeconomic issue. But it can only be assessed in the light of how households make choices about mortgages. If households take out variable-rate debt, but do so in the light of an informed assessment of the likely future path of short-term rates, then the demand for debt and for housing will depend on the whole anticipated future path of short-term interest rates. Long-term interest rates are also likely to depend upon an assessment of future short rates. It follows from this that, *if we assume informed and forward-looking behaviour by households*, then housing demand and decisions on mortgage debt should depend on longer rates even though the interest on debt is set by reference to short-term (variable) rates. But if households have a tendency to make less well-informed or myopic decisions – if they attached too much weight to the current level of the variable mortgage rate and too little to where that rate might be in the future – then the demand for housing and mortgages would be more responsive to short rates than to longer rates. Since longer rates should be less volatile than shorter rates (as in fact they are) then demand for housing and debt would then be more volatile. House prices would also be more volatile. The implication of this is that any assessment of the macroeconomic effects of most mortgages being at variable rates should come after an assessment of the microeconomic issues. Analysis of how the effectiveness of monetary policy would change if a much larger proportion of debt were at fixed rates should also build on the microeconomics of the mortgage market. This is how this Interim Report is structured.



# 2

## Fundamental characteristics to borrowers of fixed and variable-rate mortgages

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2.1 Borrowers need to consider the overall cost of servicing debt over its life. Both the likely level of debt repayments, and the extent to which they move in line with the ability of households to service debt, matter. When the nominal interest rate on debt is fixed for several years, households know the money value of the repayments they will need to make. But they do not know the real value of those payments unless inflation is predictable. What is more relevant for many households is not the profile of real repayments (that is payments relative to prices in general) but the level of payments relative to their own income. Mortgages where the interest rate is fixed, in nominal terms, do not give certainty over the proportion of income that needs to be devoted to debt repayment. Variable-rate mortgage debt, where the interest rate is reset frequently in line with current market rates, also does not give certainty about the real value of repayments, and does not allow households to know what proportion of their income needs to be devoted to debt servicing. So neither fixed nor variable-rate mortgages get rid of uncertainty. Nor is it the case that fixed-rate mortgages are *necessarily* less risky than variable-rate mortgages. They both have risks, but those risks are very different. In this section the nature and scale of those risks is analysed. In later sections whether those risks are well understood by borrowers is considered.

2.2 With variable-rate mortgages the level of repayments, relative to households' income, will fluctuate as a result of movements in either short-term real interest rates *or* in inflation. If short-term real interest rates (that is the difference between the nominal interest rate and the rate of inflation) rise, then for households whose real income is unaffected by inflation the burden of repayments will increase. Furthermore, even if nominal interest rates increase in line with inflation, so there is no change in the real cost of debt, the burden of debt repayments will increase. This is so-called 'front-end loading' – the fact that the stock of real debt is repaid more rapidly in an inflationary environment.

2.3 Debt where the nominal interest rate is fixed for several years also generates an uncertain path of real servicing costs. If inflation and nominal interest rates were to fall significantly after a longer-term fixed-rate mortgage had been taken out, then the real costs of that debt would be higher. Assuming, once again, that households' real income is unaffected by movements in inflation, then the debt servicing cost for fixed-rate mortgages will be higher than expected if inflation falls in a way not anticipated in advance.

2.4 The relative risks of different types of mortgage therefore depend, in a complicated way, on the degree of uncertainty over future inflation, the degree of uncertainty over the level of real short-term interest rates and the extent to which incomes vary with inflation and real interest rates. An important factor for the risk of nominal fixed-rate contracts is also the ability of households to refinance. Some of the risk of fixed-rate contracts would be removed if households have the ability to refinance mortgages at low cost in the event that inflation and the level of nominal interest rates subsequently fall. The significant source of risk with long-term nominal fixed-rate mortgages is that inflation may subsequently fall to a very low level and stay there for an extended period. The ability to repay part or all of that debt a number of years into the future has a significant impact on the risk characteristics of fixed-rate mortgages.

### THE RISK OF VARIABLE AND FIXED-RATE MORTGAGES UNDER DIFFERENT SCENARIOS

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2.5 To illustrate the risk and cost characteristics of different mortgage contracts, various scenarios are considered that are relevant to the UK now. In each interest rate scenario we show what would happen to the debt-servicing burden for different types of mortgage. We focus on two types of mortgage: one where the nominal interest rate is fixed for the first ten years of the contract, and one where the nominal interest rate is reset at the beginning of each year. (The simulations also show the path of repayments for a mortgage where the rate is fixed for two years and then reverts to the variable rate). In all cases we consider simple repayment mortgages where the term of the mortgage is 25 years. (A brief annex spells out precisely how the calculations are made).

2.6 In the simulations a pattern of initial mortgage interest rates is used that broadly reflects UK mortgage contracts that were available in October 2003. We consider a nominal interest rate on variable-rate debt that is initially 4.5 per cent (1 per cent above the Bank of England repo rate of October 2003 of 3.5 per cent) and a ten year fixed rate of 5.3 per cent. The variable-rate figure used is substantially lower than the average Standard Variable Rate (SVR) at the start of October 2003 which was around 5.5 per cent. But discounted deals and tracker mortgages (linked to base rate) were available at rates well under 5 per cent. Figures from the Council of Mortgage Lenders (CML) show that the average variable-rate available for *new* borrowers in the three months to September was a little over 4 per cent; Bank of England figures show that the overall average rate on outstanding mortgage debt at variable rates was above five per cent. In using a rate of 4.5 per cent we are taking a figure closer to the value that new borrowers faced, many of whom were on discounted rates for an initial period. The ten-year rate figure of 5.3 per cent is the average of lenders' quoted rates reported in Moneyfacts in late September; that is also the average rate quoted on 10 year deals on the Financial Services Authority comparative tables for the first week of October.

2.7 We assume an initial loan to income ratio of three. (CML figures show that the median loan to income ratio of first time buyers in August 2003 was 2.94, and the corresponding figure in September 2003 was 2.91). The conservative assumption is made that households have no other debt besides their mortgage. For the variable-rate mortgage, and for the two-year fix where we assume the rate is also 4.5 per cent, the ratio of debt payments to gross income is 18 per cent under these assumptions. This is close to the average debt service ratio of first time buyers (ODPM figures show the average ratio of mortgage payment to income for first time buyers was 18.3 per cent for the second quarter of 2003).

