Understanding dwellings investment

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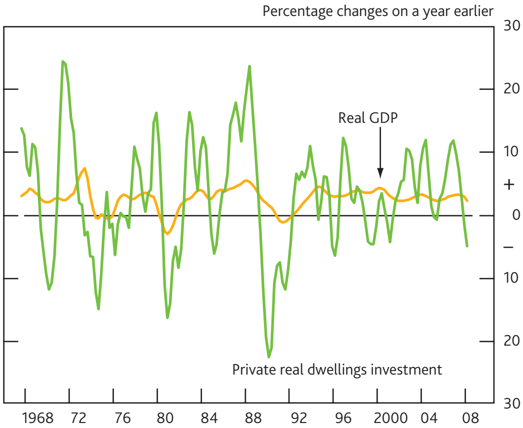
Dwellings investment (house building and home improvements) can have a large impact on GDP growth. This article presents an economic framework that helps explain movements in UK dwellings investment. House building responded sluggishly to rising house prices in the earlier part of this decade. This partly reflected lags in the construction cycle, but also increasing costs arising from the planning process. Such factors are less likely to restrain a downward adjustment in house building, and since late 2007 house builders have cut production sharply in response to lower house prices and housing market activity.

Introduction

Dwellings investment (house building and home improvements) makes up a relatively small fraction (by international standards) of UK economic activity: on average around 4½% of real GDP since 1970. But it is volatile, and has contributed significantly to UK economic cycles. Since 1970, growth in private sector dwellings investment has been more than five times as volatile as GDP growth (**Chart 1**). This volatility largely arises because small changes in the desired housing stock require large changes in housing investment.

Chart 1 Private dwellings investment and GDP(a)

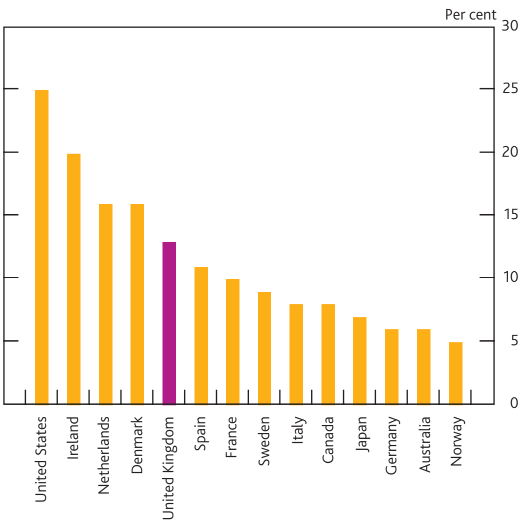


Sources: Office for National Statistics (ONS) and Bank calculations.

(a) Both series have been smoothed using a centred moving average.

Chart 2 shows that dwellings investment added significantly to weakness in the UK economy ahead of previous recessions. And the November 2008 *Inflation Report* noted that one of the biggest drags on UK growth in the first half of 2008 came from the marked decline in dwellings investment. This contraction reflected tighter credit supply and the deteriorating macroeconomic outlook, which have contributed to the sharp fall in house prices, housing market activity and house builders' profits over the past year. Further falls in investment are expected in coming quarters. But in judging the medium-term outlook, it is important to assess the incentives for residential investment in a well-founded economic framework. This article sets out such a framework.

Chart 2 Contribution of residential investment to weakness in GDP growth one year before recessions(a)

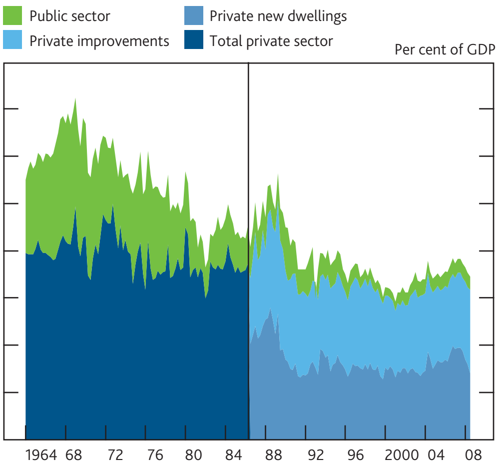


Source: International Monetary Fund (2008), Table 3.2.

(a) The chart shows the proportion of the abnormal cumulative decline in GDP that is accounted for by residential investment. The 'abnormal' contribution of a component to GDP growth is the difference between the actual and 'normal' contributions. The 'normal' contribution is calculated by smoothing the actual contributions over the whole period using the methodology in Leamer (2007).

The next section presents the general economics of investment. The article then separately applies this theory to private sector house building and improvements, which together account for over 90% of dwellings investment (**Chart 3**), and discusses how far it can explain recorded investment. Public sector investment accounts for the remainder. But, as the public sector's decision to invest in dwellings is a function of public policy as much as housing market conditions, this article focuses on private sector investment.(1)

Chart 3 Components of real dwellings investment(a)



Sources: ONS and Bank calculations.

(a) Disaggregated dwellings investment data are provided by the ONS, but are not published. They have therefore not been subject to the same level of scrutiny as published National Accounts variables. Separate data for improvements and new dwellings are not available prior to 1986 Q2.

