Trends in households' aggregate secured debt

By Rob Hamilton of the Bank's Structural Economic Analysis Division.

The aggregate level of households' secured debt relative to their income has increased by about a quarter over the past five years, and has almost tripled since 1980. Using a simple model, this article concludes that much of this increase can be accounted for by the spread of homeownership and the fall in inflation (which has reduced the rate at which households' real debt burden is eroded over time). However, the model is unable to account for the full extent of the recent increase in secured borrowing growth. The model also suggests that, because only a relatively small fraction of the housing stock changes hands each year, the aggregate level of debt responds relatively slowly to changes in house prices. So the recent increases in house prices could lead to continuing increases in the debt to income ratio over the next five to ten years.
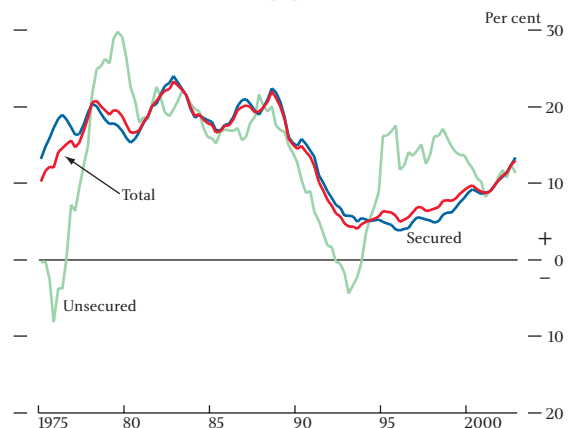
Introduction

The level of households' debt relative to their income was, in aggregate, stable for much of the 1990s but has increased from about 90% to 115% over the past five years. As shown in Chart 1, much of this increase reflects a rise in secured debt, which is the focus of this article. This rise was driven by strong borrowing, with annual growth picking up to 13% in 2002 (see Chart 2).[1] This was its fastest rate since 1990—when annual nominal income growth was over 10%, compared with under 4% in 2002.

Chart 2
Households' borrowing growth

Chart 1
Households' debt
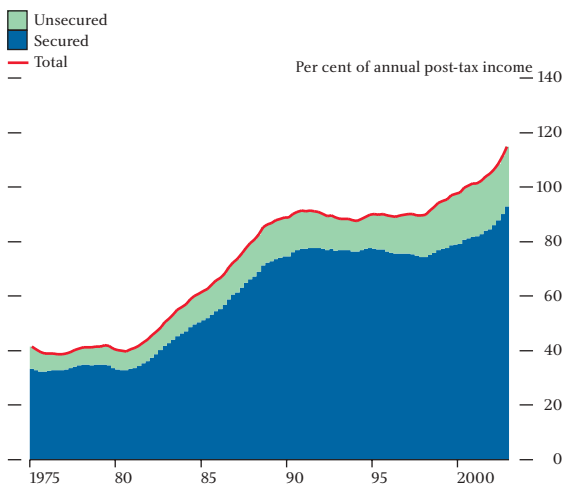
The increase in borrowing has the potential to increase households' vulnerability to falls in their income or increases in interest rates. So establishing whether these trends are likely to persist or not is likely to be of importance to policy-makers. Godley and Izurieta (2003) conclude that 'the rise in the ratio both of debt to wealth and debt to income must eventually stabilise. [But that] Unfortunately there is no way of telling when the turning point will come.'

This article uses a simple accounting model to assess the extent to which the trends in secured debt and borrowing are associated with developments in the housing market and changes in the rate of inflation. This analysis therefore hopes to shed light on whether the increase in the debt to income ratio has been surprising, given these developments, and whether it is likely to continue over the next few years. After a brief

(1) In this article, secured borrowing growth has been calculated from the level of secured debt. All charts end in 2002.

description of the model, this article discusses its ability to match the paths of debt and borrowing over the past 20 years and uses it to assess the relative contribution of different factors to these trends.

Description of model

The model analyses the effects of five main influences on secured debt and borrowing growth. First, changes in house prices relative to income. Second, movements in the loan to value ratio (LVR) for first-time buyers.[1] Third, variation in the relative popularity of repayment and interest-only mortgages. Fourth, the increase in the rate of homeownership. And fifth, the fall in inflation since the 1970s. Other factors—including households choosing to withdraw equity from their homes—are also likely to affect the level of secured debt and borrowing, but these channels are not quantified in this article.

The model can be thought of as a simple accounting framework which calculates a level of debt consistent with other features of the housing market. It does not attempt to explain those features, but is simply conditional on them. As discussed in more detail in the box, the model simulates, and aggregates, the amount of

debt held by households at different stages in their life-cycles. All households in the model are assumed to follow the same pattern of house moves, with the structure of the model designed to reflect a number of representative features of the housing market in the United Kingdom. First, around a tenth of households are assumed to move each year, in line with the average turnover rate in the economy over the past 30 years. Second, households are assumed to hold secured debt for half the time over which they are homeowners, roughly matching the proportion of homeowners with mortgage debt. And third, households are assumed to move more often when they are young, which is consistent with actual behaviour.