2.8 Charts 2.1 to 2.6 show how the ratio between the repayments on mortgages and household income evolves over a ten-year horizon under different assumptions about what happens to inflation and to real interest rates. It is in this initial period of the 25-year mortgage that the risks are at their greatest. For a repayment mortgage, with an original maturity of 25 years, a significant proportion of the debt will be repaid after ten years. And, unless there has been persistent deflation in both nominal incomes and house prices, the stock of debt after ten years will be much reduced relative to the value of the house and to household income<sup>1</sup>. From the point of affordability, what happens to inflation and the real interest rates after 10 years is much less important than what happens in the first ten years.

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<sup>1</sup> If nominal interest rates are unchanged, inflation remains at 2.5 per cent and real income rises at 2 per cent a year then ten years after a repayment mortgage is taken out the ratio of the outstanding mortgage to income falls from three to around 1.4.

2.9 For variable-rate debt we assume that the margin of the interest rate over the repo rate (or base rate) set by the central bank stays at 1 per cent. For the purposes of these calculations we assume that if a household takes on a mortgage with a 10 year fixed-rate it does not subsequently refinance, even if subsequent movements in interest rates might make this profitable. One way to interpret this is to assume that redemption charges are set at such a level that refinancing is not optimal. (It is important to note that this assumption exaggerates the risk of the fixed-rate contract. It is common for most fixed-rate mortgages in the UK to allow some prepayments to be made at low cost – frequently early redemption charges fall to zero after some years, and even when they exist households often have some flexibility in running down debt).

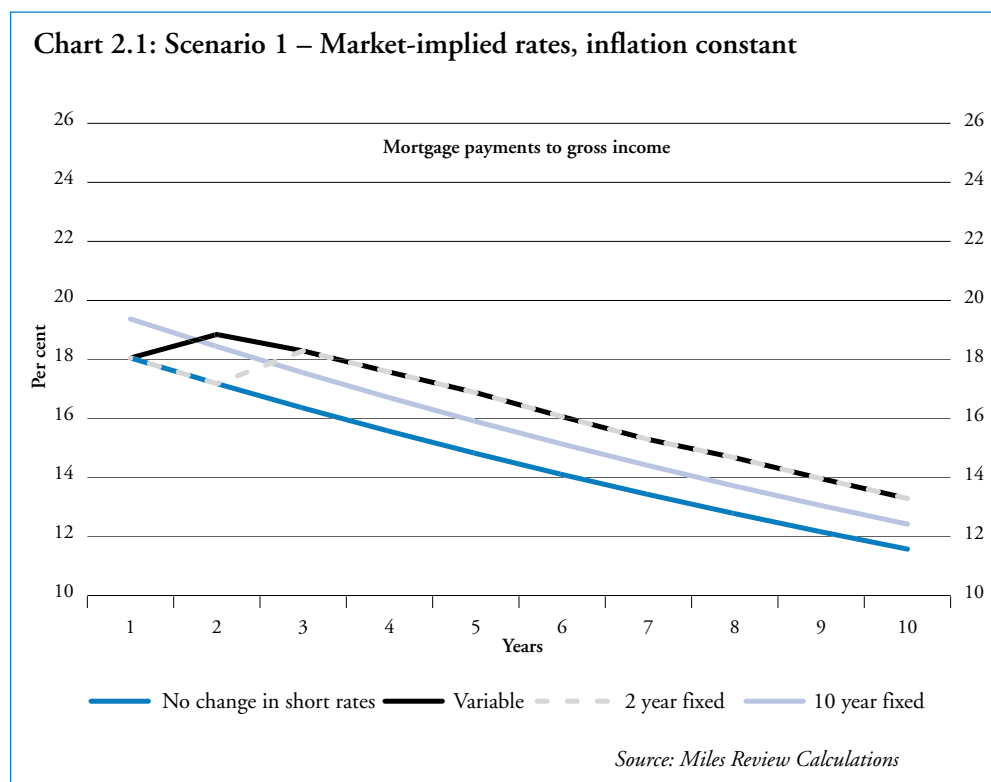
2.10 In each chart we show the evolution of the repayment burden (that is mortgage repayments as a proportion of income) under different assumptions about what happens to inflation and interest rates. It is assumed throughout that real incomes grow at a steady rate of 2.5 per cent a year and that households stay in employment – this means we are focusing on interest rate risk in isolation from risks to real household incomes. Table 2.1 summarises the assumptions that are common to all scenarios.

**Table 2.1: Common assumptions to all scenarios**

Real income growth	2.5 per cent
Ratio of loan to gross income	3 times
10-year fixed rate	5.3 per cent
Spread of variable rate over repo rate	1.0 per cent
Type of mortgage	Repayment
Term of mortgage	25 years

2.11 The charts illustrate the very different risk characteristics of fixed and variable-rate mortgages. One line on each chart always shows what the pattern of repayments on the variable-rate mortgage is if nominal interest rates stay at the level of October 2003 and inflation is permanently 2.5 per cent. Here we assume that the interest rates set by the central bank remains at an initial level of 3.5 per cent and that the interest rate on variable-rate mortgages is constant at 4.5 per cent. We label this line the “no change” path.

2.12 Chart 2.1 illustrates what happens if interest rates follow a path that was implied by forward rates in October 2003. These are the unadjusted forward rates calculated by the Bank of England from spot rates and reported daily. The implied forward rates for 8th October are used. At that time the market was implicitly anticipating some small and gradual increases in nominal interest rates. If those implicit forecasts were to turn out to be accurate then the variable-rate mortgage is initially cheaper than the fixed-rate one but marginally more expensive after three years. A combination of rising real incomes and steady inflation nonetheless keeps the profile of mortgage payments relative to incomes on variable debt fairly flat for a few years before steadily falling.