Economics of investment

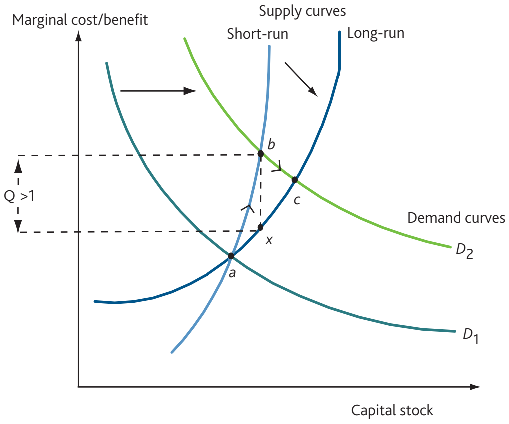
Housing is a durable good: it is not consumed once and disposed of, but yields housing services for many years. Hence, the decision to invest in housing can be analysed in a similar way to a company's decision to invest in machinery or other capital.

In theory, companies should invest in new capital until the benefit of acquiring an extra unit (the marginal benefit) equals the marginal cost. The benefit is captured by the expected return on the extra unit. The cost reflects the price of the investment good, depreciation, taxes and the interest rate on finance for investment. If the expected return rises or the cost falls, companies should invest more until marginal returns once again equal the marginal cost. When doing so, companies are adjusting their capital stock. Small changes in the desired stock can lead to large changes in the flow of investment.

In practice, there are 'adjustment costs' associated with changing the capital stock. For example, large increases in investment might push up labour costs if capacity constraints start to bind. Investment projects can also take some time to complete, so companies have to make investment decisions based on uncertain *expected* returns. This uncertainty introduces risk, especially since most investment projects cannot easily be reversed. Waiting for more information can reduce the uncertainty about returns, so companies will delay investing until the expected returns are sufficient to compensate them for the risk of investing.

Adjustment costs prevent the capital stock moving immediately to a new equilibrium. So the short-run supply response of the stock to a change in returns is less than the long-run response. This is illustrated in **Figure 1** where the short-run supply curve is steeper than the long-run curve. If there were no adjustment costs, the two curves would be equal and higher returns to investing (represented by a shift out in the demand curve from D_1 to D_2) would result in an immediate jump of the capital stock from point *a* to *c*. In the presence of adjustment costs, there is a slower adjustment from point *a* to *b*, and then to *c*.

Figure 1 Demand and supply for capital in the presence of adjustment costs



During this adjustment, the marginal returns to new investment (represented by point *b* on the demand curve) are greater than the marginal cost (represented by point *x* on the long-run supply curve). A common way to summarise this disequilibrium, and hence the incentive to invest, is known as 'Tobin's Q'.(2) Q expresses the market value of capital relative to its replacement cost, so it measures the profitability of investing. In the long run, when demand is equal to supply, Q should equal one: the return from an additional unit of capital equals the cost (points *a* or *c* in **Figure 1**). Investment should therefore just be sufficient to offset the depreciation of the capital stock.

As with other types of investment, empirical estimates suggest dwellings investment is subject to adjustment costs.(3) The

(1) Housing association investment, which in recent years accounted for around 9% of private sector new dwellings investment, is also driven to a large extent by public policy. But it is not considered separately from activity by private developers.
(2) See Tobin (1969).
(3) Topel and Rosen (1988) were the first to formalise the house builder's decision to construct new homes in the presence of adjustment costs. Using US data, they found that adjustment costs are a crucial factor underlying the house builder's decision.

responsiveness of UK dwelling investment to demand changes (signalled by price movements) in the short run is lower than in the long run.(1) And it is also low relative to other developed economies.(2)

The framework above implies companies produce and utilise the capital themselves. In practice, and housing is a good example, some companies produce capital goods for others to use. This can introduce additional frictions into the process. But the incentives to invest can still be modelled in the same way, even if those involved are slightly different. The next section applies this framework to house building and the following section considers improvements.

House building and Q

When applied to investment in new housing, Q is the *expected* market price of a new home, divided by the cost of production (see box on page 396). Because it takes time to build a home, builders must base their decision to start construction on their expectations of the price they will achieve when the property is completed and sold.

Other researchers have applied Tobin's Q to UK housing. For example, Barot and Yang (2002) use the ratio of house prices to building costs. Tsoukis and Westaway (1994) implicitly estimate Q, modelling house building as a function of house prices, residential land prices, building costs, the cost of capital and credit availability. But relative to previous analysis, this article includes more detail on the costs of house building, including costs arising from the planning process.

To highlight the importance of taking the planning process into account, this article first presents an initial simple Q measure that implicitly assumes planning costs have remained constant in real terms. The following sections outline how the components of this simple Q measure have developed over time, before combining them. More detailed estimates of the costs of the planning process are then introduced to give a more comprehensive measure of the incentive to invest in house building.

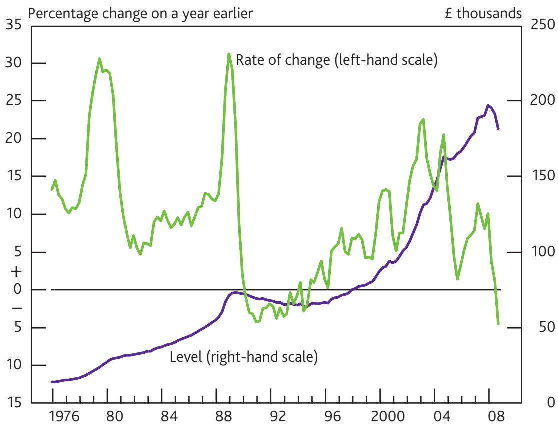
The market value of houses

The house-building Q's numerator, and the initial signal to invest, is the price of new houses. House prices should depend on the discounted cost of the future stream of housing services (what the household would hypothetically pay to rent the property). That will depend on the balance of demand and supply. The housing stock (like any form of capital) is likely to be fixed in the very short run, so changes in demand are likely to drive house price movements initially.

