

# The economics and estimation of negative equity

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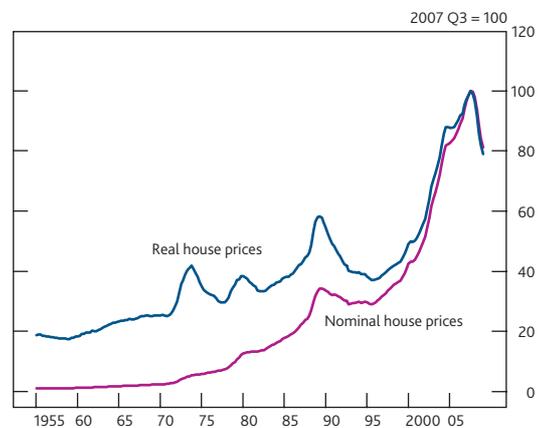
Negative equity occurs when the market value of a house is below the outstanding mortgage secured on it. As house prices fall, the number of households in negative equity tends to rise. Between the Autumn of 2007 and the Spring of 2009, nominal house prices fell by around 20% in the United Kingdom. There are no data which accurately measure the scale of negative equity. Three estimates presented in this article suggest that around 7%–11% of UK owner-occupier mortgagors were in negative equity in the Spring of 2009, although for most of those households, the total value of negative equity was relatively small. The effects of negative equity can be painful for those households concerned. Negative equity can also have implications for both monetary policy and financial stability, which are discussed in this article. These effects are likely to depend on developments elsewhere in the macroeconomy and financial system.

## Introduction

Negative equity occurs when the market value of a property is below the outstanding value of the mortgage secured on it. It only ever affects a minority of households — only 40% of UK households are mortgagors and many of those have small mortgages relative to the value of their houses. However, when house prices fall, the number of households in negative equity tends to rise. The housing market weakened significantly during 2008. The price of an average house was around 20% lower in the Spring of 2009 than it had been at the peak of the housing market in Autumn 2007; the largest fall in nominal house prices on record (**Chart 1**).<sup>(2)</sup> This is likely to have resulted in an increased incidence of negative equity.

Negative equity can be a painful experience for the households concerned. It can exacerbate households' financial difficulties in what may already be challenging times for many families. Negative equity can also have important consequences for the wider economy and the financial system, and it is these consequences that are the focus of this article. In particular, negative equity can have implications for monetary policy by affecting the pattern of aggregate demand and supply in the economy. And it can also have implications for financial stability if it leads banks to make writedowns on their mortgage books, or incur losses on securities whose value is related to the housing market, that are sufficiently large to impair the banks' capital ratios. The impairment of banks' balance sheets can also have implications for monetary policy, as evident throughout the financial crisis. These issues are

**Chart 1** UK residential property prices<sup>(a)</sup>



(a) Calculated as the average of the Nationwide and Halifax quarterly seasonally adjusted indices with the Nationwide long-run house price index prior to 1983. Real house prices calculated as nominal house prices deflated by consumer expenditure prices.

discussed in the first part of the article. An important conclusion is that the consequences of negative equity for the wider economy can vary, and are likely to depend on developments elsewhere in the macroeconomy and financial system. To illustrate this, the box on pages 116–17 compares the estimates and implications of negative equity in the United Kingdom in Spring 2009 with those in the United States and in the United Kingdom in the 1990s.

(1) The authors would like to thank Christopher Hackworth for his help in producing this article.

(2) While nominal house prices matter for negative equity, real house prices affect how much a household chooses to spend on housing relative to other goods and services. The fall in real house prices between the Autumn of 2007 and the Spring of 2009 was comparable to falls seen in previous housing market downturns in the early 1990s and the mid-1970s (**Chart 1**).

The economic consequences of negative equity depend crucially on its extent. But there are no data which accurately measure the number of households who are in negative equity. The second part of this article presents three approaches, used by the Bank and the Financial Services Authority (FSA), to estimate the incidence of negative equity in the Spring of 2009.<sup>(1)</sup> None of these approaches is perfect, so the section also discusses the merits and shortcomings of each.

The third section discusses which estimate is the most appropriate for addressing specific questions about the economic impact of negative equity. Given varying economic implications of the alternative estimates, and uncertainty around any particular one, the Bank monitors a range of estimates of negative equity.

### Why does negative equity matter?

A fall in house prices can affect economic activity regardless of the extent of negative equity. For example, lower house prices can reduce housing investment by reducing the incentive for homebuilders and homeowners to invest in housing (Corder and Roberts (2008)). And, although a fall in house prices does not affect aggregate household sector wealth,<sup>(2)</sup> it can affect the path of aggregate consumer spending in several different ways (Benito *et al* (2006)). But a fall in house prices can have additional economic effects in the event of negative equity becoming widespread, as discussed below.

In practice, the threshold beyond which each of the effects becomes important is not always the point at which the value of the property falls below the outstanding mortgage. Some of the effects described below apply to homeowners who have high loan to value (LTV) ratios, regardless of whether they are in negative equity, while others matter more for homeowners with a large amount of negative equity. In addition, the importance of negative equity for a given household will depend on whether they have other assets, like financial investments, or other debts, like personal loans. It is the overall financial position of the household that matters. However, the extent of negative equity can be a useful summary statistic for the likely importance of rising LTV ratios for the economy.

### Implications for monetary policy

A rising incidence of negative equity is often associated with weak aggregate demand, but the direction of causation is not always obvious. Negative equity tends to become more prevalent when house prices fall, which usually reflects weak demand for housing, since housing supply is fixed in the short term. Weak housing demand often coincides with weak consumer demand in general, perhaps due to reduced availability of credit to consumers and potential home buyers. But negative equity can lead to a further contraction in the availability of credit to both households and firms, and it may also reduce household mobility. The effects on aggregate demand and the supply potential of the economy can have

implications for future inflationary pressure and, therefore, for monetary policy. The rest of this section discusses those effects in more detail.