As an illustration of the mechanics of the model, consider the effect of a permanent increase in the house price to income ratio. The pink lines on Charts 3 and 4 represent the simulated values from the model if nominal income and house prices rise by 4.5% per year,[2] and if the homeownership rate, loan to value ratio for first-time buyers, and the proportion of interest-only to repayment mortgages remain unchanged. Given these settings, borrowing growth is 4.5% per year and the debt to income ratio remains

---

Structure of model

The model consists of a population of 50 cohorts of householders, who represent households aged between 25 and 75. All households follow the same pattern of house moves, with their first property purchased in their first year in the model, and subsequent moves taking place after 5, 10, 25 and 40 years.

House purchase in the model is financed via mortgages. First-time buyers are assumed to take out a 25-year mortgage, whose value is derived from the Council of Mortgage Lenders' (CML's) statistics. The debt of other households is given by their initial borrowing, minus an estimate of repayments of mortgage principal plus an estimate of any additional borrowing used to fund any moves up the housing ladder. This additional borrowing is given by an estimate of the difference between the prices of the properties that are bought and sold during each transaction. Both the initial and any additional

borrowing are assumed to be fully repaid by the time that the householder is aged 50. The price of the house bought after five years is assumed to be 10% less than the CML's average price paid by former owner-occupiers (FOOs) and the price of the purchase after ten years is assumed to be 10% more.[a] The prices of the subsequent transactions do not affect the level of secured debt in the model as they are assumed not to involve mortgage finance.

The model's estimate of the average value of borrowing per household is scaled up by a smoothed measure of the actual number of owner-occupied households with mortgages. The fraction of owner-occupiers with mortgages is derived from the Family Expenditure Survey, while the number of owner-occupied dwellings in the United Kingdom is taken from the Office of the Deputy Prime Minister's statistics.

(a) The CML's data do not distinguish between the prices paid by FOOs at different stages of the housing ladder.

---

(1) Loan to value ratios of former owner-occupiers are determined endogenously within the model.
(2) This could represent annual inflation of 2.5% and real income and real house price growth of 2%.

Chart 3
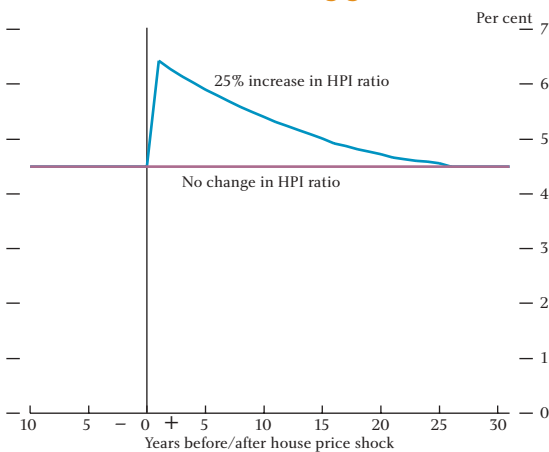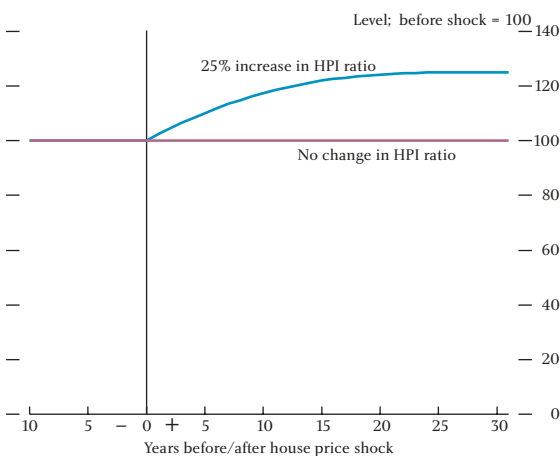**Estimated effect of a change in the house price to income ratio on borrowing growth**

Chart 4
Estimated effect of a change in the house price to income ratio on debt

constant. The blue lines show the simulated effect of a one-off 25% increase in the house price to income (HPI) ratio.[1] As the loan to value ratio is assumed not to change, this eventually results in a similar increase in the debt to income ratio. However, adjustment is very slow, with only 40% of the long-run response taking place within five years. This is because only a relatively small fraction of the housing stock changes hands each year, and a household's debt is only affected by the increase in house prices if it either entered the market, or traded up, after the time of the house price increase.[2] Full adjustment occurs when all households have purchased their first house at the higher price, which by assumption takes 25 years in the model.

