Technical Note
At what cost?

Modelling technical note

October 2013

www.shelter.org.uk

Shelter

Introduction

House prices in the UK currently follow a 'boom and bust' pattern, rising sharply and then falling back down continually. In the long run, they tend to trend upwards.

This uncertainty in the housing market can create problems for families who are looking to buy while prices go up, and also for homeowners who have bought a house just before a crash. However, house price stability will allow people to get on to the ladder, help existing home owners to move to their next dwelling and decrease the amount of time people are trapped in accommodation or conditions that are unsuitable.

Shelter commissioned the consultancy HATC to assess the likely impacts of different house price scenarios. The goal of the model is to understand how different rates of house price inflation affect different households – both buyers and current owners - in different parts of England for example, how much buying might cost them; how long they would have to save in order to buy; and what the long term impacts on their finances would be.

Overall, the model seeks to test the commonly held assumption that house price increases are generally a 'good thing' for most people.

How does the model work?

The model seeks to estimate how different households (in terms of composition, location, income, for example) are affected by varying house price inflation scenarios. By feeding in key data and making some assumptions, the model allows us to track stylised households across their working age and will provide estimates on wealth, property, savings etc.

It is important to recognise that this is a model and not a forecast. Whilst strong and robust as a model, it is not a forecast as forecasting implies a degree of certainty that these house price inflation scenarios will happen. This model does not predict or forecast how house prices will change but rather it estimates how individual households are affected given the changes to the variables in the model, *ceteris paribus*. Furthermore, a fully robust forecast demands a larger and wider range of inter-linked variables that this model does not contain.

Household type

Where we live, who we live with and what we earn affect our ability to buy a home. Therefore the model considers:

Location
The location examples used are guided by *Centre for Cities*[1] typologies, selected to provide a reasonable geographic spread and relative strength of their economies:

- London, (buoyant)
- Brighton (buoyant)
- Leeds (stable)
- Plymouth (stable)
- Coventry (struggling)

---

[1] Webber, C. and Swinney, P. – Private Sector Cities (2008) London: Centre for Cities

However, statistical information regarding earnings and household expenditure is not available at that level of geography, and therefore the report uses regional data that covers the identified areas i.e.:

- London
- South East
- Yorkshire / Humberside
- South West
- West Midlands

Household types
The household types are drawn from the ONS Families & Households categories and were selected to maximise the coverage of the population. The four largest categories are:

- Single person under 65, with no children (16% of the population);
- Couple with no children (28%);
- Couple with 1 or 2 children (18%);
- Lone parent with children (7%).

Occupation
These are drawn from the nine Major Groups in the ONS's *Standard Occupational Classification 2000* (SOC 2000) categories. The model does not include all occupations, just some representative ones.

The ones selected were the four major groups that represented the largest proportions of the total labour force. These were professional occupations (19% of the labour force), administrative & secretarial occupations (11%), skilled trades (11%) and elementary occupations (11%).

Specific occupations within these Major Groups were selected by choosing the occupation whose median income is closest to the median of that Major Group. The four specific occupations were:

- Psychologist (from the Professional Occupations) with a median 2011 salary of £38,815 ;
- Bricklayer (from the Skilled Trades occupations) with a median 2011 salary of £22,452;
- Legal Secretary (from the Administrative and Secretarial Occupations) - with a median 2011 salary of £19,268;
- Dry cleaner (from the Elementary Occupations) with a median 2011 salary of £13,479.
- These 4 occupations between them therefore represent 52% of the labour force.

Income
Earnings data was taken from the Office of National Statistics' *Annual Survey of Hours and Earnings 2011 (ASHE 2011 Table 14.7a).* The gross annual pay for full-time UK employees in 2011 provided the regional range of earnings for each occupation, in deciles. As this data set was not complete it was interpolated to produce a complete set of income deciles for the four occupations selected in this study. These were weighted for regional variations in accordance with *ASHE 2011 Table 3.7a.*

Shelter

Number of incomes per household
The model assumes that different households would have either one or two income-earners and that where two people are working, they have equivalent jobs (and therefore salaries) to the occupations selected.

The model also assumes that a household that includes children will mean that one parent will need to provide at least part-time care and will therefore only be able to work part-time.

The ASHE 2010 full-time earnings and part-time earnings figures were analysed, calculating part-time earnings as a ratio of full-time earnings for all of the occupational categories for which the median and mean salary was available (1,194 occupational categories out of 3,906). The mean ratio of part-time to full-time earnings was 51%, and the median ratio of part-time to full-time earnings was 49%. Therefore it was concluded that it is reasonable to assume that a part-time job represents half a full-time income.