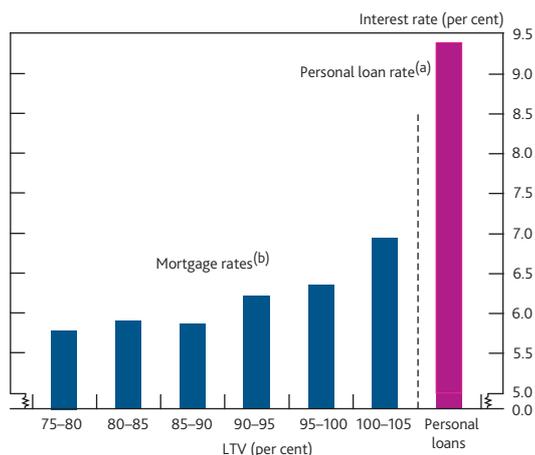
### Collateral and credit

A fall in house prices can lead to a reduction in consumer spending, and the effect is likely to be larger the greater the proportion of households with low or negative equity. There are two main ways this can happen. The first stems from the fact that housing equity can be used as collateral to obtain a secured loan on more favourable terms than a loan which is unsecured. Moreover, the more collateral a borrower has available, the better mortgage rate they can obtain. This is illustrated in **Chart 2** which shows average mortgage rates in different LTV buckets in June 2008 and compares them with the average rate on personal loans issued in the same month. Falling house prices reduce the value of collateral that homeowners have at their disposal and the amount of borrowing that can be obtained on more favourable terms. That can discourage households from borrowing and spending.<sup>(3)</sup> As well as affecting the cost of additional borrowing, falling collateral values may also affect the cost of servicing existing mortgages if borrowers have to refinance at higher interest rates when their existing deals expire (eg fixed-rate deals). That would reduce their income available for consumption, which may further reduce demand. **Chart 2** highlights that the effect of falling collateral values on the price of credit is much more pronounced at high LTV ratios. That means that falling house prices are likely to have a larger effect on aggregate borrowing and spending when a higher proportion of households have low or negative housing equity.

Second, falling values of housing equity also reduce the resources that homeowners have available to draw on to sustain their spending in the event of an unexpected loss of income (eg due to redundancy). By reducing the value of housing equity, falling house prices may lead some homeowners to seek to rebuild their balances of precautionary saving at the expense of consumer spending. While households with high amounts of housing equity may not respond much to falling house prices, because their demand for precautionary savings balances may already be satisfied, those with low or negative equity have a stronger incentive to

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- (1) The Bank wishes to thank the FSA for sharing their data and estimates. The FSA bears no responsibility for the analysis presented here.
- (2) Changes in house prices affect the distribution of household sector wealth rather than overall household sector wealth. For example, a fall in house prices benefits those who are entering the housing market or 'trading up', but at the expense of those who are leaving the housing market or 'trading down'.
- (3) That suggests a link between housing equity withdrawal (HEW) and consumer spending. HEW occurs whenever households, in aggregate, increase secured borrowing without spending the proceeds on improving or enlarging the housing stock. A fall in house prices is likely to reduce HEW for two reasons. First, it discourages homeowners from withdrawing equity from their homes for consumption by remortgaging (or taking out a second mortgage) — the collateral channel. Second, as well as such active equity withdrawal by people staying in their current home, equity is often passively released as people exit the housing market or trade down to a cheaper property. And, as house prices fall, the amount of equity withdrawn via this route will also decline. At first, that withdrawn equity is likely to be used to purchase financial assets, rather than for consumer spending. So this decline in equity withdrawal need not have any implications for current consumer spending.

Chart 2 Interest rates and collateral



Note: June 2008 is used as an example because the availability of mortgage products at high LTV ratios was much reduced after Summer 2008.

(a) June 2008 effective personal loan rate on new business, Bank of England data.

(b) Weighted average of mortgage rates in the FSA regulated mortgage transactions data from June 2008.

increase their balances of precautionary savings, particularly during a recession when job security falls.

There is empirical support for these effects. Benito and Mumtaz (2006) find that negative equity significantly raises the probability of a household being credit constrained — they would like to borrow more to finance expenditure, but are unable to do so either because the price of credit is too high or because lenders simply refuse to provide it. Similarly, Disney *et al* (2003) find that a household's spending rises by more in response to rising house prices if that household is in negative equity. Negative equity appears to induce precautionary saving which is eased as rising house prices lift households out of that position. A situation of *falling* house prices pushing people into negative equity, would then imply greater saving and lower spending.

As well as affecting the supply of credit to borrowers with low or negative equity, rising negative equity can also result in a reduced supply of credit to the economy as a whole. That is because, as will be discussed later, negative equity can raise the loss that lenders would incur in the event of default (loss given default). That can make banks less willing or able to supply credit to households and firms. Basel II regulations, which require banks to hold more capital against existing loans when their anticipated loss given default rises, can reinforce that (Benford and Nier (2007)). If credit is more costly or difficult to obtain, households and firms are likely to borrow less, leading to lower demand through lower consumer spending and investment. A reduction in credit availability may also have some effect on the supply capacity of the economy by reducing working capital for smaller businesses and the capital available for small business start-ups (Blanchflower and Oswald (1998)).

## Household mobility

Negative equity can affect household mobility by discouraging or restricting households from moving house. For example, households may be reluctant to move because they would not wish to realise a loss on their house (Tversky and Kahneman (1991)). And a household in negative equity would be unable to move if they were unable to repay their existing mortgage and meet any downpayment requirements for a new mortgage on a different house. Of relevance to that is the existence of specific schemes to help borrowers with negative equity to move, which were developed by lenders during the 1990s' housing market downturn (Tatch (2009)).<sup>(1)</sup> Such schemes could help to limit the extent to which negative equity restricts mobility. Nevertheless, the effect of negative equity on mobility was quantitatively significant during the early 1990s. Henley (1998) estimate that of those in negative equity in the early 1990s, twice as many would have moved had they not been in negative equity.

Reduced household mobility can have a range of macroeconomic effects. For example, Henley (1998) argues that reduced household mobility leads to a reduction in the supply capacity of the economy by increasing structural unemployment and reducing productivity. A temporary reduction in the number of households moving home may also have implications for tax receipts, spending on housing market services and certain types of durable goods (Benito and Wood (2005)). For example, stamp duty revenue, estate agents' fees and solicitors' fees are all linked to the level of housing transactions, which tends to fall when negative equity rises.

## Implications for financial stability

Domestic mortgage lending by the major UK banks represents over five times their core Tier 1 capital.<sup>(2)</sup> In addition, around 40% of all outstanding mortgage debt in the United Kingdom has been used to back securities. Large losses on mortgage loans and associated securities can erode banks' capital positions, affecting both lenders' willingness and ability to lend and, in extreme cases, their solvency. Both effects can have implications for aggregate demand and the supply capacity of the economy, highlighting the interdependency of financial stability and monetary policy. What matters for these losses, and their associated economic effects, is the value of debt at risk (loss given default) and the coincidence of that with defaults (probability of default). The remainder of this section discusses the relationship between negative equity, the probability of default and loss given default.