Housing demand depends on a range of factors, such as economic prosperity and demographics. Higher household income boosts housing demand; empirical analysis suggests that a 1% rise in real disposable income is associated with a similar increase in real housing demand.(3) Since 1972, real post-tax labour income per head has grown by almost 2% per year on average, implying a significant rise in housing demand over that period. This, together with demographic changes, may explain why the number of households has risen much faster than the population: Britain's population rose by around 4% between 1991 and 2004, while the number of households rose almost 10%. Lower average household size adds to housing demand.

The rate at which future benefits from a property are discounted will depend on interest rates and the expected capital gains on housing. Previous analysis indicates that the decline in long-term real risk-free interest rates over the past fifteen years can account for part of the rise in house prices between 1995 and 2007.(4) The fall in the spread between mortgage rates and risk-free rates in the earlier part of this decade would have further improved the affordability of housing and boosted house prices. And sustained house price increases may have led households to expect continued increases, which would have raised the price people were willing to pay for housing. These factors help explain the large house price increases over the past decade (**Chart 4**).

Chart 4 Price of new houses(a)



Sources: Halifax, Nationwide and Bank calculations.

(a) The average of the quarterly Halifax and Nationwide new house price indices.

Since mid-2007, at least some of these factors have unwound: mortgage lending spreads have risen, and measures of households' house price expectations have fallen as prices have fallen sharply. By 2008 Q3, new house prices were almost 8% off their peak, and surveys suggest builders expect

(1) For example, Barker (2003) reported estimates of the elasticity of supply of UK housing of 0.3 in the short run and twice that in the long run. A price elasticity of 0.3 indicates that a 1% increase in house prices is associated with a 0.3% increase in housing supply.
(2) Barker (2003) reported an international comparison study that showed the price elasticity of supply in the United Kingdom was about 0.5, versus 1.4 in the United States and 2.1 in Germany.
(3) Barker (2003), page 39.
(4) See, for example, Weeken (2004).

Tobin's Q for dwellings investment

New housing

Tobin's Q measures the incentive to invest by comparing the market price of capital to the replacement cost. In the case of housing, the relevant comparison is the market price of a new home to the cost of producing a new home.

This article's measure of Q for new housing is shown below:

$$Q_t^N = \frac{H_{t+3}^N}{L_t / D_{t+3} + C_t + P_t + F_t + O_t}$$

Where: H^N is the price of a new house;
L is the average price of non-residential land (per hectare);
D is the density of new developments (dwellings per hectare);
C is the cost of construction;
P is the cost of planning obligations;
F is the cost of professional fees associated with the development; and
O represents other costs, including the cost of finance.

There is a lag between the decision to start construction work and the sale of a completed dwelling, so house builders must form an expectation about what house prices will be when the property is sold. For simplicity, this article uses the actual value of house prices three quarters in the future as a proxy for builders' expectations. This lead on house prices is based on data from the National House Builders Council (NHBC) that show the average time between the date builders notify the NHBC of an intention to start work and the date of completion is about ten months.(1) Given that measures of density are not recorded until properties are built, Q also uses a three-quarter lead on the density of new developments to ensure that planned densities are included at the time construction starts.

It is the availability of land to build on that provides the main constraint on new supply. So the incentive for landowners to release new land for residential use must be captured in a measure of Q. While there will always be a premium on the price of residential land relative to non-residential uses, landowners should be willing to sell more land to house builders when the premium becomes unusually high. To capture this premium, the Q measure compares house prices in the numerator to the price of *non-residential* land (the opportunity cost of releasing land for residential development) in the denominator.

Details of the data sources used to construct Q are in the annex. But it should be stressed that there is considerable uncertainty about many of the components of this measure. In particular 'other costs', which includes the average premium on residential land, cannot be precisely quantified. For simplicity such costs are estimated so that the average real value of the premium on residential land and other costs over the period 1986 to 2007 is consistent with a Q equal to one. As a result, the Q measures can give an indication of the changes in the incentive to invest, but not the absolute level of returns to investment.

It should be noted that investment strictly depends on the unobservable *marginal* Q: the ratio of the market value of an *additional* unit of capital to its replacement cost. The Q shown in **Charts 8** and **9** is an *average* Q based on the flow of investment: the ratio of the market value of new housing to its replacement cost. Hayashi (1982) derives conditions under which average and marginal Q are equal. These conditions are unlikely to all be met in the case of house building. But a measure based on average costs and benefits to new investment is closer to the marginal Q than a measure based on the overall stock of housing.