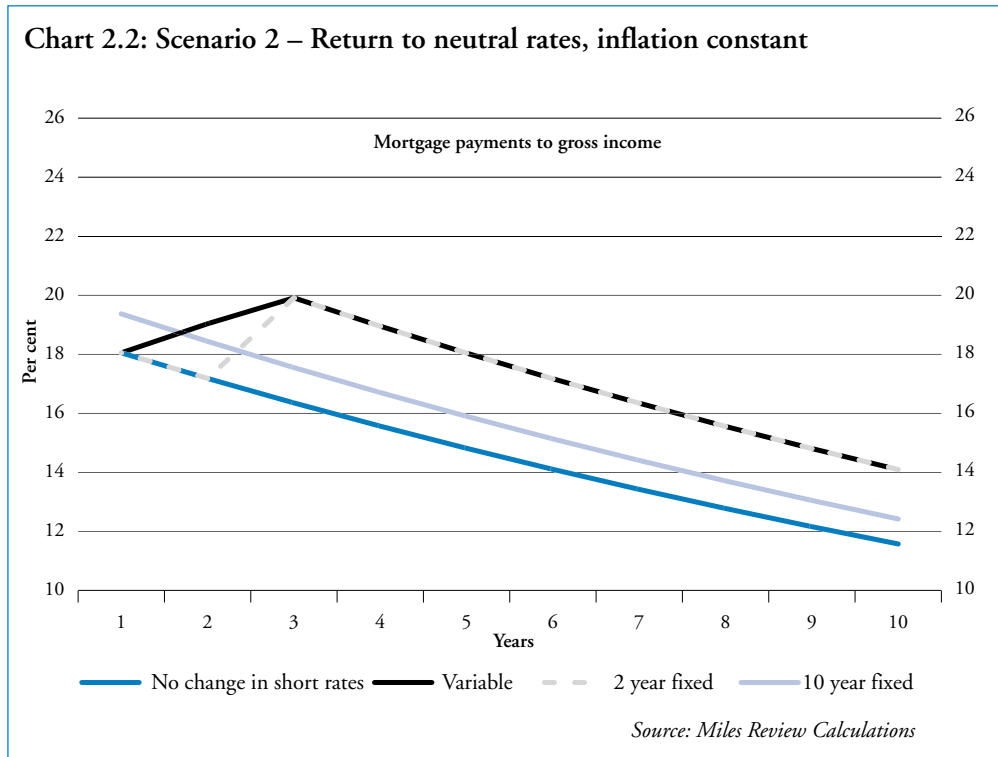


### Scenario 1: Market-implied rates, inflation constant

Year	1	2	3	4	5	6	7	8	9	10
Repo rate	3.5	4.6	4.8	4.9	4.9	5	5	5	5	5
Inflation	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Real rate	1	2.1	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5

**2.13** The next chart illustrates what would happen to the servicing burden of debt if repo rates set by the central bank were to move to a central estimate of the “neutral” level of 5.5 per cent over a two-year horizon. Most estimates of what neutral short-term nominal interest rates in the UK might be are somewhere between 5 per cent and 6 per cent. Members of the Monetary Policy Committee (MPC) in recent months have suggested that the neutral short-term nominal interest rate in the UK might be around 5.5 per cent. Recent analyses by economists at the Bank of England suggest that the neutral short-term real interest rate might be near 3.5 per cent, implying that if inflation stays at 2.5 per cent the neutral nominal interest rate is around 6 per cent.<sup>2</sup>

<sup>2</sup> MPC member Professor Stephen Nickell, giving evidence to the Treasury Select Committee on 13/06/02, suggested that the neutral short-term real interest rate was probably not far from 3 per cent. If inflation were to be steady at 2.5 per cent this implies a neutral nominal interest rate of around 5.5 per cent. MPC member Paul Tucker, in evidence to Treasury Committee on 22/05/02, said that he believed the neutral nominal interest rate was somewhere between 5 per cent and 5.5 per cent. Bank of England economists Larsen and McKewon (2003) estimate that the average neutral short-term real rate in the UK for the period from 1992 to 2002 was around 3.5 per cent. This suggests the neutral nominal rate might be close to 6 per cent.



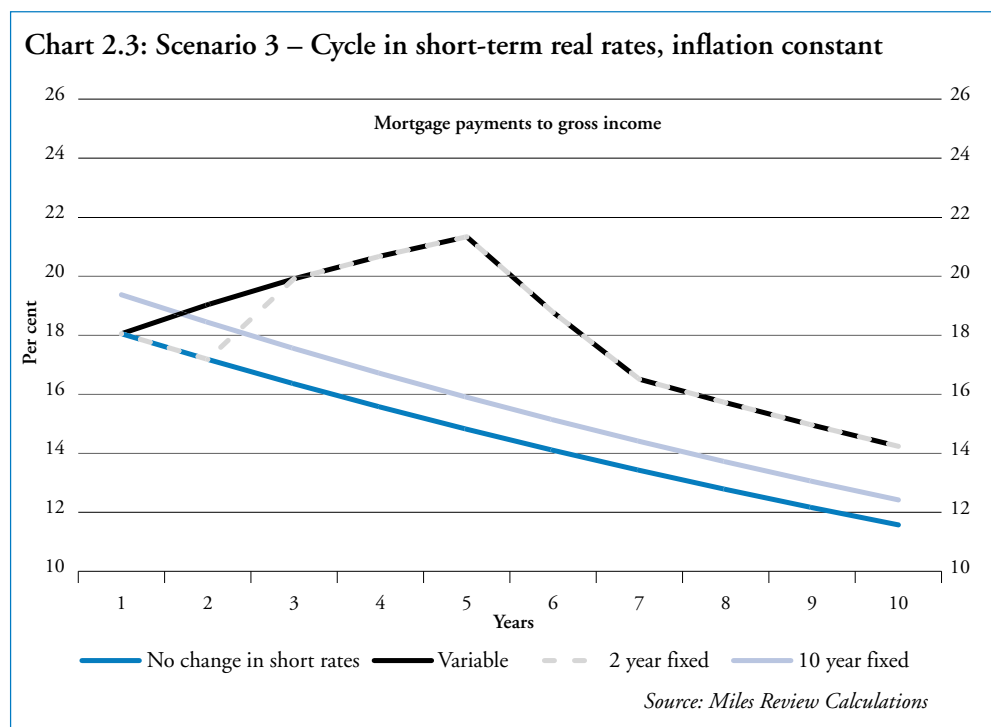
**Scenario 2: Return to neutral rates, inflation constant**

Year	1	2	3	4	5	6	7	8	9	10
Repo rate	3.5	4.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Inflation	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Real rate	1	2	3	3	3	3	3	3	3	3

2.14 Chart 2.2 shows that the increases in the debt-servicing burden of a variable rate mortgage with a gradual return over two years to an estimate of the neutral rate of 5.5 per cent is significant but not dramatic.<sup>3</sup> The debt-service burden rises from 18 per cent to 20 per cent after two years. Since there is no change in inflation the path of the debt-servicing burden of the 10 year fixed-rate mortgage is unchanged by the return to neutral rates. This path falls because nominal incomes rise by the sum of inflation and real growth

2.15 Scenario three (Chart 2.3) shows an alternative path to the estimated neutral rate of 5.5 per cent, but still at unchanged inflation. This illustrates a cycle in the path of the nominal rate which starts at 2 per cent below the neutral rate of 5.5 per cent, rises back to the neutral rate over a two year horizon, then rises to 2 per cent above the neutral rate (i.e. to 7.5 per cent) over the next two years before permanently falling back to the neutral rate two years after that. As before, inflation is assumed to remain at 2.5 per cent. Under this scenario the debt service burden of variable mortgages (and of the initial two-year fix) rises to just under 22 per cent after five years. The burden of the fixed-rate mortgage would then be around 16 per cent. The “no change” scenario shows that the burden of payments on variable-rate mortgages would have been around 15 per cent if base rate had stayed at 3.5 per cent.