(1) For example, lenders can allow households to transfer their mortgage from one house to another.

(2) Core Tier 1 capital is defined as ordinary share capital, eligible reserves and minority interests. It excludes perpetual non-cumulative preference shares and innovative Tier 1.

### Probability of default

Negative equity impacts on the probability of default in a number of ways. In principle at least, and ignoring the transaction costs associated with selling a house, negative equity is a necessary condition for default to occur. That is because any borrower with positive equity who finds themselves unable to meet their repayments can sell their house and use part of the proceeds to pay off their mortgage. It is not in the interest of such a borrower to default because that would involve surrendering the full value of the house to the lender. The perceptions that households have about the value of their housing equity are, therefore, likely to affect whether or not they default.

However, negative equity is by no means a sufficient condition for default to occur. Default is likely to be a painful experience and one that most households try to avoid. When it does happen it usually reflects severe financial difficulties and problems keeping up with mortgage payments. By itself, negative equity does not cause mortgage payment problems. Indeed, May and Tudela (2005) find no evidence that negative equity increased the likelihood of a household experiencing mortgage payments problems in a sample of UK households between 1994 and 2002. And, even during the early 1990s' episode, only a very small fraction of households in negative equity were repossessed (see **Chart B** in the box on pages 116–17).

But if a household is experiencing difficulties meeting their mortgage payments, negative equity can increase the probability of default by reducing the household's *ability* to make payments. Ordinarily, if a household were to experience a loss of income that was believed to be temporary, they could withdraw equity from their home (or take out an additional loan) to help them meet their mortgage payments until their income recovered. That is consistent with evidence in Benito (2007), who finds that households are more likely to withdraw equity from their homes if they have experienced a financial shock. But low or negative equity can affect a household's ability to do that because of credit constraints, as discussed in the previous section.

Negative equity can also increase the probability of default by affecting the household's *willingness* to make mortgage payments. Defaulting on a mortgage has severe costs for the household, including loss of residence (and potentially other assets), reduced access to credit in the future and social stigma. However, defaulting can also have the benefit of reducing or limiting the debt burden of the household.<sup>(1)</sup> When a household has a lot of negative equity, the debt burden is large relative to the value of the home. For some households in this position, defaulting on the loan may be preferable to continuing to struggle with payments.

Negative equity may affect the probability of default of buy-to-let (BTL) mortgagors (those who have mortgages on properties which they let out to tenants) differently to that of owner-occupier mortgagors. In particular, the initial costs of defaulting on a BTL mortgage may be lower because defaulting does not lead directly to loss of residence, as it does for an owner-occupier. On the other hand, BTL mortgagors are more likely to have alternative financial resources, which lenders could lay claim to in the event of default.<sup>(2)</sup> So, overall, it is hard to determine whether negative equity is more likely to lead to BTL mortgagors defaulting than owner-occupiers.

Evidence on the extent to which negative equity leads to default in the United Kingdom is restricted to surveys and aggregate data. The survey data only provide qualitative evidence and aggregate data are not likely to be particularly informative about the effect of negative equity on default. That is because default is an event that only ever affects a minority of households and is unlikely to be captured well in aggregate data, which better describe the average household. Nevertheless, the available evidence does suggest that negative equity plays a role in mortgage defaults. For example, Coles (1992) presents evidence from a 1991 survey of lenders in which a high LTV ratio was frequently noted as an important characteristic of borrowers falling behind in meeting their mortgage payments. And Brookes, Dicks and Pradhan (1994) and Whitley, Windram and Cox (2004) find that a reduction in the aggregate amount of housing equity owned by UK households was associated with an increase in the overall number of households that fell into arrears.

But other factors that affect payment ability (like interest rates and unemployment, for example) play important roles as well. That suggests that the level of household defaults, and therefore the impact of negative equity on financial stability, is likely to depend on conditions in the broader macroeconomic environment.

### Loss given default

Faced with a borrower who is considering default, the lender normally has a number of options depending on the details of the particular case. Often the lender may try to agree with the borrower a change in the terms of the loan which will allow the borrower to eventually repay the loan in full. For example, if the borrower was recently made redundant, the lender may accept lower payments for a certain period until the borrower finds a new job. It is often in the interest of the lender to show forbearance because it can reduce (or eliminate) the loss on the loan.

(1) Because lending in the United Kingdom is done on a recourse basis and borrowers can be pursued for twelve years (five in Scotland) for any shortfalls in their debt obligations, defaulting will not necessarily permanently remove a household's debt burden. It is likely to limit it though, by reducing the total value of arrears added to their debt payments.

(2) For example, most BTL borrowers have equity in their primary residence. See Hellebrandt, Young and Waldron (2008) for survey evidence.

In some cases, however, default by the borrower is unavoidable. If the loan was held on the lender's mortgage book, the loss that the lender would realise depends on how much of the loan can be recovered by selling the house on which the mortgage was secured. Negative equity implies that the proceeds of the sale would not be enough to cover the outstanding loan. The total loss made by the lender would also depend on any costs incurred in selling repossessed property (such as estate agents' and solicitors' fees) and on how much money the lender can later recover from the borrower. It is the total value of negative equity (net of costs and recoveries) that is relevant in assessing lenders' potential losses, not the number of households in negative equity.

Mortgage losses may not be confined to the mortgage book of the lender. Investors (including banks themselves) who own securities that are backed by pools of mortgages (mortgage-backed securities (MBS)) would also be likely to suffer: increasing defaults on underlying mortgages would tend to reduce the current and future stream of mortgage repayments from that portfolio. This is likely to lead to a fall in the price of the security. The price of an MBS can also be affected by a general shift in investor sentiment, regardless of the actual performance of any given portfolio of loans.<sup>(1)</sup>

## Estimating negative equity

In order to calculate the number of mortgagors in negative equity exactly, it would be necessary to know the current house value and outstanding mortgage of every mortgaged property in the United Kingdom. Those data are mostly unobserved: individual houses are valued infrequently, normally only when the mortgage is refinanced or when the property is sold, and data on the outstanding value of individual mortgages are held by individual lenders who do not generally make this information publicly available. For this reason, negative equity can only be estimated, and the estimates are necessarily uncertain.