Although changes in house prices play a key role in the model, they should not be viewed as *explaining* changes

in debt.[3] This is because the two are likely to be jointly determined: the price that a potential buyer would be willing to offer may depend on the amount of credit that is available and/or their appetite for debt. Therefore, the model can be thought of as simulating a level of debt that is *consistent* with current and previous values of house prices. It does not provide any insight into why the levels of house prices and debt may have changed, or whether these underlying changes are themselves sustainable.

Results from the model

Charts 5 and 6 present simulations from the model of the debt to income ratio and borrowing growth rates. These projections have been calculated by running the model using data for the house price to income ratio, LVR, homeownership rate, nominal income growth and mortgage type. Not surprisingly, the fit to the actual data is by no means perfect, suggesting that any forecast

Chart 5
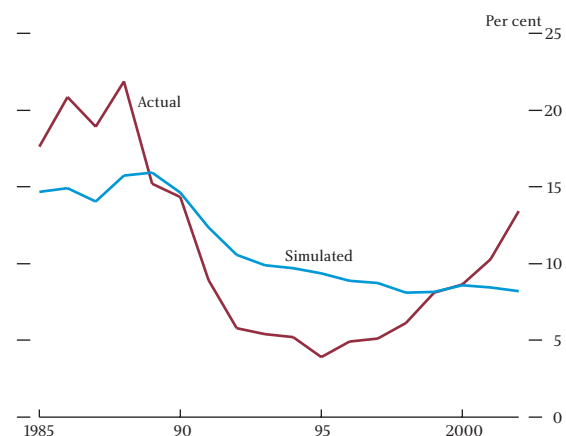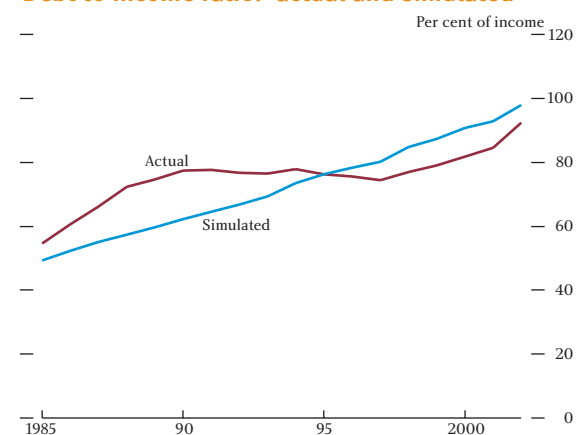**Growth of secured debt: actual and simulated**

Chart 6
Debt to income ratio: actual and simulated

(1) The house price to income ratio in 2002 was about 25% higher than its average over the past 30 years.
(2) By assumption, the model ignores the possibility of discretionary equity withdrawal by households.
(3) For a discussion of factors that may have contributed to the recent increase in house prices, and with it higher debt levels, see the box 'Structural economic factors affecting house prices', Bank of England (2002).

should be treated with caution. Nevertheless, despite not capturing all the year-to-year movements, it broadly matches the level of the debt to income ratio, its upward trend over the past 20 years, and some of the cyclicality of borrowing growth. So it may provide some guidance on what lies behind the recent trends in debt and borrowing, and on their likely future path.

It is possible that the failure of the model to capture the extent of the pick-up in borrowing growth in the late 1980s, and the sharpness of this slowdown in the early 1990s, is related to the short-lived increase in housing market turnover around that time (see Chart 7). An increase in the rate of transactions by former owner-occupiers may be important, particularly if they choose to withdraw equity when moving house, perhaps to fund the costs of moving home.[1] An increase in the number of first-time buyers may lead to an increase in the fraction of households with mortgages, or with high loan to income ratios, which might also lead to an increase in debt. Neither effect is captured within the model, which assumes that the rate of turnover is constant.

Chart 7
Housing market turnover[a]
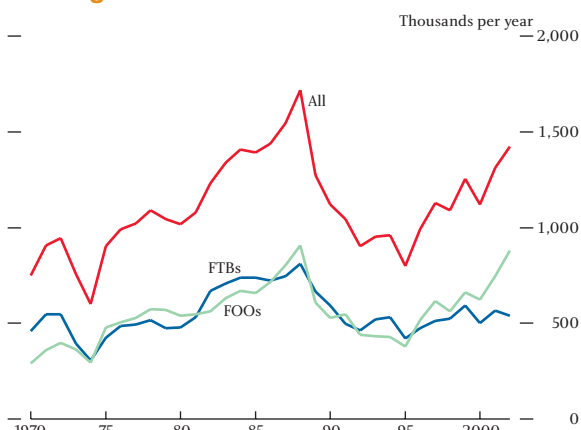
Sources: Council of Mortgage Lenders and Office of the Deputy Prime Minister.

(a) FTBs are first-time buyers and FOOs are former owner-occupiers.