Therefore the model assumes the following income streams for the different household types:

Couple with no children: 2 incomes;
Couple with children: 1½ incomes;
Single person with no children: 1 income;
Single person with children: ½ income.

Income progression
The model assumes that people within elementary and skilled trades occupations begin earning at age 18, whilst administration and professional occupations begin earning at age 21.

For ease the model assumes that all households, in all occupations would start off on the first income decile for that occupation, and that over time they would earn promotions, moving up income deciles, with the final promotion taking them to the 6th decile.

The model does assume that higher-paid occupations will take longer to reach more senior positions, with professional occupations achieving their final salary aged 50, administration and secretarial occupations at age 40 and elementary and skilled trades occupations at age 30.

Within these parameters, the rate of job income progression through the deciles was driven by assumptions about the professional occupations' rate of promotion. It was assumed that they would spend two years on the 1st decile, three years on the 2nd, ten years on the 3rd and 15 years on the 4th decile before their final promotion to the 6th decile aged 50.

The rate of promotion for other occupations used the same rate, but prorated to reflect the different timescale between first employment and reaching the 6th income decile aged 40 and 30 as applicable.

Occupation	1st decile	2nd decile	3rd decile	4th decile	6th decile
Psychologist	Year 1	Year 3	Year 6	Year 16	Year 31
Legal Secretary	Year 1	Year 2	Year 4	Year 10	Year 21
Bricklayer & Dry Cleaner	Year 1	Year 2	Year 4	Year 7	Year 14

It is worth noting that in most years the household does not receive a promotion, and therefore income is uplifted in accordance with assumed RPI only.

Shelter

Moving house
The model assumes that first-time buyers would purchase the cheapest property in the area which was a flat for all regions apart from Leeds (Yorkshire & Humberside), which was a terraced house.

The model also assumes that all households, when starting work, would want to purchase their entry-level dwelling as soon as possible, and would **rent** somewhere until they were able to make their first purchase.

After that, the degree to which households want a larger dwelling is assumed to be driven by a growing family (for those households with children) or a desire to acquire more space (for those households without children).

Department of Communities & Local Government data suggests that owner-occupying households move on average every 11 years[2]. This median figure covered households at different stages in their "housing journey". The model assumes that the rate of moving is faster in the early years and slower later on.

Therefore, the model assumes that households will *seek* to move at the following rates:

- **First purchase** - Year one, a flat (or, if in Leeds, a terraced house);
- **Second purchase** – Year five for households with children or year seven for households without children, moving from a flat to a terraced house. Households in Leeds are assumed not to move at this time as they are already in a terraced house.
- **Third purchase**: Year 11 for households with children or year 16 for households without children, moving from a terraced house to a semi-detached house.
- **Fourth purchase**: Year 21 for households with children moving from a semi-detached house to a detached house. The model assumes that households without children do not wish to trade up beyond a semi-detached house.

Although these are the targeted dates for trading up, actual trading up occurs in the model when two conditions are met:
- the household is assumed to want to move (in accordance with the above timetables);
- the household income and equity means they can afford to move.

In many cases households will *not* be able to make their first purchase as soon as they enter employment. The delay in achieving their first purchase is referred to in the study as the ***Frustration Period***.

Also, many households will not be able to afford to trade up at the rate that they would like to, and so will remain trapped in homes that do not meet their needs. The cumulative period of time that households want to move, but are unable to do so, is referred to in the study as the ***Trapped Period***.

Savings
The model looks at the accumulated wealth at age 65. This is the sum of equity (for owner occupiers) plus savings. Therefore, assumptions were made on savings rates.

---

[2] English Housing Survey, Department for Communities and Local Government (DCLG, 2010d)

The model assumes that all households, under all scenarios, will save where they have the capacity to do so. Where a household is 'trapped' the model shows them moving when their savings reach a point that allows them to do so (if ever). That is to say, the model assumes that people will use all of their savings as a deposit in order to obtain a mortgage.

Where savings are not needed to facilitate a move (such as when the household is in their final property, or where households are renting and do not wish to buy) the savings are accumulated and form part of the predicted household assets at retirement.

The model assumes that households cannot save when housing costs are at a very large proportion of household income, but that the household can start to save as housing costs fall over time as a proportion of income. The model assumes that as housing costs fall below a "reasonable proportion" of household income, savings are accrued. That "reasonable proportion" is 33% of household income[3].