This section describes three alternative approaches to estimating the incidence of negative equity that the Bank has been using to monitor developments. The first approach uses mortgagors' own subjective valuations of their houses and of outstanding mortgages, as reported in household surveys. The second approach uses information on the LTV ratio of individual mortgage transactions at the time of house purchase. The third approach uses published information from a sample of lenders on the LTV ratios of households to whom they have lent in the past. The approaches are used to generate a range of estimates of the incidence of negative equity in 2009 Q1. It should be noted that each approach requires a number of assumptions to generate an estimate. That means there is a considerable range of uncertainty around all three estimates. Each approach has its drawbacks, so none of the estimates are perfect.

Estimates based on all three of these approaches have been published previously. The Bank of England (2008) published estimates based on the NMG Research survey of household finances in its October 2008 *Financial Stability Report* and in the 2008 Q4 *Quarterly Bulletin* (Hellebrandt, Young and Waldron (2008)). The Council of Mortgage Lenders (CML) published estimates in April 2009 based on individual mortgage transactions (Tatch (2009)). And the FSA (2009) published estimates using data from mortgage lenders in its 2009 *Financial Risk Outlook*.

## Estimates using household surveys

The most straightforward way to estimate the proportion of mortgagors in negative equity is to survey a sample of households and ask them to estimate the current value of their house and outstanding mortgage. Those who report that the value of their mortgage is larger than the value of their house are estimated to be in negative equity. One such survey is the NMG Research survey commissioned by the Bank. The latest survey was carried out in late September and early October 2008. Just over 1,000 of the households surveyed were mortgagors.<sup>(2)</sup> The responses were used to calculate an estimate of the LTV ratio of each mortgagor in the survey sample.<sup>(3)</sup>

Approximately 4% of mortgagors in the survey reported that they were in negative equity in September 2008, compared with around 1% in September 2007 (**Chart 3**). Between 2008 Q3 and 2009 Q1, house prices declined by a further 8% (according to the average of the Nationwide and Halifax indices as in **Chart 1**). By mechanically lowering the reported house values in the 2008 survey by 8% (and assuming that the value of the mortgages remained unchanged) it is possible to calculate an updated estimate of negative equity from the survey for 2009 Q1. That estimate suggests that 7% of UK owner-occupier mortgagors were in negative equity by the end of 2009 Q1, equivalent to around 700,000 households. But **Chart 3** also highlights that the majority of mortgagors had substantial equity in their homes. Over 75% of UK owner-occupier mortgagors were estimated to have an LTV ratio of less than 75%.<sup>(4)</sup>

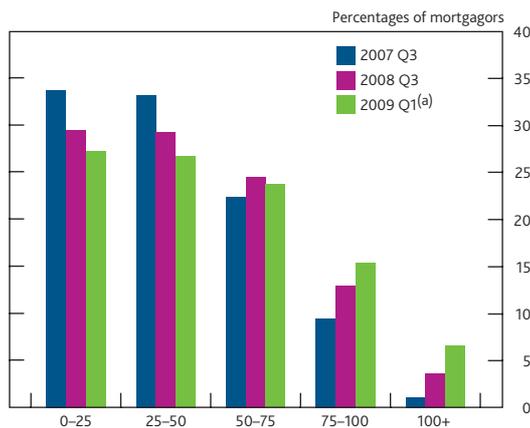
The main advantage of a survey-based approach is that households should potentially have better information about the value of their house and mortgage than almost anyone else. For example, they should take into account local housing market conditions, and also any unscheduled mortgage

(1) See 'Losses on financial assets' Box 1, *Financial Stability Report* (October 2008), available at [www.bankofengland.co.uk/publications/fsr/2008/fsrfull0810.pdf](http://www.bankofengland.co.uk/publications/fsr/2008/fsrfull0810.pdf).

(2) See Hellebrandt, Young and Waldron (2008) for a discussion of the results. Among other things, the survey asked: 'About how much would you expect to get from your main home if you sold it today?' and 'Roughly how much is left to pay on your current mortgage and secured loan(s) on your home?'

(3) See the box in Hellebrandt, Young and Waldron (2008) for more details of the methodology.

(4) The method used to calculate LTV ratios is in line with the method used in Hellebrandt, Young and Waldron (2008). It is, however, slightly revised from the approach used in the October 2008 *Financial Stability Report* and so the estimates above are slightly higher than those presented in that publication.

**Chart 3** Distribution of loan to value ratios

Source: NMG Research survey.

(a) Updated by mechanically lowering the reported house values in the 2008 survey by 8%; the fall in house prices between 2008 Q3, approximately when the 2008 survey was conducted, and 2009 Q1 according to the average of the Nationwide and Halifax quarterly indices (Chart 1). It was assumed that the value of households' mortgages was unchanged.

repayments or home improvements which affected the value of their housing equity.

However, research suggests that, collectively, respondents to surveys of this sort overstate the value of their house and understate their mortgage debt (Redwood and Tudela (2004)). The mean house value reported by mortgagors in the 2008 NMG Research survey was £213,000, compared to £172,000 and £209,000 in September, according to Halifax and the Department for Communities and Local Government respectively. The mean reported value of mortgages in the survey was £87,000 compared to £101,000 based on aggregate ONS data. This suggests that household surveys are likely to underestimate the incidence of negative equity.<sup>(1)</sup> In addition to that potential bias, there is also some uncertainty around the aggregation of survey samples. Given the 2008 NMG Research survey sample size of around 1,000 mortgagors, and an estimated proportion in negative equity of 7%, standard statistical methods would suggest with 95% confidence that the true proportion of mortgagors in negative equity in 2009 Q1 is somewhere between 5.6% and 8.7%.