Understanding the projections from the model

This section considers how changes in house prices relative to income, LVRs, mortgage types, homeownership rates and nominal income growth influence the projections from the model. The effect of each is evaluated by considering how a baseline projection, where all the factors remain constant over time, is changed by incorporating actual outturns for

each factor. The baseline has been calculated by keeping the house price to income ratio, homeownership rate, LVR and the proportion of different mortgage types unchanged at their average levels over the past 40 years, and fixing nominal income growth to 4.5% per year.

As discussed above, it can take up to 25 years before the full effect of a shock to a factor feeds its way through the model. Therefore, although projections from the model are shown from 1985, they also reflect the cumulative effect of any changes prior to this date.

Although changes in each factor are considered separately, it is possible that they are sometimes related. For example, as discussed in Bank of England (2002), the house price to income ratio may be boosted by a fall in inflation. This is because lower inflation reduces initial nominal payments on a mortgage, which might relax credit constraints for some households and enable them to finance higher debts, thereby increasing housing demand and thus house prices. Similarly, changes in the homeownership rate may change the balance between housing supply and demand, affecting house prices. In practice, the model would attribute the effects of both to variation in house prices, rather than to their underlying cause.

Variation in house prices relative to income

Chart 8 shows that the aggregate house price to income ratio has increased by about 50% over the past five years. The ratio had previously peaked in the early 1970s and late 1980s and troughed in the mid-1970s and mid-1990s.

Chart 8
House price to income ratio per person of working age
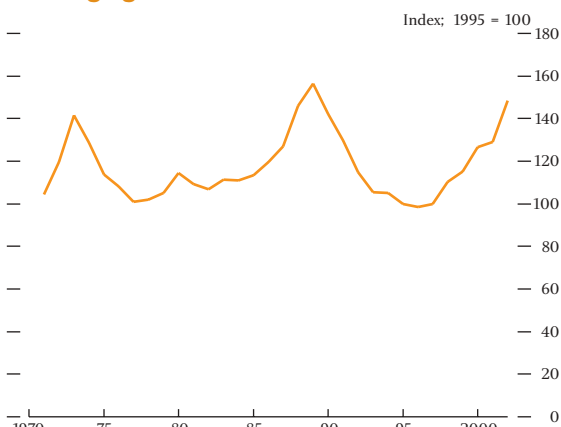
Sources: Office of the Deputy Prime Minister and Office for National Statistics.

---

(1) Ortalo-Magné and Rady (2002) present a model in which housing turnover is restricted by transactions costs. An increase in house prices (as occurred in the late 1980s) increases housing equity and reduces any credit constraints caused by these costs, enabling an increase in turnover.

Charts 9 and 10 show the model's estimate of how these changes would have been reflected in the debt to income ratio and in borrowing growth. The calculated effect is the difference between the blue 'baselines', where all the factors are kept constant, and the orange lines, which use actual data for the house price to income ratio but keep the other factors unchanged.

Chart 9
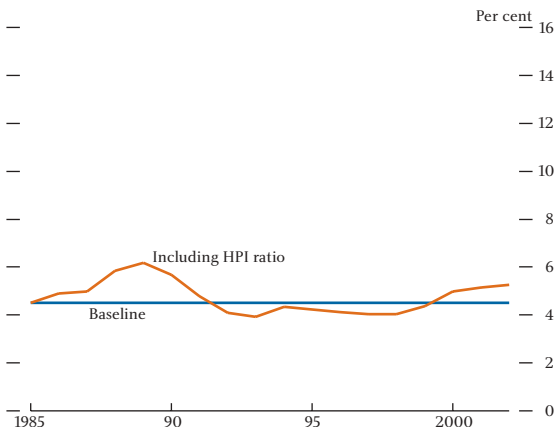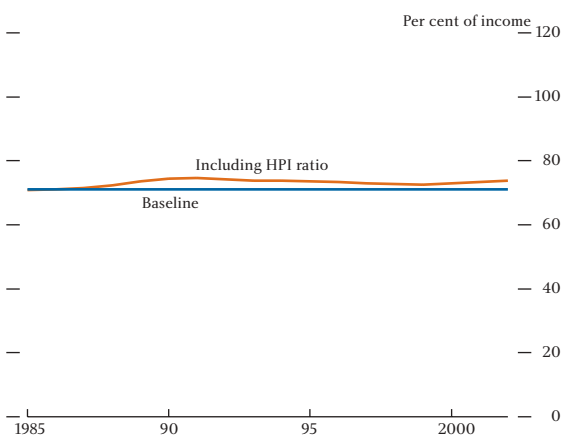**Simulated effect of changes in the house price to income ratio on borrowing growth**

Per cent

[Chart showing "Including HPI ratio" and "Baseline" lines, y-axis from 0 to 16, x-axis from 1985 to 2000]

Chart 10
Simulated effect of changes in the house price to income ratio on debt

Per cent of income

[Chart showing "Including HPI ratio" and "Baseline" lines, y-axis from 0 to 120, x-axis from 1985 to 2000]

The model suggests that previous fluctuations in the house price to income ratio have had important influences on the rate of borrowing, with growth boosted in the late 1980s but held back in the mid-1990s. However, the overall effect on the debt to income ratio is estimated to have been quite modest, partly because the changes in the house price to income ratio were relatively short-lived compared with the speed of adjustment of the debt level.

