Ministry of Housing, Communities & Local Government

Analysis of the determinants of house price changes

Introduction

The Ministry of Housing, Communities and Local Government (MHCLG) has conducted a short piece of analysis intended to illustrate the individual relationships between some important housing market determinants and house prices. The analysis uses relationships estimated from the affordability model described in the 2007 and 2008 reports by the National Housing and Planning Advice Unit (NHPAU)[1, 2]. Given the complexity of the housing market, this analysis is not intended to be exhaustive in its explanatory power and throughout this release references are made to limitations. Other studies are available that analyse this relationship.

Background

House prices are fundamentally a function of the supply of and demand for housing. Underlying demand for housing is positively correlated with the number of households that form and changes in real incomes. Demand is negatively correlated with interest rates. The impact of higher demand on house prices and rents will depend on the increase in demand relative to changing supply.

This ad hoc publication estimates the indicative change in house prices over time which could be attributed to different determinants of house prices. These estimates are on an individual basis holding all else equal, and are calculated for changes in: the number of households; real incomes; interest rates; and housing supply.

Method

In June 2007, the NHPAU published, 'Affordability matters'; a report which described the University of Reading econometric model which estimates the relationship between housing supply and affordability through the interplay of demographic trends, incomes, the labour market and the housing market[1]. The report included estimates of some of the key relationships embedded within the model to further understanding of how the housing market operates in the long run.

In 2008, the NHPAU published the report, 'Affordability *still* matters'[2] which repeated the estimates of the key drivers of house prices and their relationship with affordability as set out in the 2007 report. 'Affordability *still* matters' set out that, holding all else equal:

- If the number of households increases by 1 per cent, house prices would increase by about 2 per cent;

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[1] Affordability matters (page 18): National Housing and Planning Advice Unit, 2007
http://www.wiltshire.gov.uk/corestrategydocument?directory=Studies%2C%20Surveys%20and%20Assessments&fileref=3
[2] Affordability *still* matters (page 22): National Housing and Planning Advice Unit, 2008
http://webarchive.nationalarchives.gov.uk/20081214215740/http:/www.communities.gov.uk/documents/507390/pdf/867681.pdf

- A 1 per cent rise in real incomes would increase house prices by 2 per cent;
- If interest rates increase by one percentage point then house prices would fall by around 3 per cent; and,
- If housing stock increases by 1 per cent, house prices would fall by around 2 per cent.

For the purposes of this analysis the estimated relationships from the University of Reading model (described in the 2007 and 2008 NHPAU reports) have been applied to historical data showing how the individual factors have changed over time. This provides a stylised indication of the change in house prices as a result of each of the determinants, holding all else equal.

Use of analysis in this way should be treated cautiously and used primarily to draw stylised inferences. The model estimates the national long run relationships assuming all other factors are equal. In reality, shifts to one of these determining parameters do not happen in isolation and changes to house prices are due to the interaction of many demographic, economic and societal factors.

For each factor a suitable, publically available dataset was used to estimate the change over a 25 year period (1991 to 2016).

The number of households depends on the population and the rate at which households form. Population is dependent on the four components of demographic change: births; deaths; net international migration; and, net cross-border migration (migration between countries within the United Kingdom). For the purpose of this analysis, net international migration has been presented separately. The change in the population (of England) between 1991 and 2016 which was born outside of the United Kingdom (UK) has been used as a proxy for net international migration. For the purpose of this analysis, it is assumed that population growth is proportionate to household growth.

Bank of England base rate data was used as a proxy for average mortgage rates (see the 'Interest rate reduction' section for further information about the use of this proxy).

House prices

House price information over the period has been provided for context. This is not comparable to the stylised estimates of the impact of individual determinants on real house prices, holding all else held equal.

From 1991 (year ending Q4-1991) to 2016 (year ending Q4-2016) the mix-adjusted average house price in the UK increased from £54,000 to £206,000[3] (a 284 per cent increase). Deflating to 1991 prices using the Consumer Price Index[4], this is equivalent to a £70,000 increase over the same period in real terms.

Results

The results of the analysis are presented in Table 1, and explained below.

Household growth

In 1991, the population of England was 47.1 million[5]. In 2016, the population of England was 54.5 million[6]. This is equivalent to an increase of 16 per cent over this period (1991 to 2016). Applying the relationship from the University of Reading model set out in the methodology section above (a 1 per cent increase in the number of households leads to a 2 per cent increase in house prices)[7], this increase in the population is expected to have led to a 32 per cent increase in house prices, holding all else equal.

Over the same period (1991 to 2016) the non-UK born population of England increased by 4.8 million; from 3.5 million to 8.4 million (these figures do not sum due to rounding). Applying the relationship between household growth and house prices derived from the University of Reading affordability model, the increase in the non-UK born population in England is expected to have led to a 21 per cent increase in house prices; holding all else equal.

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[3] UK house prices s5nce 1952: Mix-adjusted house prices.
https://www.nationwide.co.uk/-/media/MainSite/documents/about/house-price-index/downloads/uk-house-price-since-1952.xls
[4] ONS Consumer Price Inflation time series dataset
https://www.ons.gov.uk/economy/inflationandpriceindices/datasets/consumerpriceindices
[5] 1991 census – local base statistics: Table: L07: Country of birth
https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp

[6] January to December 2016 Population of the UK by country of birth and nationality
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality

[7] The coefficients used in this analysis describe the long-run relationship between different variables. In the short-run it is possible that the relationship between house price growth and increases in the non-domestic population are less strong than the relationship with respect to the overall population due to differences in household income and the propensity to form in the owner-occupied and private rented sectors.