Deposit

Having a deposit large enough to secure a mortgage is a particular barrier and has become even more of an issue in recent years as credit is constrained. The model therefore takes into account two scenarios within the analysis:

1. Households are gifted the money necessary to cover the deposit on their first purchase, and the associated transaction costs. Help with deposits usually comes from parental assistance 'Bank of Mum and Dad'[4] or other windfalls such as inheritance money.
2. Each household has to save the money, in full, to cover these costs before they can make their first purchase.

The analysis in the report assumes that all households have to save for a deposit.

Economic assumptions

The costs of borrowing and wider macroeconomic variables also play a role in determining house prices and the ability to purchase a home. While macroeconomic variables are influenced by a range of global and national factors, the model has made some assumptions on various rates and costs.

General Economic Assumptions 2010 – 2054
These assumptions are subjective, but are based on current market estimates of relevant rates and are averaged them over the modelling period.

- Bank Base Rate: 2%
- LIBOR: 2.5%
- General inflation p.a.: 3.0%
- Savings interest rate p.a.: 1.0%
- Market Rent p.a.:   5% of property value

---

[3] This can be seen in the context of the EU's Housing Cost Overburden Rate threshold being set at 40% of household income. Of the 4 family types assumed in this model, the proportions that are spending more than 40% of their income on housing costs ranges between 12% -34%.
http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&plugin=1&language=en&pcode=tessi166 ,
and the Aviva *Family Finances Report* summer 2011 reporting that on average household spends 21% of their income on housing costs, and 19% in the August 2012 report.
[4] Shelter -
http://england.shelter.org.uk/campaigns/building_more_affordable_homes/the_bank_of_mum_and_dad

Costs of Purchasing Assumptions

Mortgage term:	25 years
Mortgage type:	Repayment[5]
Mortgage Interest Rate:	3.0% real i.e. 6.0%
Income multiplier (sets the maximum mortgage available to the household)	Actual rates 1997 – 2010 After 2010: assumed to be 3.5 times household income.
Deposit required	Actual rates 1997 – 2010 After 2010: assumed to be 10% of purchase price
Fees per move:	£3,000 plus 1% of purchase price in year 1, inflated thereafter in accordance with RPI
Stamp Duty:	Actual rates 1997 – 2010; thereafter :

Purchase price	Rate
< £125,000	0%
£125,001 – £250,000	1%
£250,001 – £500,000	3%
£500,001 – £1,000,000	4%
>£1,000,000	5%

House prices
House prices are driven by general house price inflation but also by geography and dwelling type. Property price data was sourced from Nationwide House Price Indices[6] and Office of National Statistics / Communities & Local Government[7] in order to obtain information about price differentials arising from both location and property type.

For the period 1997 - 2010 the model uses actual property prices and these were used in the model. These actual prices were also used to establish price differentials between the five geographic regions used in this study, and between the property types of a flat, terraced house, semi-detached house and detached house. These differentials were used in the model to predict property prices after 2010, under each of the HPI scenarios.

House price inflation scenarios

The model can be used to test any range of house price scenarios. This allows us to see how households are affected if house prices rise or fall, or stay the same. It also helps us to test assumptions about whether an increase in house prices is a worthwhile objective as well as allowing us to assess which type of change would help those on low-middle incomes.