The model also suggests that the increase in house prices relative to income since 2000 was accompanied by a rise in borrowing growth. As discussed above, the model predicts that this increase will eventually lead to a similar rise in the debt to income ratio. But, since the estimated speed of adjustment is so slow, the model suggests that most of this increase has yet to feed through.

When considering these results, it is important to note that this model only captures the relationship between house prices and secured debt used for house purchase. In practice, existing homeowners may choose to respond to an increase (reduction) in house prices by withdrawing (injecting) equity from their homes. Indeed, this may partly explain the recent strength of remortgaging and mortgage equity withdrawal. If this is the case, the speed of adjustment to the new steady state may be faster than the model suggests, and the further increase in debt that is consistent with the recent increase in house prices may be smaller.

Movements in loan to value ratios

Chart 11 shows that the loan to value ratio for first-time buyers has fluctuated at around 80% over the past 30 years. The model suggests that such small fluctuations should have had negligible effects on borrowing growth, and thus on the level of debt relative to income.

Chart 11
Loan to value ratios at house purchase for first-time buyers

Per cent

[Chart showing a purple line, y-axis from 0 to 100, x-axis from 1970 to 2000]
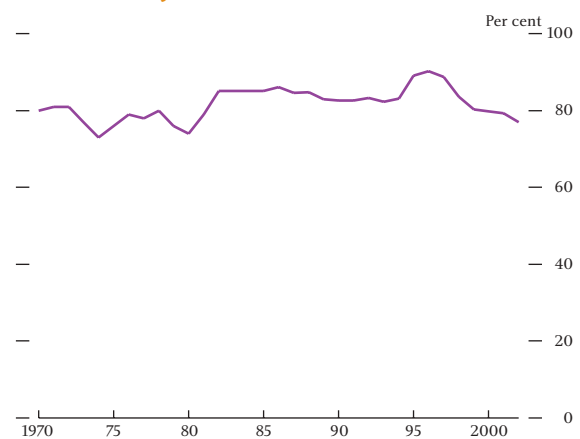
Source: Council of Mortgage Lenders.

Differing popularity of repayment and interest-only mortgages

Chart 12 shows that the share of new mortgages that are repayment rather than endowment (or other types of interest-only mortgage) declined from around 90% in 1970 to under 20% by the late 1980s. Since then, their popularity has increased, to almost 80% in 2002.

Chart 12
Relative popularity of repayment mortgages(a)
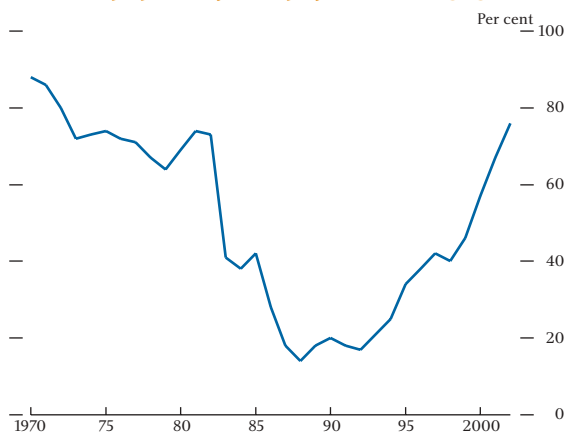
(a) For new mortgages.

Chart 13
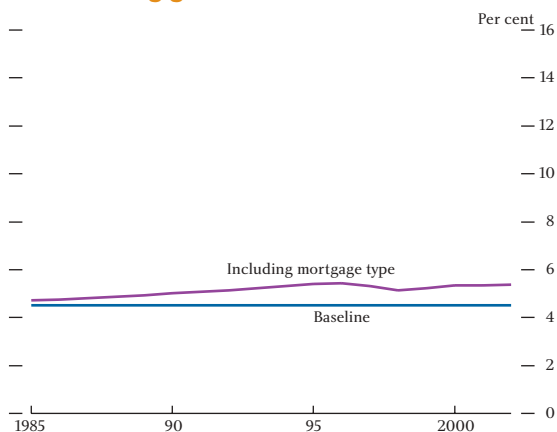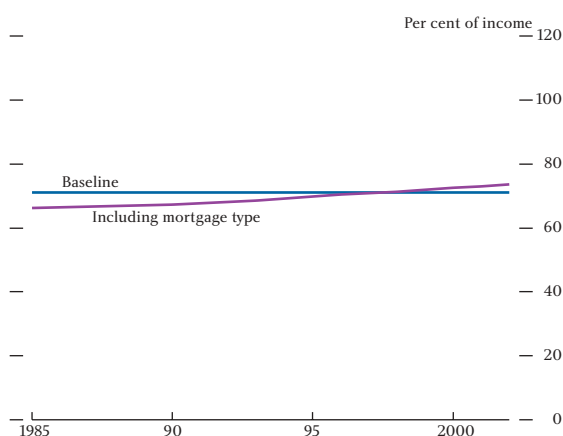**Simulated effect of variation in mortgage type on borrowing growth**