Improvements

In theory, households' incentive to invest in improvements can be summarised in a Q measure in the same way as for house building. Q for a given improvement (say extending a two-bedroom house to three bedrooms) is defined as:

$$Q^I = \frac{H^I}{H^U + C}$$

where H^I is the market value of a property that has been improved (a three-bedroom house). C is the cost of the improvement (including raw materials, any labour costs and, where applicable, costs associated with obtaining planning permission). H^U is the market value of a property that cannot be altered via this particular improvement (a two-bedroom house that does not have space for an extension).

Comparing H^I to H^U captures the full gains from improving. The difference in value between H^U and that of a similar property that does have the potential to be improved is already incorporated in H^I. H^U is equivalent to the value of non-residential land in the house-building Q. If demand for a particular type of improvement increases, H^I will rise relative to H^U. This raises Q, assuming construction costs do not change, and increases the incentive to undertake the improvement.(2)

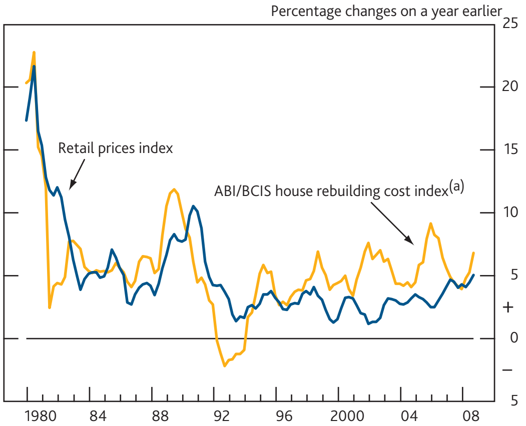
(1) In practice, there is considerable variation around the time to build for any particular site, but the profile of Q is invariant to small changes in this lead.
(2) Households owning improvable properties have the choice of undertaking improvements themselves or releasing them to those who want the improvements by selling them at their now higher prices.

further price falls over the next year. Nevertheless, prices remain considerably higher than a decade ago. However, construction costs and land prices, two key components of Q's denominator, are also higher, reducing any incentive to build.

Construction costs

House builders face costs for inputs such as raw materials and labour. Complying with building regulations, which impose minimum standards for new properties, also imposes a cost.(1) A combined measure of these costs has increased more sharply than retail price inflation since around 1994 (**Chart 5**). One explanation is that changes to building regulations have increased compliance costs. Another is that cutbacks in construction employment in the 1990s' recession subsequently resulted in prolonged labour shortages and rising wage costs relative to other sectors once output picked up. House builders have noted that much of the labour shed from the industry did not return even as wages rose sharply in real terms.(2) These effects only eased substantially in 2004 (**Chart 6**), as migrant labour was attracted to the United Kingdom.

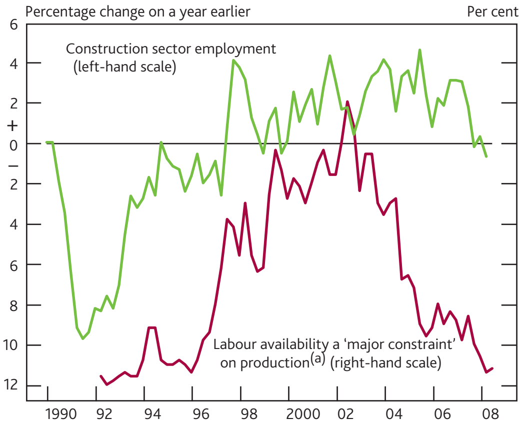
Chart 5 Retail price and construction cost inflation



Sources: Building Cost Information Service and ONS.

(a) See annex for details.

Chart 6 Employment and labour availability



Sources: Home Builders Federation and ONS.

(a) Percentage of builders citing labour availability as a major constraint on production.

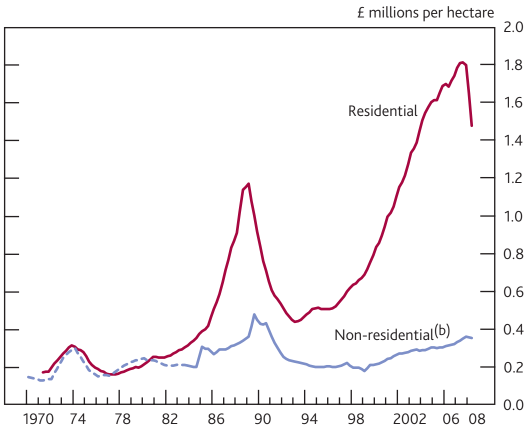
Increasing construction costs may have limited the incentive to invest to some degree. However, construction costs accounted for less than half of new house prices in recent years.(3) Another important element is land prices.

Land prices

House prices more than doubled in the decade to end-2007. House builders, attempting to increase output in response to the rise in housing demand, bid up the price of the limited supply of residential land. While production can be increased by raising building densities, supply can only increase substantially if landowners release further land for residential use (subject to receiving planning consent, which is discussed below). The availability of land is likely to be the key constraint on house building and so must be captured in any measure of Q. The amount of new land released will depend on the price of residential land relative to the returns from alternative land uses.

Chart 7 shows residential land prices against an estimate of the alternative non-residential value, based on agricultural and industrial land prices. The rise in the ratio of residential to non-residential land prices indicates that incentives to convert land to residential use have increased substantially in recent years. The exact size of the premium is uncertain, because the variety of sites makes it difficult to assess average land values. Furthermore, as Barker (2006) notes, **Chart 7** overstates the incentive to some extent, because the comparison is based on average land values whereas new developments involve land which can be converted relatively easily. Different land types are often not close substitutes. For example, agricultural land usually does not have access to roads and utilities. So residential land should always be worth more on average, but

Chart 7 Real UK land prices(a)



Sources: Department for Communities and Local Government, Department for Environment, Food and Rural Affairs, ONS, Valuation Office Agency and Bank calculations.