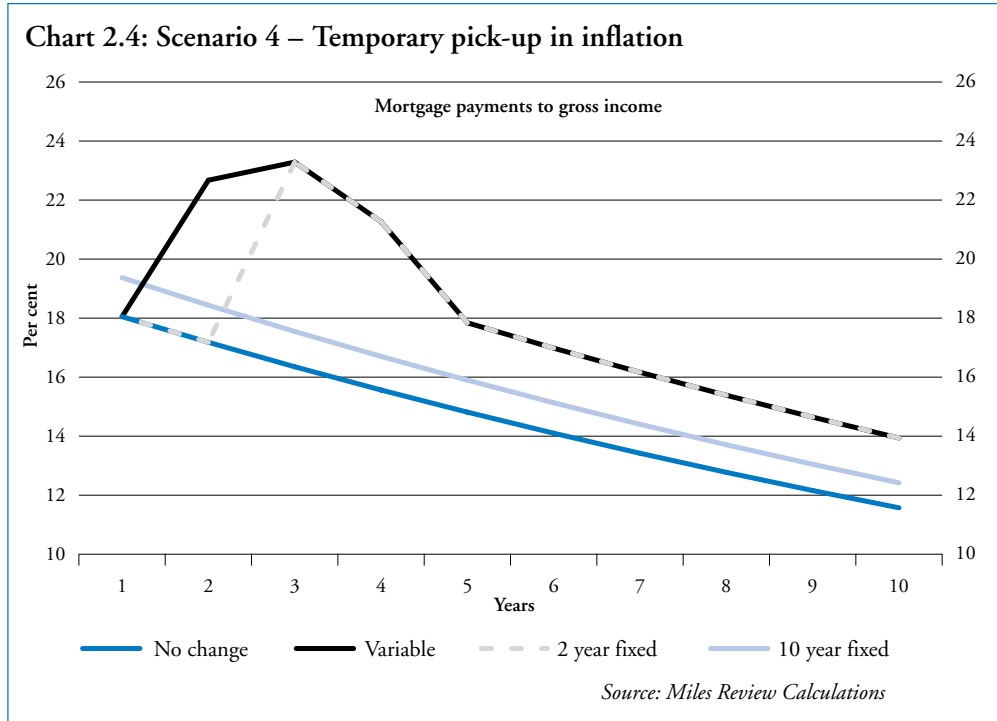
<sup>3</sup>The neutral nominal rate is actually calculated by assuming steady inflation of 2.5 per cent and that the real short-term neutral rate is 3 per cent. This generates a neutral nominal rate of  $100 \times [(1 + 0.025) \times (1.03) - 1] = 5.6$  per cent.



### Scenario 3: Cycle in short-term rates, inflation constant

Year	1	2	3	4	5	6	7	8	9	10
Repo rate	3.5	4.5	5.6	6.6	7.6	6.6	5.6	5.6	5.6	5.6
Inflation	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Real rate	1	2	3	4	5	4	3	3	3	3

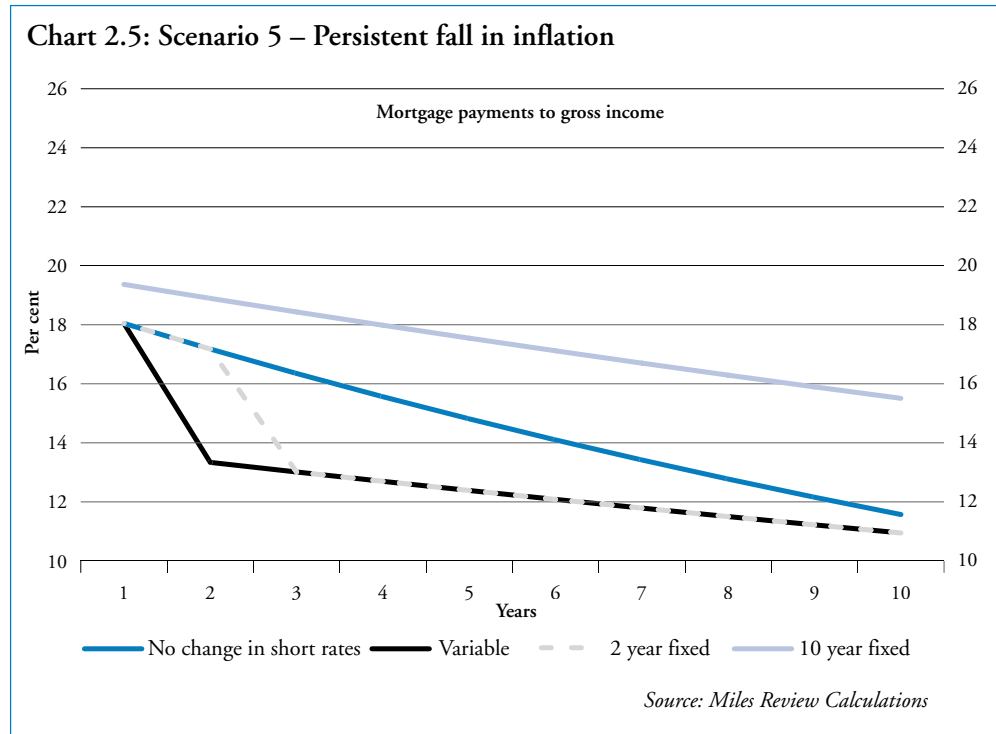
**2.16** The risk with variable rate mortgages would be far greater were there to be some pickup in inflation which prompted the central bank to increase nominal interest rates by enough to start bearing down on inflation. Scenario 4 (Chart 2.4) illustrates what happens to the debt service burden where inflation temporarily moves up from 2.5 per cent to a high of 4 per cent two years ahead. Monetary policy responds so that the short-term nominal interest rate moves up by more than inflation. This is what one might expect if the central bank needs to increase the real cost of debt so as to bear down on inflation. It is assumed that the real interest rate starts from an unusually low level of 1 per cent (that is a nominal interest rate of 3.5 per cent and inflation rate of 2.5 per cent) and then moves up both because inflation increases, and because the real interest rate needs to temporarily move above its assumed long-run neutral level of 3 per cent. It is important to note with this scenario that it does *not* represent a dramatic acceleration in inflation, merely a temporary movement in the pace of inflation above an initial rate of 2.5 per cent to a higher level of 4 per cent, which persists for only one year. As a result of this temporary and mild up-tick in inflation the real short-term rate of interest is increased by 0.5 per cent above its assumed neutral level (of 3 per cent) for a couple of years. The impact upon the debt servicing burden of variable-rate mortgages is now substantial. The servicing cost rises from an initial level of 18 per cent to just under 24 per cent. A survey undertaken by B&W Deloitte in 2003 for the FSA finds that average income gearing for families reporting it hard to make repayments on mortgage debt was 24 per cent (FSA, 2003c). Chart 2.4 illustrates that one does not need to predict a return to late 1980s style inflation for variable rate mortgages to generate very significant increases in debt repayment levels.