### Estimates using data on the flow of mortgage lending

The second approach uses a large data set of individual mortgage transactions collected by the FSA as part of its regulatory responsibilities.<sup>(2)</sup> Among other things, this data set contains precise information on the size of the loan and the value of the house at the point when the loan was made. This makes it possible to calculate precisely the original value of housing equity of each mortgagor in the data set. In order to determine whether a given mortgagor was in negative equity in 2009 Q1, it is necessary to make two key adjustments to his or her original housing equity. First, the house value needs to be updated for subsequent house price growth. If house prices are falling, incumbent mortgagors' housing equity will tend to fall over time. Second, the outstanding mortgage needs to be updated for principal repayments. The majority of mortgagors gradually repay the mortgage principal over the life of the

mortgage, which reduces the size of the outstanding mortgage and increases the amount of equity they own in their houses over time.<sup>(3)</sup>

The FSA data set captures mortgage transactions between 2005 Q2 and 2009 Q1. Despite this short back run, it captures around 65% of the total stock of owner-occupied mortgages outstanding in the United Kingdom. That is because UK mortgages tend to be refinanced quite frequently. Moreover, the mortgages that are not captured in this data set, those households who took out or refinanced a mortgage prior to 2005 Q2, are unlikely to have been at risk of negative equity in 2009 Q1. That reflects both house price developments and mortgage repayments. Nominal house prices in 2009 Q1 were only slightly below their 2005 Q2 level (Chart 1) and had increased rapidly in the years preceding that, so few households who took out their mortgage prior to 2005 Q2 would have been pushed into negative equity by falling house prices alone. In addition, most of those households would likely have made sufficient repayments of principal between 2005 Q2 and 2009 Q1 to avoid negative equity.

Estimates using this methodology suggest that roughly 10% of owner-occupier mortgagors were in negative equity at the end of 2009 Q1, or around 1 million households. The CML, who have access to this data set and who use a very similar methodology, estimate that 900,000 households were in negative equity at the end of 2008 (Tatch (2009)).

Relative to the survey based approach, the main advantage of the flow data approach is that it allows housing equity at origination to be calculated for the population of recently issued regulated mortgages. And it does so without relying on the subjective responses of households.

The main problem with this approach is that it is not possible to adjust precisely for principal repayments and house price changes since each loan was originated. The adjustment is not able to capture unscheduled repayments of the mortgage principal by those with capital repayment mortgages or lump-sum repayments by those with interest-only mortgages, and equally it cannot capture arrears on repayments or repayment holidays.<sup>(4)</sup> House price adjustments are sensitive to the house price index used and do not take into account local factors or home improvements made since origination of

(1) It is possible that the degree of bias in the responses varies according to the LTV ratio of the respondent. Mortgagors with high LTVs are likely to be those who bought their homes and took out their mortgages more recently. Those households are likely to be better informed about the value of their house and mortgage, so they may provide more accurate responses. In that case, estimates of negative equity would not be as biased as estimates of the average LTV ratio.

(2) The FSA data set covers only regulated mortgage transactions (including regulated adverse credit and self-certified loans). BTL and second charge mortgages are not included because they are not regulated. The data set is not publicly available.

(3) The data set includes postcode information, which allows regional house price indices (average of the Nationwide and Halifax) to be used for the house price growth adjustment. And it distinguishes between interest-only mortgages and 'repayment' mortgages so adjustments for the latter can be made more accurately.

(4) Some mortgage equity withdrawal is captured if that withdrawal requires the borrower to remortgage and the new mortgage appears in the transactions data.

## A comparison with different episodes

The scale and economic effects of negative equity are likely to depend on the wider backdrop of the macroeconomy and financial system. This box compares the current episode with two other episodes: the housing downturn in the United Kingdom in the 1990s and the downturn in the United States that began in 2006.

### The 1990s

Cutler (1995) estimates that 1.1 million households were in negative equity in 1995 Q2, equivalent to 11% of all mortgagors. That is broadly similar to the estimate for 2009 Q1 presented earlier that is most methodologically similar — the method based on mortgage transactions data.<sup>(1)</sup>

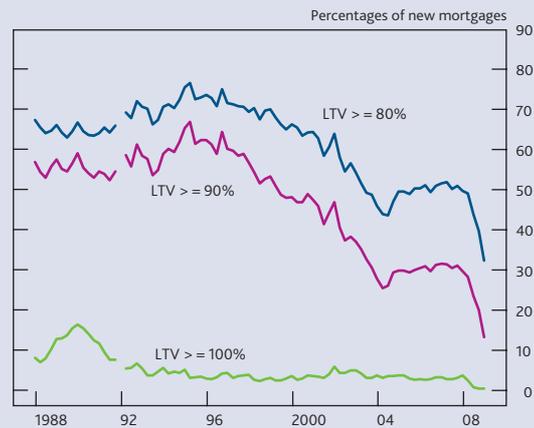
There are a number of factors that would, *a priori*, suggest that the extent of negative equity might have been higher in 2009 Q1 than in the 1990s. First, the fall in house prices was both larger and quicker in the more recent episode than in the early 1990s, giving households less time to make repayments to avoid falling into negative equity. House prices fell by 19% in just a year and a half between 2007 Q3 and 2009 Q1. By contrast, it took almost six years for house prices to fall by 15% between 1989 Q3 and 1995 Q2.<sup>(2)</sup>

Second, the emergence of interest-only (IO) mortgages since the mid-1990s is likely to have reduced the rate of mortgage principal repayment. While IO mortgages were non-existent in the run up to the housing downturn in the early 1990s, they accounted for up to 22% in 2006 of new loans and 24% in 2007.<sup>(3)</sup>

Third, a loosening of credit conditions in the early part of 2000 led to the emergence of specialist lenders focusing on lending to adverse credit borrowers (those who have previously been in significant arrears on mortgage or unsecured debts, and/or who have had County Court Judgements, Bankruptcy Orders or Individual Voluntary Arrangements). This sector grew to around 3%–4% of the mortgage stock by the end of 2007. Adverse credit borrowers tend to have borrowed at higher LTV ratios.

But other factors which strengthened the housing equity position of households in the run up to the more recent crisis help to explain why estimates of the scale of negative equity in these two episodes are similar. First, despite the emergence of the adverse credit sector in the early 2000s, the proportion of mortgages issued at high LTV ratios was actually lower than in the late 1980s and early 1990s (**Chart A**). Moreover, the volume of housing market transactions at the peak of that housing cycle was much larger, which further increased the number of new high LTV mortgages in the stock at the time.

Chart A Mortgagors' LTV ratios



Sources: FSA and Survey of Mortgage Lenders.

Second, Mortgage Interest Relief at Source (MIRAS), which provided mortgagors with tax relief on their mortgage interest payments, was withdrawn in 2000. So mortgagors would have had lower incentives to repay their outstanding balances and lower their LTV ratios before the 1990s' episode than they would have done in the run up to the more recent crisis.