(a) 1987 prices, deflated by RPI.
(b) Data prior to October 1983 are estimated based on agricultural land price inflation.

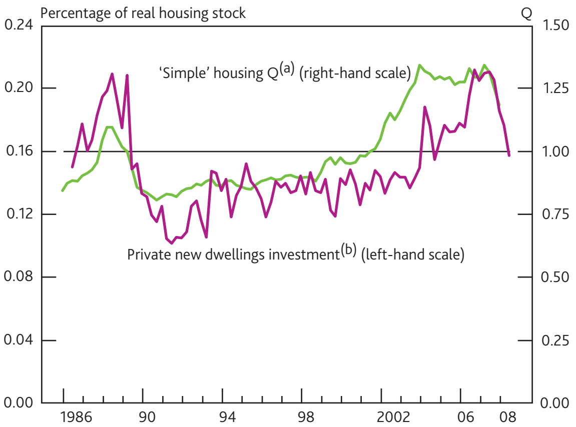
(1) Other regulatory costs, such as costs arising from the planning system are discussed later in the article.
(2) Office of Fair Trading (2008), page 176.
(3) Note this only includes the cost of the dwelling itself, not related infrastructure or decontamination/preparation of the site.

landowners should be willing to sell more land to house builders when the premium is unusually high. The estimated Q captures changes in this premium by comparing house prices in the numerator to the price of *non-residential* land (the opportunity cost of releasing land for residential development) in the denominator.

A simple Q estimate for new dwellings

Putting the above elements together (house prices divided by the sum of construction, land and other costs, such as the cost of finance), gives a simple initial estimate of Q (**Chart 8**). There is significant uncertainty about the components of this measure. As a result, while the measure gives an indication of the profile of returns, it does not provide a meaningful estimate of the absolute level of the return to house building.

Chart 8 'Simple' housing Q and real private new dwellings investment



Source: See annex for source data.

(a) Average of Q set equal to one over the period 1986–2007.
(b) Private new dwellings investment data are provided by the ONS, but are not published. They have therefore not been subject to the same level of scrutiny as published National Accounts variables.

Q rose in the late 1980s as house prices rose faster than costs, prompting a house-building boom. Then, as housing market prospects deteriorated, so did the expected return and, with it, house building. Q quickly dropped and remained low until 2001, when rising house prices relative to costs again boosted the returns to house building. It is perhaps puzzling why house building did not rise more quickly given the increased returns. However, this simple Q measure includes only a basic implicit estimate of a variety of 'other' costs; assuming such costs remain constant in real terms. In practice, these costs are likely to have varied over time. One particular example is the costs arising from the planning system.

The effect of planning on Q

As in all advanced economies, UK house building is subject to planning legislation. There are good reasons for not allowing unregulated land use, such as the value society places on open space or the potential to reduce commuting distances and carbon emissions by keeping housing closer together.[1] Planners balance the costs and benefits of regulating land use. But such restrictions inevitably reduce the land available for house building and raise the costs associated with new developments.

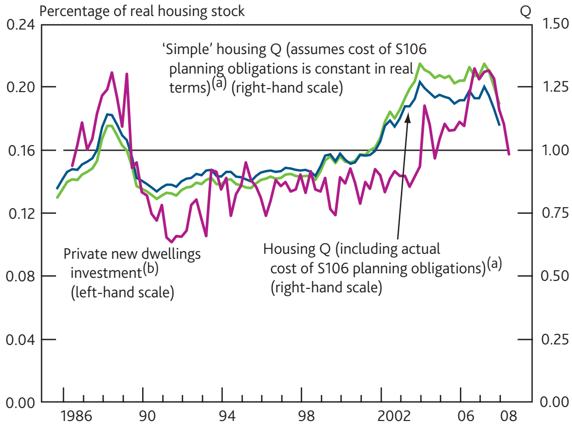
An example of planning legislation is Section 106 (S106) agreements. S106 of the 1990 Town and Country Planning Act allows local authorities to seek cash or contributions-in-kind from developers to mitigate a development's impact. These payments contribute towards affordable housing, transport infrastructure and other public benefits. 'S106 agreements offer a useful mechanism for infrastructure delivery and, in some cases, can act as an incentive for development by allowing local authorities to extract development contributions for the benefit of the wider community' (Barker (2004), page 53). Aside from affecting planning authorities' incentives, such contributions can also boost private sector new dwellings investment, as payments towards affordable housing may allow additional investment by housing associations (which the ONS classifies within the private sector).

Information on the costs of S106 agreements is limited, but research for the Department for Communities and Local Government (CLG) and other data indicate that the value of S106 agreements has risen considerably over the past decade.[2] For example, CLG estimates that the value of S106 planning obligations agreed in England rose by around 57% between 2003/04 and 2005/06, to £4 billion (around 15% of the total value of house building).[3] By contrast, the value of house building rose by less than 40% over the same period. While there is much uncertainty around these estimates, **Chart 9** suggests such costs dampened the rise in returns to house building from 2001. The Q measure that includes these costs picks up less sharply than the simple measure, which may help explain part of the subdued pickup in new dwellings investment over the past decade.