**Scenario 4: Temporary pick-up in inflation**

Year	1	2	3	4	5	6	7	8	9	10
Repo rate	3.5	6.6	7.6	7.1	5.6	5.6	5.6	5.6	5.6	5.6
Inflation	2.5	3.5	4	3.5	2.5	2.5	2.5	2.5	2.5	2.5
Real rate	1	3	3.5	3.5	3	3	3	3	3	3

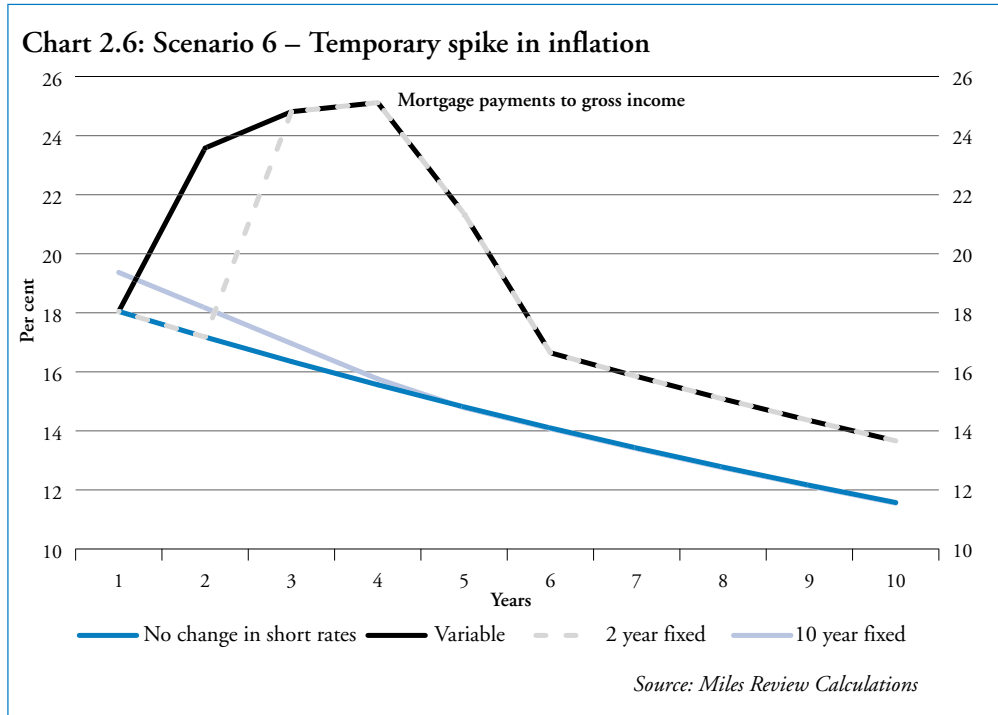
2.17 Fixed nominal interest rates generate their own risks. But these are very different. They are illustrated in Chart 2.5. This shows what happens to the debt service burden if inflation and interest rates fall significantly and permanently after a household has taken out a 10-year fixed-rate mortgage. We show what happens when the level of inflation, initially running at 2.5 per cent, falls to zero and stays there. Short-term nominal interest rates, which we assume start at 3.5 per cent, fall to 1 per cent and stay there. On this scenario the central bank keeps the short-term real interest rate consistently 2 per cent below the central estimate of the neutral real rate of 3 per cent. The chart shows that as a result the debt service burden of fixed-rate mortgages then declines only gradually. The gap between the costs of the fixed and variable rate mortgage becomes significant and long lasting. But there is no rise in the debt-servicing burden of the fixed-rate mortgage. Households that had taken out fixed-rate mortgages would feel they had missed out on much cheaper variable-rate deals if inflation fell to zero permanently; but they would not find that the burden of debt repayment increased – it just falls less rapidly than otherwise.



### Scenario 5: Persistent fall in inflation

Year	1	2	3	4	5	6	7	8	9	10
Repo rate	3.5	1	1	1	1	1	1	1	1	1
Inflation	2.5	0	0	0	0	0	0	0	0	0
Real rate	1	1	1	1	1	1	1	1	1	1

2.18 Finally we consider the implications of a short spike in the inflation rate. Scenario 6 is one in which the inflation rate rises to a peak of 5 per cent four years ahead. The *real* short-term interest rate is increased by 1.5 per cent above its neutral rate when inflation peaks. But this tightening in monetary policy is enough to bring inflation back down to 2.5 per cent within two years of the peak. This scenario is the flip side of the low inflation scenario, but is less extreme. Inflation gets up to 2.5 per cent above the central rate and the real interest rate goes up to 1.5 per cent above its assumed neutral rate. But this is temporary. Under the scenario of unexpectedly low inflation the inflation rate stays at 2.5 per cent below the central rate for ten years and the real rate is consistently 2 per cent below the neutral level. Chart 2.6 shows how great the cost is to those on variable-rate mortgages of the sharp spike in inflation. The debt service burden rises from 18 per cent to just under 26 per cent. This peak is reached 4 years into the mortgage deal. Mortgages with interest rates fixed for four years or less that switched into a variable rate would offer no protection at all against this sort of inflation spike. Indeed the increase in the burden would be worse because it would then be sudden.



**Scenario 6: Temporary spike in inflation**

Year	1	2	3	4	5	6	7	8	9	10
Repo rate	3.5	7.1	8.7	9.7	8.2	5.6	5.6	5.6	5.6	5.6
Inflation	2.5	4	4.5	5	4	2.5	2.5	2.5	2.5	2.5
Real rate	1	3	4	4.5	4	3	3	3	3	3

2.19 There is a notable asymmetry in the risk of fixed and variable-rate mortgages in the inflationary and deflationary environments. Scenarios 4 and 6 show that if inflation does pick up somewhat, albeit temporarily, the debt service burden of the variable rate mortgage can increase sharply. If inflation were to collapse to zero and stay there permanently, the debt service burden on the fixed-rate mortgage does not rise, though such mortgages would then turn out to be relatively expensive. If people are encouraged to view everything in terms of relative cost they will feel they have had a bad deal with the fixed-rate mortgage. But it is not relative cost that really causes hardship – people have to cut back on other spending, fall into arrears, and ultimately may face repossession because of rises in the cost of debt *relative to their ability to pay*. It is plausible that households would be more likely to run into problems if they had variable-rate mortgages and inflation rose than if they had fixed-rate mortgages and inflation fell, at least for the inflation and deflation scenarios that we have illustrated.