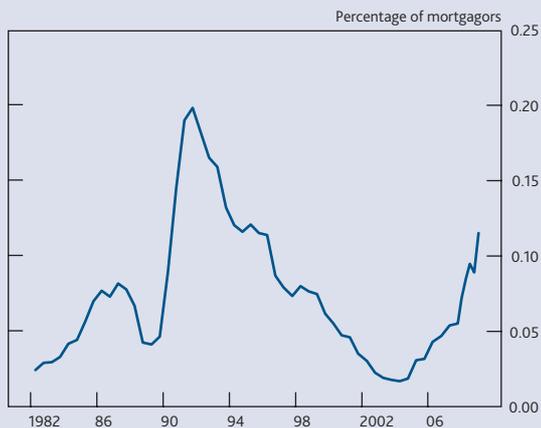
Despite similar estimates in the two periods, the implications of negative equity may be somewhat different in 2009 than in the 1990s. A particularly important difference is that rising negative equity in 2008 and 2009 has been accompanied by a severe financial crisis characterised by losses suffered on structured credit investments and concerns over banks' funding. That weakness in the banking system and associated lack of confidence suggests that rising negative equity is likely to have had a larger impact on credit availability and aggregate demand than it did in the 1990s. This also illustrates how financial stability concerns can have implications for monetary policy.

The growth in structured credit products (such as MBS) that has occurred since the early 2000s has important implications for how losses are distributed. In particular, the range of institutions that are exposed to losses on mortgage loans is greater in 2009 than in the 1990s. Moreover, uncertainty about the exposure of different investors to defaults is likely to have exacerbated the severity of the financial crisis, and so, via this channel at least, increased the impact of negative equity on the economy relative to the 1990s.

The implications of negative equity for losses on mortgage loans depend to an important degree on the extent of mortgage payment problems. As of 2009 Q1, arrears and repossessions remained well below their peaks in the early 1990s (**Chart B**). A number of factors are likely to influence payment problems, including the level of interest rates and

unemployment. In 2009 Q1, both of these were below their respective peaks during the 1990s' slowdown. Market commentators expect unemployment to rise further, but interest rates to remain low. The extent to which payment problems rise going forward depends on how any changes interact with other influences on households' finances.

**Chart B** Quarterly repossession rate<sup>(a)</sup>



Source: Council of Mortgage Lenders.

(a) Following the exclusion of 'legacy loans' from 2009 Q1, the latest figure is not directly comparable to earlier data. See 2009 Q1 arrears and repossessions release for more details.

## The United States

There are no official estimates of the extent of negative equity in the United States. However, a private sector estimate suggests that nearly one in six mortgagors was in negative equity around the end of 2008.<sup>(4)</sup> By that time house prices had fallen by around 30% from their June 2006 peak according to the Case-Shiller 10-City house price index — a larger fall than experienced in the United Kingdom up to 2009 Q1.

Certain characteristics of the mortgage market in the United States also make households particularly prone to falling into negative equity. First, the United States experienced a higher take-up of IO mortgages than in the United Kingdom, and in addition there has been significant growth in negative amortisation (NegAm) products which do not exist in the United Kingdom.<sup>(5)</sup> IO and NegAm together accounted for about 26% of all mortgages originated in 2006 (Edmiston and Zalneraitis (2007)).

Second, US tax laws allow interest on mortgages for owner-occupied homes to be deductible against income tax. This means that households do not have as strong an incentive to reduce their outstanding mortgage balances. Therefore, their LTV ratios are likely to remain high for longer after origination than perhaps would have been the case otherwise (Ellis (2008)).

Differences in regimes may also make the impact of negative equity larger in the United States than in the United Kingdom. Lending in the United Kingdom is done on a recourse basis, and following default, a borrower can be pursued for outstanding mortgage obligations. But in the United States, the prevalence of 'no-recourse lending' reduces the cost of default to the household, and therefore increases the probability of default for a given level of negative equity (Crosby (2008)).

- (1) Cutler's estimate is based on a sample of new mortgage lending from the Council of Mortgage Lender's Survey of Mortgage Lenders. The survey, which was discontinued in 2005 Q2, contained similar information to that in the FSA's data set. However, the sample was smaller and contained less detailed information on the characteristics of new mortgage lending, making it more difficult to adjust for mortgage repayments.
- (2) Calculated using the average of the Halifax and Nationwide seasonally adjusted quarterly indices as shown in **Chart 1**.
- (3) Source: FSA mortgage transactions data. Some IO mortgages have a repayment vehicle whereby the mortgagor makes payments to the vehicle rather than to the mortgage provider. Unfortunately, the data do not identify 'pure' IO mortgages, with no vehicle. The figures presented here are for mortgages where the vehicle was not identified and so represent an upper bound for the proportion of pure IO mortgages.
- (4) See Hagerty and Simon (2008).
- (5) Negative amortisation mortgages allow the borrower, for a period of time, to pay less than the interest accruals, generally up to a certain percentage of the original loan amount.

the loan. On the one hand, failure to account for unscheduled or lump-sum repayments and home improvements implies an overestimate of negative equity. On the other hand, failure to account for variation in house prices at the individual level, arrears and repayment holidays may imply an underestimate of negative equity.<sup>(1)</sup> Overall, the net impact of those considerations is uncertain.

### Estimates based on lenders' mortgage book data

The third approach to estimating negative equity has been developed by the FSA and is based on lenders' own estimates of the housing equity held by mortgagors to whom they have lent in the past. In their 2009 *Financial Risk Outlook*, the FSA presented negative equity estimates based on 2007 published data (from annual or interim results, investor presentations and securitisation reports) from a sample of UK lenders covering 80% of the market by value (including 45% of the BTL market).<sup>(2)</sup> Each lender estimated the proportion of their mortgage book (including BTL) in different LTV ratio buckets (eg 75%–80%, 80%–85% etc).<sup>(3)</sup> To do this the lenders would have used up-to-date internal information about the outstanding value of mortgages on their own mortgage books, together with an adjustment for house prices since origination of each loan. The FSA weighted these estimates using the lenders' respective market shares and combined them to generate an estimate of the proportion of all mortgagors in each of the LTV ratio buckets at the end of 2007. That distribution formed the basis of an estimate of the incidence of negative equity at the end of 2007, but also for the effects of further potential house price falls since then. For example, if house prices fell by 20% after the end of 2007, as they almost did between the end of 2007 and 2009 Q1, then all those who had an LTV ratio of more than 80% at the end of 2007 would have been in negative equity (under the assumption that was made that there were no repayments of principal since the end of 2007).