Q in **Chart 9** does not include other costs that may also have changed in recent years, such as the cost of obtaining planning permission. For example, not all applications receive permission. In recent years the rejection rate for major housing applications has increased significantly, from around 15% in the mid-1990s, to over 35% in 2008.[4] As applicants must bear the cost of unsuccessful applications, this suggests the cost per successful application has risen in recent years. The rejection rate understates the effect of the planning system on the availability of developable land, as many sites are in areas, such as the greenbelts surrounding various cities, where development is forbidden. While the cost of such restrictions is not easily quantified, recent studies have noted

(1) For other examples see Barker (2006), pages 154–59.
(2) See annex for more details.
(3) Crook *et al* (2008).
(4) Major residential developments are those with ten or more dwellings.

Chart 9 Housing Q (including the costs of S106 agreements) and real private new dwellings investment



Source: See annex for source data.

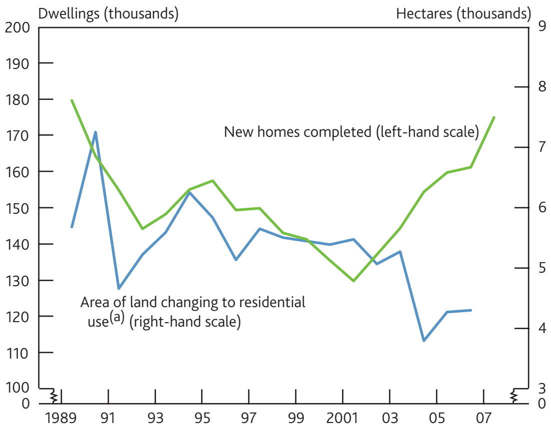
(a) Average of both measures of Q set equal to one over the period 1986–2007.
(b) Private new dwellings investment data are provided by the ONS, but are not published. They have therefore not been subject to the same level of scrutiny as published National Accounts variables.

that the planning process has constrained house builders' ability to increase supply rapidly when demand increases.[1] Indeed, the amount of land used for new house building has fallen since 2003 (**Chart 10**), despite an increased number of major housing applications.

Restrictions on land supply do not necessarily prevent a rise in house-building activity (**Chart 10**). Builders can shift production from low-density houses to high-density flats. Densities in England have increased from 25 dwellings per hectare in 2001 to around 45 in 2007. But as the supply of flats rises relative to the supply of houses, the relative price of flats will fall, reducing the incentive to invest (assuming the relative demand for flats does not also increase).

The time taken to get planning permission may also explain the sluggish response of house building to rising returns up to

Chart 10 New dwellings investment and land use, England



Source: Department for Communities and Local Government.

(a) 1999 land area statistics are not published by CLG. The figure shown is the mid-point between the 1998 and 2000 figures.

2007. Research by the Home Builders Federation (HBF (2006)) and Ball (2008) found that the average time spent in planning was about fifteen months, but is highly variable, with some developments spending more than three years in planning.

The estimated Q also takes no account of uncertainty and the benefit of waiting for more information. In the context of housing, house builders may not have believed that the rise in house prices from around 2000 was a persistent phenomenon, so may have wanted to see several years of consistent price increases relative to costs before expanding output. Similarly, now property prices and housing market transactions are falling, builders may be unwilling to invest while they are unsure what price they will receive, or even if they can sell their properties, once the development is complete. The unobservable cost of uncertainty should enter the denominator of Q. At present this cost is likely to be unusually high, so the current estimated level of Q may overstate the incentive to build homes.

Asymmetric supply response

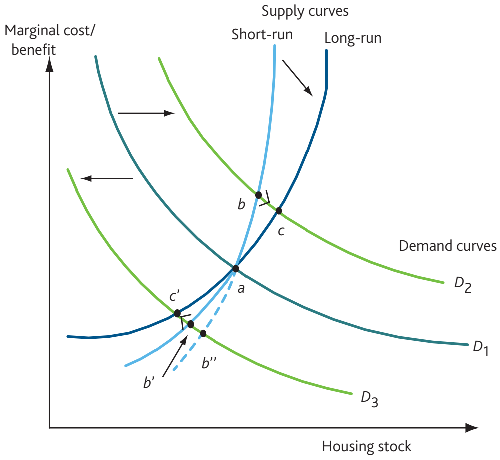
This article has discussed why investment in new dwellings in the United Kingdom responded only slowly to increased returns from 2001 to mid-2007. But since then house prices and activity have fallen sharply. The sharp fall in house building in response highlights asymmetric adjustment costs, which reduce the responsiveness of investment to *increases* in demand, but have less impact when demand *falls*. For example, planning permission grants a permission rather than an obligation to build, so builders can cut production in response to a fall in demand more easily than they can increase production. It is also easier to cut the labour force than to find new workers with appropriate skills.

Figure 2 illustrates the effect of asymmetric adjustment costs with a 'kink' in the short-run supply curve. (The dotted line shows the 'unkinked' curve from **Figure 1**.) As before, an increase in demand from D_1 to D_2 initially causes a jump from the starting point *a* to point *b*. This corresponds to a large move upwards in house prices and a limited increase in the housing stock. If adjustment costs were symmetric, a fall in demand from D_1 to D_3 would similarly result in a large fall in prices and a limited fall in the stock (a move from *a* to *b''*). But with asymmetric costs, a fall in demand has a smaller initial effect on prices, because the slope of the short-run supply curve is closer to the long-run response (a move from *a* to *b'*).