Chart 14
**Simulated effect of variation in mortgage type on debt**

The average level of secured debt over the lifetime of a repayment mortgage is lower than with an interest-only mortgage. This is because the debt is gradually repaid over the life of the mortgage, rather than being fully repaid at the end of the loan.[1] The model suggests that the combined effect of the changes in the relative popularity of different mortgage types has had only a modest upward effect on borrowing growth, and thus on the debt to income ratio (see Charts 13 and 14).

Homeownership rates

The homeownership rate (defined here as the number of owner-occupied dwellings divided by the population of working age, to abstract from population growth) has increased by almost a half since 1975 and about a quarter since 1985 (see Chart 15).[2] Much of this increase reflects a general trend towards a lower number of adults per dwelling, although ownership was also boosted by council house sales.

Chart 15
Dwellings status
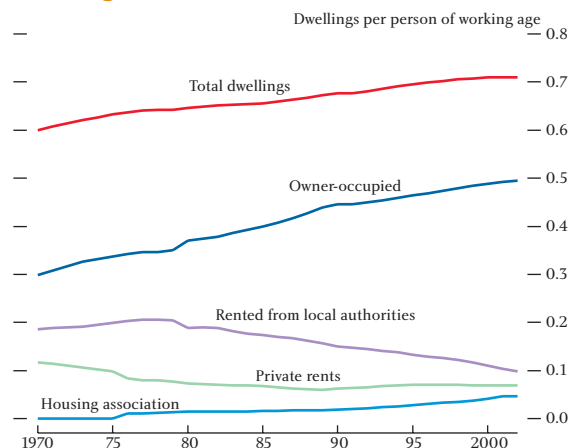
The simulated value of debt from the model is calculated by scaling up its estimate of debt per household by the rate of homeownership in the United Kingdom.[3] This means that a percentage change in homeownership is predicted to lead to an equivalent increase in debt. The model therefore suggests that the increase in the homeownership rate over the past 30 years boosted borrowing growth and led to a substantial rise in the debt to income ratio (see Charts 16 and 17). So a significant part of the rise in the debt to income ratio is likely to reflect an increase in the number of households with debt, rather than an increase in the amount of debt per household.

(1) Although a household's average debt is higher with an interest-only mortgage than a repayment one, so too are its financial assets—as these are accumulated to pay off the mortgage.
(2) This analysis abstracts from population growth by using the rate rather than the level of homeownership. Population growth is likely to increase both aggregate income and the number of dwellings.
(3) The proportion of owner-occupiers that have mortgages has barely changed over the past 20 years (increasing from 67% to 69%) so the effect of variation in this factor has not been separately identified in this article.

Chart 16
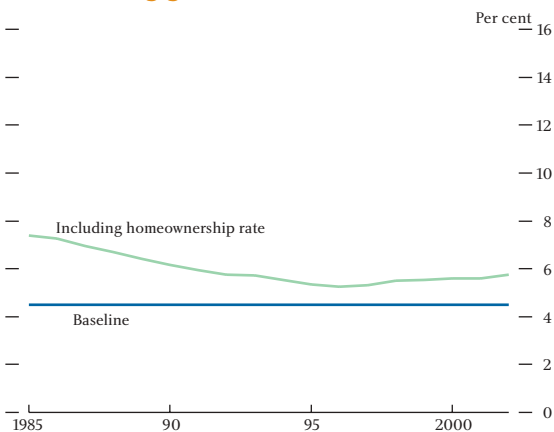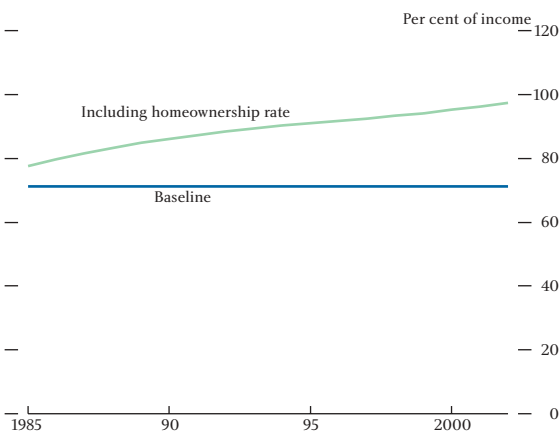**Simulated effect of changes in homeownership on borrowing growth**