Because individual lenders tend to publish information based on different sets of LTV buckets, the aggregate LTV buckets generated by the FSA had to be large enough to be consistent with all the lenders.<sup>(4)</sup> Those limitations meant that the FSA only calculated estimates of negative equity under particular house price scenarios — namely 10%, 20% and 30% house price falls from the end of 2007.<sup>(5)</sup>

Based on a house price fall of 20%, the FSA estimates suggest that around 11% of UK owner-occupier mortgages were in negative equity at the end of 2009 Q1, equivalent to 1.1 million households. That is very close to estimates generated using the second approach outlined above. The FSA estimates also suggest that around 200,000 BTL mortgages were in negative equity in 2009 Q1. Some of these BTL mortgages may be held by households that were in negative equity on their own houses and some landlords may hold multiple BTL mortgages that were in negative equity. For this reason the

total number of households with mortgages that were in negative equity is likely to be less than the sum of these two estimates.

The advantage of this approach is that the number of adjustments that the lenders need to make to estimate the housing equity of mortgagors to whom they have lent is smaller than in the approach described above which uses transactions data. They have accurate information on the outstanding mortgage because they know the repayments made by their customers and so need only make adjustments for changes in house prices. Although that adjustment is subject to the problems already discussed above, the precise knowledge of households' outstanding mortgages should make estimates of the incidence of negative equity based on lenders' mortgage books more accurate.

The problems with this approach stem from the fact that it is based on a published snapshot of the lenders' mortgage book at a given time (in this case end-2007). This means that estimates can only be updated fully when lenders publish the necessary information (usually once a year). Adjusting the estimates for developments since then is problematic because adjustments for repayments cannot be made to the combined LTV distribution as they can when using individual mortgage transaction data, and the estimates generated do not capture mortgages issued since the latest snapshot. In addition, the data are based on a sample of lenders, albeit a large one. But the sample is not random and may not be representative of the population.<sup>(6)</sup>

### Summary

The three estimates presented above suggest that around 7% to 11% of UK owner-occupier mortgagors were in negative equity at the end of 2009 Q1. The estimate based on household survey results is the lowest of the three, but given the tendency of survey respondents to overstate the value of their housing equity, that is perhaps not surprising. The other two approaches generate very similar estimates of the

(1) Failure to take into account individual-level variation in house prices is likely to lead to an underestimate of negative equity because the distribution of LTV ratios is such that there are more mortgagors who are close to but below the negative equity threshold than are those who are close to but above it (eg Chart 3).

(2) The sample excludes the majority of second charge loans. A second charge loan is an additional secured loan taken out by a household with an existing mortgage. It is called a 'second charge' loan because if the household gets into financial difficulties and the home is repossessed, the lender of the original mortgage has the first right to recover as much money as they can, with the lender of the second loan having rights over the remainder.

(3) Lenders present data on the proportion of the *value* of mortgages in different LTV buckets. These data have to be adjusted to generate an estimate of the *number* of mortgages in different LTV buckets, which is necessary to obtain an estimate of the number of households in negative equity. The FSA made that adjustment using data from a sample of securitisation and covered bond reports, which contain information on both numbers and values.

(4) For example, if one lender reported 80%–85% and 85%–90% and another lender reported only 80%–90%, the FSA had to generate an overall bucket of 80%–90%.

(5) Other house price scenarios could be considered, but the lack of granularity in the data would mean these estimates would be less accurate.

(6) Although all the major BTL lenders are included in the sample, many specialist lenders, who tended to focus on adverse credit lending, are not. By itself, that implies that the FSA calculations would tend to underestimate the incidence of negative equity.

**Table A** Summary of negative equity estimates

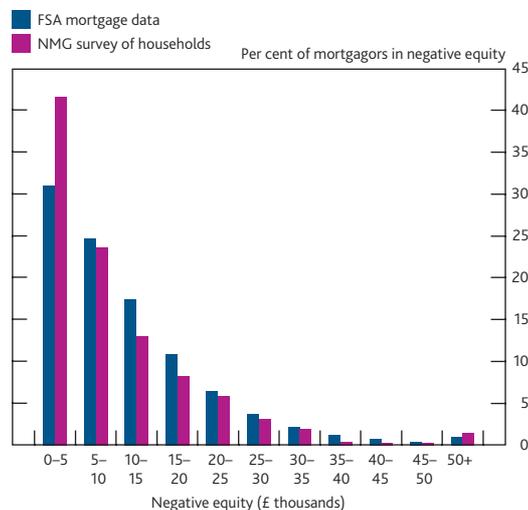
Description	Advantages	Disadvantages	Estimate for 2009 Q1 Number of households (Percentage of mortgagors)
<b>Household survey</b> NMG Research survey carried out in late September and early October 2008	<ul style="list-style-type: none"> <li>i) Households should have more information about the value of their home and outstanding debts — they can account for home improvements and unscheduled mortgage payments.</li> <li>ii) Gauges households' own perceptions, which should affect their financial decisions.</li> </ul>	<ul style="list-style-type: none"> <li>i) Households tend to overestimate the value of their housing equity.</li> <li>ii) Surveys are subject to sampling variation.</li> </ul>	700,000 (7%)
<b>Flow of mortgage lending</b> FSA data on all regulated mortgage transactions between 2005 Q2 and 2009 Q1	<ul style="list-style-type: none"> <li>i) Captures the population of recent regulated mortgage transactions and so avoids problems with samples.</li> <li>ii) Precise LTV ratio at origination available for each mortgage transaction.</li> <li>iii) An objective estimate, which is likely to be informative about lenders' potential losses and credit supply.</li> </ul>	<ul style="list-style-type: none"> <li>i) Unable to adjust precisely for principal repayments.</li> <li>ii) Unable to adjust precisely for changes in individual property prices.</li> </ul>	1 million (10%)
<b>Lenders' mortgage books</b> Published LTV distributions from a large sample of lenders estimated at end-2007	<ul style="list-style-type: none"> <li>i) Lenders are able to update precisely the value of their customers' outstanding mortgages over time.</li> <li>ii) Allows for estimates of negative equity on BTL mortgages.</li> <li>iii) An objective estimate, which is likely to be informative about lenders' potential losses and credit supply.</li> </ul>	<ul style="list-style-type: none"> <li>i) Does not capture mortgages issued since end-2007, or any principal repayments since then.</li> <li>ii) Data published in aggregate LTV buckets.</li> <li>iii) Unable to adjust precisely for changes in individual property prices.</li> <li>iv) Although sample is large, it is not necessarily representative of the total mortgage population.</li> </ul>	1.1 million (11%) 200,000 BTL

incidence of negative equity. They avoid the problem of subjectivity of survey responses. But various adjustments that need to be made to the data create problems and biases of their own. These estimates will tend to overstate negative equity to the extent that repayments of mortgage principal are not fully adjusted for. However, using regional as opposed to individual-level data to adjust for house price changes since the origination of each mortgage may lead to a bias the other way (see footnote 1 on page 118). The three approaches and their relative advantages and disadvantages are summarised in **Table A**.