Pryce (1999) finds evidence of asymmetric responses to house prices in the United Kingdom, with a lower supply response in the boom of the late 1980s than in the bust of the early 1990s. Some evidence for this asymmetry can also be seen in the sluggish response of investment to increases in Q earlier in this decade, compared with the period since the start of 2007,

(1) For example Barker (2004), Callcutt (2007) and Office of Fair Trading (2008).

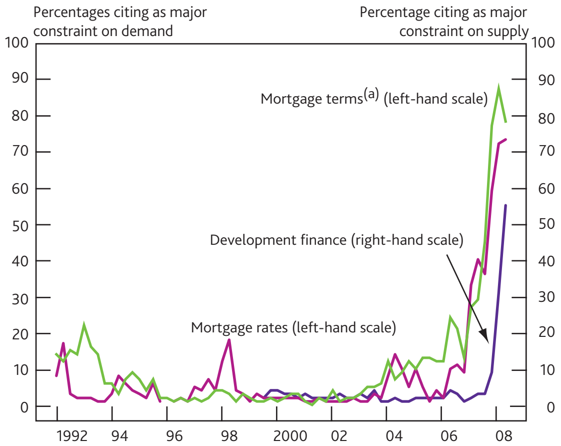
Figure 2 Demand and supply for housing in the presence of asymmetric adjustment costs



during which new dwellings investment has fallen by around a quarter as Q has fallen.

To the extent that credit availability is procyclical, credit might compound the effects of asymmetric adjustment costs. Survey evidence from the HBF suggests that between 1992 and 2007 house builders did not feel constrained by credit availability (**Chart 11**). However, since mid-2007, survey data and reports from Bank contacts indicate that the availability of credit to house builders has tightened significantly and is acting as a major constraint on supply. Furthermore, house builders report that credit availability is acting as a constraint on household housing demand. The Q measure does not take account of credit market frictions, because the underlying theory assumes companies can always obtain finance to exploit a profitable investment opportunity.

Chart 11 House builders' view of major constraints on demand for and supply of new dwellings



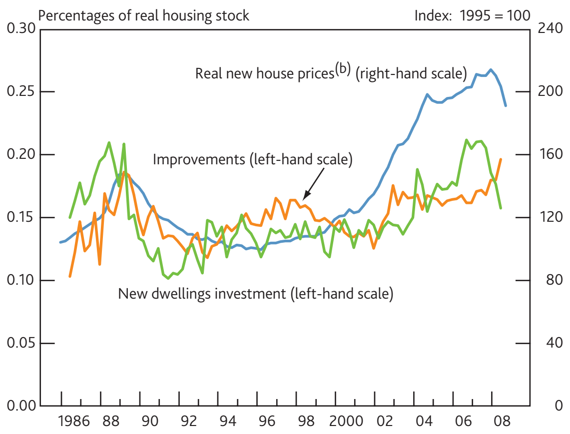
Source: Home Builders Federation.

(a) Mortgage income multiples and loan to value ratios.

Improvements

Between 2002 and 2007, improvements to existing dwellings (defined as major renovations or modifications) increased as a percentage of the housing stock, but by less than the rise in new dwellings (**Chart 12**). Given the potential substitutability of improvements and new dwellings, and the strong increase in housing demand implied by rapid house price increases, the level of improvements over the recent past is perhaps surprisingly low. This is especially true given that the increase in planning costs in recent years might have encouraged a substitution from house building, because planning affects new house building more than improvements. However, new dwellings and improvements are not perfect substitutes: an existing house cannot be improved indefinitely. And over the past 20 years the number of households has risen substantially while the average household size has fallen, so improvements may be less appropriate to meet the demand for additional housing.

Chart 12 Components of dwellings investment and real house prices(a)



Sources: Halifax, Nationwide, ONS and Bank calculations.

(a) Disaggregated dwellings investment data are provided by the ONS, but are not published. They have therefore not been subject to the same level of scrutiny as published National Accounts variables.
(b) The average of the Halifax and Nationwide new house price indices, deflated by RPI.

In theory, households' incentive to invest in improvements can be summarised in a Q measure in the same way as for house building (see the box on page 396). In practice, it is difficult to construct such a Q measure. The cost of improvements can be estimated, but given the wide variety of possible improvements, the value of an average improvement is unobservable. Furthermore, even if Q could be measured, it may not adequately explain recorded changes in improvements, because measuring improvements is very difficult. 'The borderline between… improvements, on the one hand, and repairs (which are part of intermediate consumption) on the other, is not easy to draw.' (ONS (1998), paragraph 15.36). For this reason, improvements data are more uncertain than new dwellings data.

Nevertheless, some general conclusions can be drawn. The value of improvements is determined by demand for the housing services they provide, and so is likely to be correlated with the general level of house prices (which is driven by aggregate housing demand). This is supported by **Chart 12**. It is therefore plausible that the fall in house prices over the past year implies a fall in improvements, as the incentive to improve properties diminishes.