2.20 Empirical research on the causes of mortgage arrears and re-possession shows that rises in the ratio of debt servicing to income have a powerful impact. Box 2.1 summarises some of that research.

### Box 2.1: The impact of changes in debt servicing costs on arrears and repossessions.

Muellbauer and Cameron (1997) present an analysis of the determinants of the level of house possessions in the UK. They focus on the factors driving court possession orders and court actions and of the proportion of actions that are implemented. They find a powerful influence of changes in the debt-servicing ratio on possessions. Their measure of the debt service ratio is the product of the average tax adjusted mortgage interest rate and the average mortgage divided by average personal disposable income.

They find that a rise in the debt service ratio of 0.10 (which at the time of their analysis would have been caused by a rise in the average mortgage rate of 2 per cent) has the following impacts:

- a rise in the number of court actions initiated by around 21 per cent
- a rise, in the short run, in the number of court orders, for a given level of court actions, of about five per cent
- a rise in the proportion of court actions implemented of around 12 per cent

The implication of this is that a rise in the debt service ratio of 0.1 generates an overall increase in implemented court actions of about 42 per cent ( $1.21 \times 1.05 \times 1.12 = 1.423$ ). This result is for given levels of unemployment, income and house prices.

They also investigate the link between possessions and arrears. They find that a rise in the debt service ratio of 0.1 (which at the time of their analysis would have been caused by a rise in the average mortgage rate of 2 per cent) increases the level of possessions by about 50 per cent, for a given level of mortgage arrears. Since one would anticipate the level of arrears itself to rise when interest rates go up the overall increase in possessions would be more than 50 per cent.

Oxford Economic Forecasting (2001) analysed the impact of a number of factors, including interest rates, on mortgage payment arrears and house possessions by lenders. The following table shows their estimates of the impact of an increase in debt servicing costs, associated with an increase in interest rates. The main effect is on first-time buyers who tend to have high debt servicing costs relative to their income and are more likely to be credit constrained.

#### Impact of an increase in interest rates on mortgage arrears

	Impact after 18 months per cent	Impact after 5 years per cent
10 per cent increase in aggregate debt service ratio	3	½
10 per cent increase in debt service ratio for first time buyers	12	32

Source: Oxford Economic Forecasting (2001)

#### Impact of an increase in interest rates on house possessions

	Impact after 18 months per cent	Impact after 5 years per cent
Mortgage payment arrears	6	10
10 per cent increase in aggregate debt service ratio	9	0

Source: Oxford Economic Forecasting (2001)

These two tables show estimated impacts of a 10 per cent rise in the debt service ratio. This is not the impact of a rise of 10 percentage points in the ratio. If the debt service burden were to rise from 18 per cent to 24 per cent this would be a rise of 33 per cent in the debt service burden (ie  $100 \text{ per cent} \times (24-18)/18$ ). The OEF figures shown in tables 2.2 and 2.3, which show the effect of a 10 per cent rise in the debt service burden, would need to be tripled to show the estimated impact of such a change.

**2.21** Fixed-rate mortgages are one means of avoiding the risk of an unexpected rise in nominal interest rates. But there are other instruments that could provide insurance against those risks. A cap on a variable-rate mortgage can provide the same insurance against upside risk while allowing the mortgage holder to gain the benefit of falling rates. A financial contract which pays off if interest rates rise – a form of option – has a similar effect. In principle, combinations of floors and caps – giving protection against a rise in market rates but placing a limit on the benefit to the borrower when market rates fall – can be constructed in such a way that the initial rate on the loan might be the same as a fully variable rate. For a given path of short-term interest rates each of these contracts – a fixed-rate mortgage, a capped variable mortgage, a variable rate with a cap and a floor – have different implications. All give greater certainty over the path of future nominal payments than a variable-rate mortgage.

**2.22** Flexible mortgage products give borrowers some scope to over-pay or under-pay. Unlike fixed-rate mortgages or capped mortgages, they do not give greater longer-term certainty over the path of nominal payments. However, they can allow households with variable-rate mortgages to smooth out the impact of temporary increases in short-term rates. But flexibility is strictly limited. Borrowers usually have an option to reduce payments – or to borrow more – if their existing mortgage is below a certain predetermined level. For many recent first-time borrowers flexibility is limited because for a majority their loan-to-value (LTV) ratios are over 80 per cent, and a large minority (40%) have LTVs over 90 per cent.<sup>4</sup> Even for households with lower loan-to-value ratios flexibility over the profile of payments offers only limited protection against a change in the level of short-term rates that is not reversed within a few quarters. Evidence suggests that flexible mortgages tend to be bought by relatively affluent borrowers (CML, 2002).

### Fixed-rate mortgages and inflation risks

**2.23** One important conceptual point emerges from this analysis. It is *not* the case that variable-rate mortgages self-evidently become far more attractive for borrowers in an environment of high and volatile inflation. One rather simplistic interpretation of the absence of long-term, fixed-rate mortgages in the UK is that high and volatile inflation made such contracts deeply unattractive. From the point of view of households, this is not a very convincing story. High and volatile inflation generates major front-end-loading problems, even in an environment where nominal interest rates simply move in line with inflation so there is no fluctuation in real interest rates. In fact, the risk characteristics of variable-rate mortgages were somewhat less favourable even than this, because in the 1970s and 1980s there was substantial variability in short-term **real** interest rates also. In an environment of volatile inflation central banks may need to see real short-term interest rates move rather substantially as they attempt to moderate extreme fluctuations in inflation. For these reasons it is most certainly **not** self-evident that variable-rate mortgages are preferable in an environment of high and volatile inflation. But the scenarios considered above do not include a return to high and volatile inflation. They illustrate the implications of volatility in inflation and in real rates in an environment of generally low inflation.

<sup>4</sup>CML figures, 2003 Q3.

**2.24** The only contract that gives certainty over the profile of real mortgage repayments is an inflation-indexed mortgage. An inflation-indexed fixed-rate mortgage is one where repayments are constant in real terms; repayments in nominal terms are proportional to the general level of prices so that when inflation moves up the scale of payments moves up in line. In the UK there is a large market in long-term indexed debt, nearly all of which has been issued by the government. Indexed mortgages are rare and have been issued in very few countries. This is surprising. Such contracts avoid some of the risks that variable-rate mortgages generate and that fixed nominal debt creates. For households whose real incomes are more predictable than their nominal incomes, indexed mortgages can give more certainty over the affordability of repaying debt than fixed nominal rate mortgages. There will, however, be many households that have predictable nominal incomes and for whom a fixed nominal rate mortgage can be more appropriate.