Per cent

Including homeownership rate

Baseline

Chart 17
Simulated effect of changes in homeownership on debt

Per cent of income

Including homeownership rate

Baseline

The model's estimate of debt only takes into account borrowing on properties that are owner-occupied, and not those that are rented out. Data from the Council of Mortgage Lenders indicate that buy-to-let mortgages have increased from 0.4% of all mortgage debt in 1998 to 3.6% by the end of 2002. In practice, this increase is likely to have boosted borrowing growth, and thus the aggregate level of debt relative to income. But the rate of owner-occupation used in the model does take into account shifts of properties either into or out of the rental sector. Although the model suggests that such changes have affected households' debt, at the aggregate level they would also have been offset by changes in the finances of the other sector(s).

Inflation and nominal income growth

The annual rate of retail price inflation in the United Kingdom has varied considerably over the past 30 years (see Chart 18). Annual inflation has averaged about 3% since 1990, compared with over 7% in the 1980s and almost 13% in the 1970s. Like other nominal variables,

the growth rates of income, house prices and borrowing are all likely to have been reduced by the fall in the level of inflation.

Chart 18
Retail price inflation and nominal income growth

Percentage changes on a year earlier

Nominal income

RPI
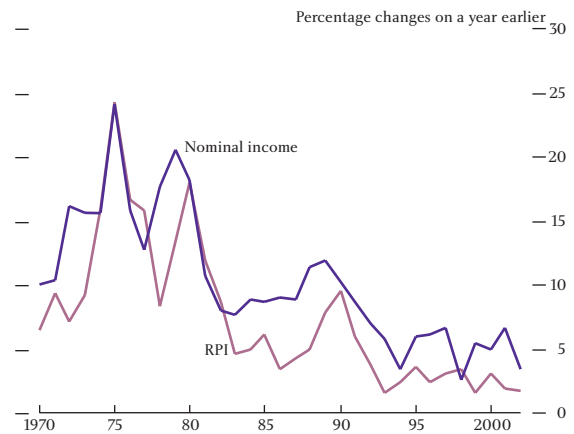
Within the model, the effect of changes in inflation (together with changes in real income growth) is captured by varying the nominal income input. For a given house price to income ratio, variation in nominal income growth feeds through into house price inflation, and thus into secured borrowing growth. Chart 19 shows the effect of incorporating actual income growth into the model. As expected, simulated borrowing growth rates over the past 20 years are significantly higher than in the baseline scenario, where nominal income and house prices increase by 4.5% per year. However, as inflation has fallen, the model suggests that this positive effect on borrowing growth will have eased.

Chart 19
Simulated effect of changes in inflation on borrowing growth

Per cent

Including inflation

Baseline
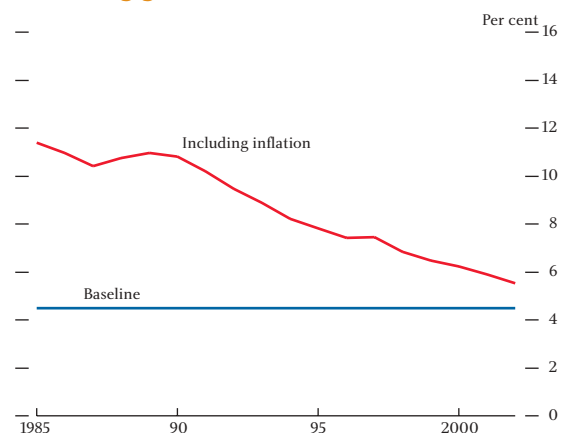
Inflation has no effect in the model on the amount of borrowing relative to income undertaken by households when purchasing their first property. But it does affect

the rate at which the real value of this borrowing is eroded over time, and thus the average level of debt relative to income over the lifetime of a mortgage. Chart 20 shows that (for a given initial level of borrowing relative to income and unchanged real income growth) the average value of the debt to income ratio over the life of a 25-year mortgage is about 40% higher if inflation is 2.5% rather than 10%.

Chart 20
Effect of inflation on a household's debt to income ratio(a)
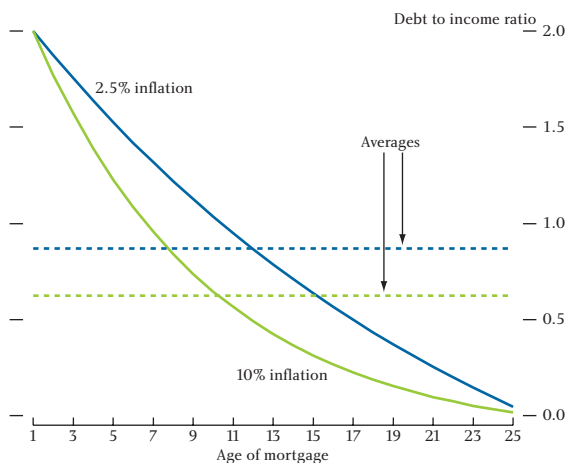
(a) Assuming real mortgage rate of 2.5% and real income growth of 2%, a 25-year repayment mortgage and that debt is initially twice annual income.