Conclusion

This article used an economic framework — in particular 'Q' theory — to interpret movements in dwellings investment. The rise in house building between 2003 and 2007 can be explained to some extent with a Q measure based on estimates for house prices, land prices, construction costs and planning costs. However, house building initially rose more slowly than might have been expected, possibly reflecting factors, such as time spent in planning, which limit the speed at which house builders can react to rising returns. Such factors have not restrained the response of house building to the fall in estimated returns over the past year and to the tightening in credit supply. In 2008 Q3, starts by private developers and housing associations were 48% lower than a year ago. Given the lags in the construction process, this is likely to translate into weak investment for some time.

The scale and pace of the eventual recovery in house building will depend on the expected future path of house prices and on credit supply. The Bank will use the framework described in this article to help in its assessment of the medium-term outlook for new dwellings investment.

For improvements to existing dwellings, data limitations preclude the construction of an appropriate Q measure. In addition, investment in improvements is subject to greater measurement error than house building, because it is difficult to distinguish between improvements and repairs. But, as the return from improving a property is likely to be correlated with the general level of house prices, the recent fall in prices suggests that improvements might fall in the near term.

Annex
Data underlying the components of Q for new housing

This annex details the data sources used to estimate Q, as defined in the box on page 396.

Price of new homes (H^N)

New house prices are a simple average of the quarterly Halifax and Nationwide price indices for new homes.(1)

Price of land per dwelling (*L/D*)

Data on non-residential land prices are based on agricultural and industrial land price data from the Department for Environment, Food and Rural Affairs and the Valuation Office Agency. In each region of the United Kingdom, a weighted average land price is calculated based on the split between greenfield and brownfield development in that region. Information on this split is sourced from the Department for Communities and Local Government (CLG). A UK index is created by weighting together each region using population weights as a proxy for the number of dwellings in each area.

To calculate the cost of land used per dwelling, CLG data on building densities for new developments are used.

Construction costs (*C*)

The construction cost of a dwelling is based on a CLG report (CLG (2008)), which estimated that the cost of building an average dwelling in 2007 Q4 was about £72,500. The report notes that this estimate relates to the construction of the dwelling only. It makes no allowance for site-specific costs, such as infrastructure or drainage, or non-construction costs such as planning or legal fees. This cost is projected backwards using the house rebuilding cost index from the Association of British Insurers (ABI) and Building Cost Information Service (BCIS).

Fees (*F*)

House builders incur significant other costs in the process of building a dwelling in the form of professional fees to solicitors, architects and planning advisers. The ONS estimate these costs are equal to about 5% of construction output, so the measure of Q uses the same estimate.(2)

Planning obligations (*P*)

Section 106 (S106) of the 1990 Town and Country Planning Act allows local authorities to seek cash or contributions-in-kind from developers to mitigate a development's impact. Rough estimates of the cost of such planning obligations are based on research from the CLG for 2003/04 and 2005/06 (**Table 1**). In practice, not all agreed contributions will be delivered as some developments may not go ahead or may be renegotiated. So estimates of S106 costs are based on the assumption that only a proportion of agreed contributions are delivered.

Table 1 Value of Section 106 planning agreements agreed and delivered (England)

£ billions	Agreed		Estimate of actual delivered	
	2003/04	2005/06	2003/04	2005/06
Total value of non-affordable housing obligations (excluding land)	0.7	1.0	0.5	0.4[a]
Affordable housing	1.2	2.0	0.6	0.9
Subtotal	1.9	3.0	1.1	1.3
Land contributions (other than for affordable housing)	Unknown	1.0	Unknown	Unknown
Total delivered	Unknown	4.0	Unknown	Unknown

Source: Crook *et al* (2008).

(a) Crook *et al* caution that the small sample size used to estimate this number means 'this analysis cannot be regarded as accurate, but it is the one estimate of the value of obligations actually delivered in 2005–06'.

Projections beyond the available data are based on estimates from Barlow *et al* (1994) of the number of affordable homes built in the early 1990s and the assumption that the number of Section 106 agreements has risen over time in line with available data (**Table 2**). The cost per Section 106 agreement is assumed to move in line with residential land prices (either because some payments are given in the form of open space or land for affordable housing that will be linked directly to land prices, or because the viability of a scheme, and hence the amount a builder can afford to pay in planning obligations, will be a function of land values).

Table 2 Proportion of planning permissions with planning agreements attached (England)

Per cent	1987–90	1993	1997/98	2003/04	2005/06
All developments	0.5[a]	1.1	1.5	6.9	6.4
All dwellings developments			7	14	14
Major dwellings developments[b]			26	40	48

Source: Crook *et al* (2008).

(a) A small number of planning permissions had planning agreements attached prior to 1990, reflecting agreements signed under earlier planning legislation.
(b) Major dwellings developments are those for ten or more dwellings.

Other costs (*O*)

In the absence of detailed data on, for example, the cost of capital for landowners and builders, the estimate of 'other' costs are estimated as a constant percentage of construction costs so that the average values of both measures of Q presented in this article are equal to one over the period 1986 to 2007.

(1) The Halifax index for new house prices is only available back to 1983. Prior to that, the series is projected back using only the Nationwide new house price index.
(2) Further details are provided in the UK Gross National Income (ESA95) Inventory, Chapter 5: The Expenditure Approach, paragraph 4.2.1.4.

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