Six scenarios
- **Boom and bust**: continuing the boom/bust cycle of the last 40 years, all with a trend line of long term real price increase of 2.8% p.a. (the figure of 2.8% has been taken from the Barker Review, 2004);
- **Current Trend**: the same figure of 2.8% real price growth but as a straight-line trend i.e. without the boom/bust cycle;
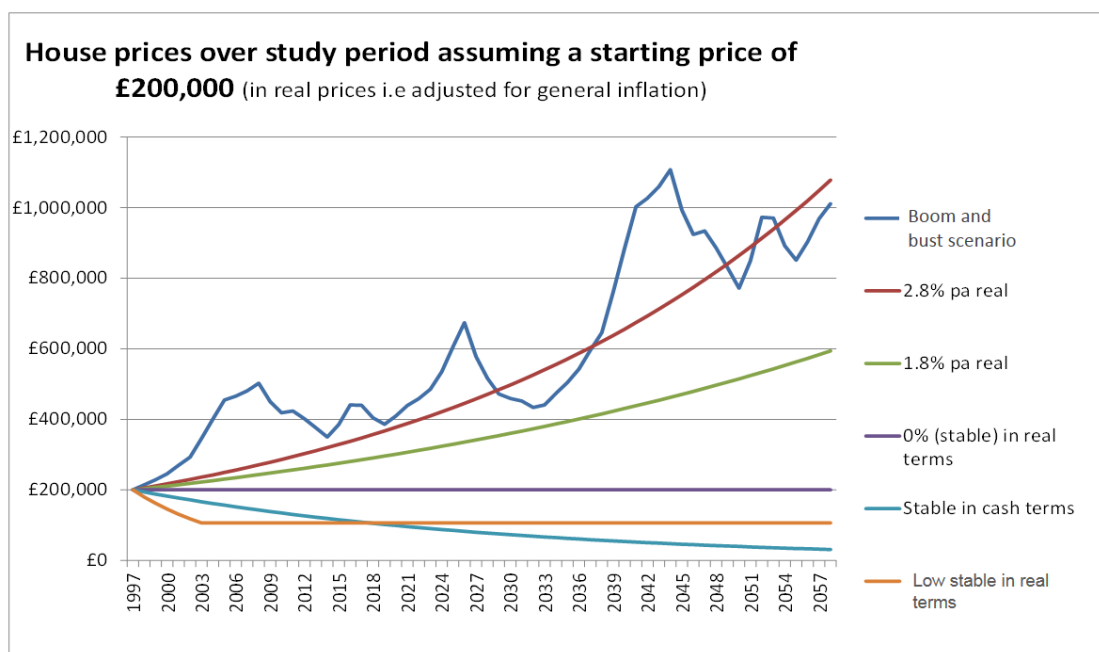
---

[5] Mortgages were assumed to be taken out on a repayment, not interest-only basis, as Council of Mortgage Lenders reports that these represent 98% of loans to first-time buyers and 83% of loans to movers (CML, January 2012).
[6] Nationwide Building Society's Real Regional House Price Indices
[7] House Price Index Table 26, February 2012.

- **Increased Supply**: this assumes a significant increase in housebuilding production to 200,000 completions per annum (as recommended in the Barker Review), to erode real house price inflation to 1.8% p.a.;
- **Stable in real terms** i.e. house prices increase in line with general inflation;
- **Stable in cash terms** i.e. house prices do not increase at all;
- **Stable prices at a lower value** – stable house prices in real terms after a 10% reduction.

The analysis in the report uses only two of these scenarios for comparison – boom and bust and stable in cash terms.

House prices over study period assuming a starting price of £200,000 (in real prices i.e adjusted for general inflation)

Model limitations

Every model created has limitations as assumptions on a range of factors and variables have to be made in order to create a working model and/or ensure suitable levels of complexity. While not ideal, it is necessary to make some assumptions in order to allow a model to work.

1. At age 18 (or 21 depending on the occupation), each household is in employment and is renting in the private sector. The model assumes that households source housing that meets their needs/wants from the market rental sector until they are able to buy. It does not assume that they will stay with family, for example.
2. It is also assumed that there are no trapped periods for those living in the private rented sector. Therefore, the model assumes that whilst either choosing to rent or renting in order to save for a deposit, these households are in accommodation that satisfies their needs. In reality, the private rental sector does have problems and issues for households that this model does not cover.
3. The model does not assume that households 'downsize' at any point.
4. For couples, both partners are assumed to be in the same income group.
5. The decrease in household income where a parent has a child were applied from the first year of employment through to retirement even though it is unlikely that the households with children would experience a reduction in income from Year 1 all the

way through to Year 40+. The reduction in income occasioned by children would normally be expected to last for approximately 15 years from birth to mid teenage.

6. The model assumes that there is continued career progression with promotions and income increases.

7. Where a promotion doesn't happen in a given year (the majority of years) earnings are assumed to increase in line with inflation (RPI) which often does not happen, particularly recently.

8. The model assumes no income from any form of welfare benefits, or any other source other than occupations. In the model, low-income households may have housing costs that leaves unrealistically little money for food, energy, clothing and other costs. It is assumed that welfare benefits will provide for the needs of such households.

Measurable outputs

In order to determine the effects of varying house price scenarios, the model can measure:

- Wealth (equity plus savings) at the end of the period
- How long it takes to purchase the first dwelling
- How many cumulative years are households in accommodation that is too small (in terms of need or ambition)
- Whether, by the end of the housing period (65 years old), the household was able to fully purchase the largest dwelling they wanted.