Chart 21 shows the model's estimate for how changes in nominal income growth have affected the aggregate debt to income ratio by changing the rate of debt erosion. The blue baseline gives the simulated values if nominal income growth is fixed at 4.5% per annum and the other factors remain constant. The red line shows the projection including data for nominal income. High nominal income growth in the 1970s and 1980s is estimated to have had a significant downward effect on the aggregate debt to income ratio at the beginning of

Chart 21
**Simulated effect of inflation on debt**
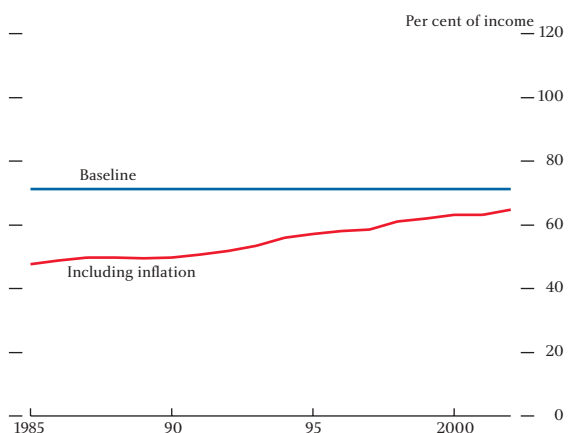
the sample period. As the growth rate of nominal income has declined, this negative influence has eased and the aggregate level of debt relative to income has increased. The model also suggests that adjustment of the debt to income ratio to the level of inflation is slow (reflecting the slow turnover of the housing stock discussed above). So, looking forward, the model predicts that continued adjustment to the current lower level of inflation may lead to a further small increase in the level of debt relative to income.

It is also possible that variation in the rate of inflation also leads to other changes in borrowing that are not captured in the model. For example, as discussed above, credit constraints may mean that the level of inflation has an effect on house prices, and thus on debt. Or it is possible that a higher rate of debt erosion during periods of higher inflation enabled households to trade up the housing ladder more easily, or withdraw equity from their homes.

Summary and conclusions

This article uses a highly stylised model of the housing market to explore trends in households' secured debt and borrowing growth. As shown in Chart 22, the model suggests that the long-run increase in debt relative to income has mainly been associated with the rise in homeownership and the reduction in the level of inflation over the 1990s (which has reduced the rate of inflation erosion of the debt burden). However, the fit of the model is not perfect, and it is unable to explain all the short-term fluctuations, including the extent of the pick-up in secured borrowing growth since 2000.

Chart 22
Estimated contributions to the cumulative change in the debt to income ratio from 1985
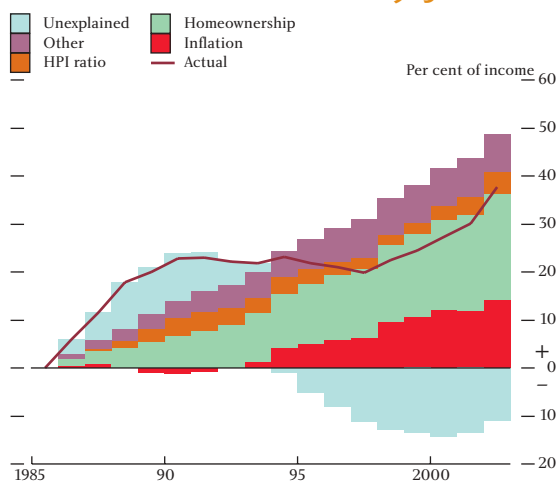
The model also simulates a level of debt that is consistent with current and previous values of house prices. It suggests that, because only a relatively small fraction of the housing stock changes hands each year, the aggregate level of debt responds relatively slowly to changes in house prices. And, even under the stylised assumption that house price inflation were to slow to around zero over the next two years before picking up thereafter to the rate of nominal income growth,[1] it predicts that the level of debt relative to income is likely to continue to rise over the next five to ten years.

---

(1) This path for house prices would imply that the increase in the house price to income ratio since 1995 is only partly reversed.

References

Bank of England (2002), *Inflation Report*, August.

Council of Mortgage Lenders, *Housing Finance*, various issues.

Godley, W and Izurieta, A (2003), 'Coasting on the lending bubble both in the UK and the US', *Cambridge Endowment for Research in Finance.*

Ortalo-Magné, F and Rady, S (2002), 'Housing market dynamics: on the contribution of income shocks and credit constraints', *CESInfo Working Paper 823*.