### OPTIMAL MORTGAGE CONTRACTS

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**2.25** The charts above illustrate the different risk characteristics of variable and fixed nominal rate mortgages. They do not show which is preferable to a particular household. That can only be determined once we know what appetite for risk a household has, and how they might trade off a different risk profile against the possible higher average cost of a mortgage that provided greater insurance against uncertainty. Recent work by John Campbell and Joao Cocco (2003) attempts to address this crucial issue. Their research looks at the relative attractiveness of short-term fixed-rate mortgages and long-term fixed-rate mortgages to a typical US household. They consider plausible paths for US inflation and for the degree of volatility in house prices, real interest rates and incomes. They then estimate which type of contracts – short-term fixes or long-term fixes – would be preferable for a household that is averse to taking risks, but is also concerned about the average cost of different mortgages. Economists at the Bank of England, in preliminary but on-going work, have used that same framework to assess the relative attractiveness of short-term fixes and long-term fixes for UK households. (Appendix 2.2 at the end of this section briefly describes the model and how it is calibrated). Making plausible assumptions about the volatility of inflation and of real interest rates for the UK economy today, they assess which contracts would be preferable to households that understood the risks they face. They assume that fixed-rate mortgages are more expensive than variable-rate mortgages, in the sense that on average the fixed-rate deal would be 60 basis points more expensive than the variable-rate deal.

**2.26** Their preliminary results indicate that for many households longer-term fixed-rate contracts are likely to be preferable to shorter-term fixed-rate contracts. For households borrowing substantial amounts (loan to income ratios of 3.5 or more), long-term fixed-rate mortgages seem to have better risk and return characteristics. For households borrowing significantly less than this and who have low income risk there is little to choose between longer-term fixes and shorter-term fixes, although the shorter-term fixes come out slightly ahead. But if the average cost of a long-term fixed-rate mortgage over the average cost of the short term fixed deal fell even slightly, by as little as 10 basis points, the two contracts would be equally desirable even for households borrowing average amounts and who have low-income risks. For households with higher volatility in incomes long-term fixed-rate mortgages seem to be far more desirable<sup>5</sup>.

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<sup>5</sup> It is interesting that these results on the relative attractiveness of different mortgages seem fairly intensive to the size of redemption charges on long-term fixes – a point that is relevant to the analysis in section 5.

2.27 These are highly preliminary results and will need to be considered in more detail in the Final Report. But they suggest that mortgages with longer-term fixed rates are likely to provide desirable risk return characteristics for many types of household. First-time buyers borrowing more than three times their income or households with significant uncertainty over their future incomes would, on the basis of the modelling of optimal decisions, be better off fixing the rate at which they borrow for an extended period. This group of households is likely to be significant. Data from the CML shows that the median loan to income ratio of first time buyers in August and September 2003 was around 2.95. That figure suggests that close to half of first-time buyers in recent quarters have a mortgage to income ratio in excess of three. Even amongst households with lower loan-to-income ratios many will have a high degree of uncertainty over future incomes. The simulation results suggest that, for those households, fixed-rate mortgages have substantial advantages, even if their loan to income ratios are well under three. The implication of the simulation results is that a substantial proportion of households, and perhaps a majority of first-time buyers, should find that the advantages of fixed-rate mortgages make them an attractive option – assuming that decisions are made in an informed and forward-looking way and that the pricing of different mortgages reflects the shape of the yield curve.

2.28 The preliminary results, paradoxically, suggest that longer-term fixed-rate mortgages in the UK may have been relatively more attractive than in the US. Campbell and Cocco find that for many US households choosing a shorter-term fixed-rate mortgage would have been preferable to taking the longer-term fix that has been the dominant type of mortgage contract in recent years. But the Campbell and Cocco simulations are based on assumptions about interest rate and inflation volatility and house price variability that are plausible for the US. Their results are not really comparable to those from the version of their model calibrated to the UK economy.

2.29 It is important to note that the comparison being made in the Campbell and Cocco work, and the version of it applied to the UK, is not between a fully variable-rate mortgage, (for example a standard variable-rate mortgage in the UK or a tracker mortgage) and a long-term fixed-rate mortgage. Rather it is between a mortgage where the interest rate is fixed for two years and one where the rate is fixed for the full maturity of the loan. In those cases where, of these two contracts, the longer-term fixed-rate mortgage is preferable to the shorter-term fixed-rate mortgage, it would almost certainly be even more favourable when assessed against a fully variable-rate mortgage. And if a 25 or 30 year fixed-rate mortgage is preferable to a two year fixed it is highly likely that a 10 year fix is preferable to a fully variable-rate mortgage.

## CONCLUSION

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2.30 All of this suggests that mortgages with interest rates fixed for substantially longer than is currently common should be expected to be attractive to a very substantial proportion of households that make decisions in an informed, forward-looking and rational way. In fact very few of such households do take medium or long-term fixed-rate mortgages. How households actually make decisions will depend both upon their understanding of risk and the information they are given about mortgages. In the next section how households make decisions is considered in detail. How mortgages are funded and priced is considered in Sections 4 and 5.

## APPENDIX 2.1: THE CALCULATION OF DEBT-SERVICING BURDENS

2.31 The following calculations of debt-servicing burdens for variable-rate mortgages are based on the analysis of Miles (1994). Denote the outstanding mortgage  $t$  periods into the life of the loan by  $M_t$  and the size of the original loan by  $M_0$ . Let  $y_t$  denote the current value of disposable income of the borrower. The nominal interest rate at time  $t$  is  $r_t$  and we let the consumer price index be  $P_{ct}$ .

2.32 A standard, variable-rate, amortising repayment loan is one such that if nominal, short-term interest rates were to remain unchanged nominal debt payments would be constant and the present value of future repayments discounted at the current interest rate would equal the size of the loan. If we denote the period  $t$  repayment by  $m_t$  this implies that for a variable-rate loan:

$$m_t = \left( \frac{r_t}{1+r_t} \right) \left( \frac{M_t}{1 - \left( \frac{1}{1+r_t} \right)^{T+1-t}} \right) \quad (1)$$

where  $T$  is the original (at  $t=0$ ) term to maturity of the loan.