The FSA data on mortgage transactions and the NMG survey can also be used to estimate the distribution of negative equity values (**Chart 4**). That suggests that the majority of those households who were in negative equity in 2009 Q1 had relatively small amounts of negative equity. According to the FSA data 73% of households had less than £15,000, and 56% had less than £10,000, of negative equity. The NMG survey suggests 78% had less than £15,000 and 65% had less than £10,000.

Overall then, although negative equity had become more widespread, the majority of households continued to hold significant buffers of housing equity. Estimates from the NMG survey suggest that over 75% of mortgagors had an LTV ratio of below 75% in 2009 Q1. The survey and FSA mortgage data indicate that the majority of those that had fallen into negative equity by 2009 Q1 had relatively small values of negative equity. This suggests that relatively few households are likely to be in a position where negative equity may

**Chart 4** Estimated distribution of negative equity values in 2009 Q1



influence their willingness to continue servicing their mortgage payments.

When thinking about the macroeconomic implications of these estimates, as discussed previously, it is important to bear in mind that it is the overall balance sheet position of households that matters. Negative equity is less of a concern for households with additional assets, such as deposits or equities. On the other hand, unsecured debt adds to households' total debt and tends to exacerbate the problems of low or negative housing equity. It is not clear from the available evidence which of those is likely to be more important. For example, mortgagors who reported having LTV

ratios in excess of 80% in the 2005 British Household Panel Survey reported holding an average of around £6,000 of financial assets; while mortgagors who reported having LTV ratios in excess of 80% in the 2008 NMG Research survey also reported holding around £6,000 of unsecured debt.<sup>(1)</sup>

## Which estimate is the most appropriate?

As discussed in the first section, negative equity can have several consequences for the economy and the financial system. The relative attractiveness of subjective survey-based estimates and more objective measures, depends on which of these consequences are of interest.

Responses to household surveys (like the NMG Research survey) provide a measure of household *perceptions* and these are important to the extent that they influence households' decisions, regardless of their accuracy. For example, as already discussed, the perception of low or negative housing equity may lead households to increase their precautionary saving. It may also affect their perceptions of credit availability, making them less likely to apply for loans. Both of those effects would serve to reduce consumer spending and aggregate demand. The perception of negative equity may also influence households who are struggling with their debts, by affecting their ability and willingness to meet mortgage payments. This is important for considering probability of default.

But for other purposes, alternative measures that do not rely on households' subjective perceptions may be more useful. Lenders' decisions about credit supply are in part determined by their own estimates of the LTV distributions on their mortgage books and by losses they expect to make on those loans. And for households who do apply for credit, their ability to withdraw housing equity to finance consumption depends on an objective valuation of their house by the lender and the outstanding mortgage. Moreover, for the purposes of evaluating financial stability and monetary policy, it is important to have objective measures of potential losses on mortgage lending. So in thinking about bank losses and credit supply, objective measures of negative equity, such as those based on disaggregated mortgage data or lenders' mortgage books, are useful.

## Conclusion

The housing market weakened significantly during 2008 and the price of an average house was around 20% lower in the Spring of 2009 than it had been at the peak in the housing market in Autumn 2007. As house prices fall, the number of households in negative equity tends to rise.

There are no data which accurately measure the scale of negative equity, but it can be estimated in several ways. This article has presented three different approaches. Estimates

using these approaches suggest that between 700,000 and 1.1 million households in the United Kingdom (or around 7%–11% of UK owner-occupier mortgagors) were in negative equity in 2009 Q1, similar to the number estimated to be in negative equity in the mid 1990s. But the majority of mortgagors continued to hold significant buffers of housing equity with an estimate based on a household survey suggesting that over 75% of mortgagors had an LTV ratio of less than 75%. Estimates also indicate that the majority of those that had fallen into negative equity by 2009 Q1 had relatively small values of negative equity; though that would increase in the future if house prices fell further.

It should always be borne in mind that there is a great deal of uncertainty around any estimate of negative equity, reflecting the assumptions required to generate the estimate. In addition, negative equity is an arbitrary threshold, particularly once all of households' assets and debts are taken into account. Nevertheless, rising LTV ratios during 2008, as indicated by higher estimates of the number of households in negative equity, are likely to have had economic consequences.

Negative equity can have an impact on both aggregate demand and supply in the economy with implications for future inflationary pressure and, therefore, for monetary policy. It can also affect banks' resilience by raising the probability of default and loss given default on banks' mortgage exposures and lead to losses on investments in securities related to the housing market. The financial crisis that began in 2007 led to a contraction in the supply of credit to households and firms in the United Kingdom. One consequence of that has been a fall in consumer demand for goods and services, including demand for housing. In turn, that has resulted in falling house prices and a rising incidence of negative equity. By increasing expected bank losses, negative equity may have amplified the slowdown by further constraining the supply of credit to households and firms — thereby reducing aggregate demand and supply. That impact of negative equity on credit conditions may have been somewhat stronger than in the 1990s' recession because of elevated concerns over banks' capital positions at the start of the slowdown. But as of 2009 Q1, arrears and repossessions remained well below their peaks in the early 1990s. In addition, the minority of UK households in negative equity in 2009 Q1 for the most part had relatively small levels of negative equity. Looking ahead, monetary policy and financial stability implications of negative equity will depend on the outlook for house prices and for factors that affect households' ability to service debt, including interest rates and unemployment.

(1) The 2008 NMG Research survey did not ask about households' assets, and the British Household Panel Survey only does so every five years.

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