We can write the ratio of debt repayments to income:

$$\frac{m_t}{y_t} = \left( \frac{r_t}{1+r_t} \right) \left( \frac{M_t}{p_{h0}} \right) \left( \frac{p_{h0}}{y_t} \right) \left( \frac{1}{1 - \left( \frac{1}{1+r_t} \right)^{T+1-t}} \right) \quad (2)$$

where  $p_{h0}$  is the value of the house acquired when the loan was made at time  $t=0$ . Denote the per-period consumer price inflation rate between time 0 and time  $t$  by  $\pi_{ct}$  and let per-period, real (in terms of consumer goods) income growth over the same period be  $g^y$ . Thus:

$$(1 + \pi_{ct})^t \equiv \left( \frac{p_{ct}}{p_{c0}} \right) \quad (3)$$

$$(1 + g_{yt})^t \equiv \left( \frac{y_t}{y_0} \right) \left( \frac{p_{c0}}{p_{ct}} \right) \quad (4)$$

Using (3) and (4) in (2), we can now write:

$$\frac{m_t}{y_t} = \left( \frac{r_t}{1+r_t} \right) \left( \frac{M_t}{p_{h0}} \right) \left( \frac{p_{h0}}{y_0} \right) \left( \frac{[(1 + \pi_{ct}) \cdot (1 + g_{yt})]^t}{1 - \left( \frac{1}{1+r_t} \right)^{T+1-t}} \right) \quad (5)$$

2.33 If interest rates have not changed between 0 and  $t$ , we can write the outstanding debt at  $t$  as a simple function of  $M_0$ ,  $t$ ,  $T$  and  $r_t$ . Using (1), and noting that if interest rates are unchanged between 0 and  $t$ ,  $m_0 = m_s$  for all  $s$  where  $0 < s \leq t$ , we can deduce:

$$M_t = M_0 \left( \frac{1 - \left( \frac{1}{1+r_t} \right)^{T+1-t}}{1 - \left( \frac{1}{1+r_t} \right)^{T+1}} \right) \quad (6)$$

2.34 Finally substituting (6) into (5) gives the equation used to derive the service ratio of mortgage payments for variable-rate mortgages:

$$\frac{m_t}{y_t} = \left( \frac{r_t}{1+r_t} \right) \left( \frac{M_0}{p_{h0}} \right) \left( \frac{p_{h0}}{y_0} \right) \left( \frac{[(1+\pi_{ct}) \cdot (1+g_{yt})]^t}{1 - \left( \frac{1}{1+r_t} \right)^{T+1}} \right) \quad (7)$$

## APPENDIX 2.2: THE CAMPBELL AND COCCO SIMULATION MODEL APPLIED TO THE UK:

2.35 This annex briefly describes the key parameters used in the simulation model of optimal mortgage choice that was developed by Campbell and Cocco (2003). Greater details of the overall structure of the model can be found in the Campbell and Cocco paper.

2.36 Campbell and Cocco model the consumption/saving behaviour of agents under different mortgage contracts of an exogenously given maturity (30 years) and size. The interest rate is either variable at a two-year frequency (an adjustable-rate mortgage or ARM, in Campbell and Cocco's terminology), fixed for 30 years (FRM), or fixed in real terms with the capital value indexed to inflation.<sup>6</sup> The adjustable-rate mortgage in this model is like a short-term fixed-rate loan in the UK. People face uncertainty about inflation, real interest rates, labour income, house prices and the need to move house. The value of the house people buy is set exogenously and choices are made about the type of mortgage to use and the level of saving in each period. Agents can choose to refinance fixed-rate mortgages for a penalty of 1 per cent of the initial capital value of the loan.

2.37 Households are assumed to make decisions based on a rational assessment of the uncertainty they face into the future and with the aim of maximising expected utility over their lifetime.

2.38 The programs compute consumption/saving rules for agents with each kind mortgage contract, and then simulate the distribution of realised utility in each case. The mean of this utility distribution – an estimator of the expected lifetime utility under each contract – is used to evaluate the relative merits of each contract, and predict which one the agents will choose in each regime.

<sup>6</sup>The authors suggest that the latter mortgage with nonstochastic real repayments, which are either constant or declining to mimic and isolate the effect of front-end loading, would eliminate both cash-flow and inflation risks. They include these contracts in the simulation to illustrate the resulting welfare improvement. In principle, mortgages that shared labour-income or house-price risk would be better still, but are not considered.

2.39 The key inputs into the model are the assumptions about the volatility and average levels of household incomes and of interest rates, and assumptions about how mortgages are priced and how averse people are to taking risk.

2.40 Campbell and Cocco use assumptions about the mean and volatility of inflation and of real interest rates shown in the final row of Table A1. These are based on US experience. The UK averages for the 1980s and for the 1990s are shown in the first two rows. The average values for the 1990s values were used for the UK simulations reported above. So for the simulations we are *not* assuming a return to a more volatile, high inflation environment like that of the 1980s

**Table A1: Inflation and real interest rates**

	Inflation			Real interest	
	Mean	St. Dev.	AR(1) coeff.	Mean	St. Dev.
UK 1980s	5.6	2	0.89	6.1	2.6
UK 1990s	2.5	0.83	0.75	3.4	1.3
Campbell & Cocco	4.6	3.9	0.57	2	2.2

*Source: Bank of England, Campbell & Cocco (2003).*

### Labour income

2.41 The labour income process used in the simulations reported above has the same structure as that used by Campbell & Cocco. It has three components:

#### *Mean age-earnings profile*

The age-earning profile used by Campbell & Cocco is very similar to one estimated for the UK by Dutta, Sefton and Weale (1999). For that reason the original Campbell-Cocco age-earnings profiles are used in the UK calibration exercise.

#### *Permanent income shock*

Campbell & Cocco suggest that, because aggregate income is highly persistent, transitory income shocks are idiosyncratic, and they equate aggregate and permanent shocks. By following their assumption, one would estimate the standard deviation of permanent shocks to income of UK households by looking at the standard deviation of aggregate UK personal disposable income. The historical value for the UK of that standard deviation (2.2 per cent per year) is close to the 2.0 per cent value used by Campbell & Cocco. In some simulations the 2 per cent figure is used. But this gives a volatility of the permanent component of household income which is very low and this has a powerful impact on the results. Higher values of volatility, which are likely to be more relevant to a high proportion of first-time buyers, were also used.

#### *Transitory income shock*

Campbell & Cocco set the standard deviation of the transitory labour income shock to be 14.1 per cent per year. Dutta, Sefton and Weale (1999) estimate a Markov matrix for UK household income. This can be transformed to imply something that approximates the average standard deviation of annual income shocks, relative to the population mean. The implied figure is very high and much higher than the estimate used by Campbell & Cocco. For the simulations reported above a base case value for the transitory component is set at the figure used by Campbell and Cocco of 14.1 per cent a year.

### Household preferences:

2.42 The coefficient of risk aversion in the simulations is set equal to 3. The discount factor is set equal to 0.98.