Real income growth

In 1991, aggregate real household disposable income was £754 billion. In 2016, aggregate real household disposable income was £1,320 billion[8]. This is a real terms increase of 75 per cent. Applying the relationship in the NHPAU report (a 1 per cent increase in real incomes leads to a 2 per cent increase in house prices), holding all else equal the increase in real terms of 75 per cent is expected to have led to house prices increasing by 150 per cent between 1991 and 2016.

Interest rate reduction

No estimate is made in the table below of the impact of the change in house prices due to falling interest rates between 1991 and 2016. The estimated relationships in the NHPAU 'Affordability matters'[1] (2007) and 'Affordability *still* matters'[2] (2008) reports are dependent on input data that covers the period up to 2007. Since then, the level of interest rates has changed markedly, and there have also been important changes to the mortgage market including mortgage regulation and the relationship between mortgage rates and interest rates[9]. These changes are of a scale that means that a model estimated for the earlier period cannot reliably be used for the years since 2007.

Explaining this in more detail, the University of Reading affordability model described in the NHPAU reports 'Affordability matters'[1] (2007) and 'Affordability *still* matters'[2] (2008) found that if interest rates rise by one percentage point, house prices would fall by around three per cent. They note that, "Of course, any econometric model is based on historical trends"[2]. In this case, the analysis is based on mortgage rates between 1980 and Q1-2007[10]. During this period, mortgage rates were only briefly and fractionally outside the range of 5 to 15 per cent. Thus we should see the model as well-specified for forecasting the effect of changes in interest rates between 5 and 15 per cent. Recently, however, mortgage rates have been substantially below 5 per cent[12]. In that context, we cannot assume that the original model estimate of the relationship between interest rates and house prices is an accurate basis on which to analyse the effect on house prices of falls in mortgage rates to their current levels. Thus estimates using this coefficient are not included in the table below.

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[8] Real Households' & Households and Non-Profit Institutions Serving Households (NPISH) disposable income at chained volume measures (reference year 2015)(1):CP:£m:SA, UK figure
https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/nrjr/ukea?referrer=search&searchTerm=nrjr

[9] Credit conditions are not included in the University of Reading affordability model as used in the NHPAU 2007 and 2008 reports. In the period up to 2007 when the first report was published, credit liberalisation had taken place for a number of years, meaning constraints on access to credit were relatively low. This position has materially changed since the global recession and hence later iterations of the University of Reading affordability model do include credit condition inputs.

[10] Affordability matters (page 8, figure 3): National Housing and Planning Advice Unit, 2007
http://www.wiltshire.gov.uk/corestrategydocument?directory=Studies%2C%20Surveys%20and%20Assessments&fileref=3

However, interest rates are clearly a very important determination of house prices, and it should be expected that the decrease in interest rates experienced over the period from 1991 to 2016, other things equal, would have increased the demand for housing and hence put upwards pressure on house prices. Therefore the table includes information on changes in rates over the period, though it does not include data on the potential impact on house prices.

The Bank of England regularly publishes information on its base rate so a full time series is available. In 1991 the annual average Bank of England minimum band 1 dealing rate (as it was called, since changed to the official bank rate) was between 11 and 12 per cent[11]. Since then the rate has steadily declined. In 2016, the annual average official bank rate was between 0 and 1 per cent[11]. This is a decrease of 11 percentage points in the annual average bank rate over the period. However, this is a loose proxy for mortgage rates. Mortgage rates and the Bank of England base rate do not move one-for-one with each-other. In January 1999 the average standard variable rate (quoted mortgage interest rates at bank and building societies) was 7.6 per cent; in January 2016 this had decreased to 4.2 per cent[12.]

Housing supply

In 2016, the housing stock (dwelling stock) in England was 23.7 million[13]. Using MHCLG published data on net additional dwellings[14]; it is possible to infer that the housing stock in England in 1991 was 19.7 million.

Therefore the increase in the housing stock between 1991 and 2016 is estimated to be 4.1 million which is equivalent to 20.6 per cent (figures may not sum due to rounding). Applying the relationship reported in the NHPAU publications[1,2] (a 1 per cent increase in the housing stock reduces house prices by 2 per cent), the increase in housing supply is expected to have led to house prices reducing by 40 per cent all other things equal.

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[11] Statistical Interactive Database – official Bank Rate history
http://www.bankofengland.co.uk/boeapps/iadb/Repo.asp

[12]Mortgage interest rates: Average quoted mortgage interest rates: Building Societies Association (Bank of England)
https://www.bsa.org.uk/statistics/mortgages-housing

[13] Dwelling stock estimates in England: 2016
https://www.gov.uk/government/statistics/dwelling-stock-estimates-in-england-2016

[14] Housing supply: net additional dwellings, England: 2016 to 2017
https://www.gov.uk/government/statistics/housing-supply-net-additional-dwellings-england-2016-to-2017

Table of results

Table 1: Stylised estimates of the individual real impact on house prices by determinant, all else held equal				
All estimates are based on the NHPAU model and are individual stylised estimates. Therefore these estimates are not additive				
Factor relationship	**Description**	**Period**	**Real impact on house prices over 25 years** (1991 prices)	
Total England population growth *(1 per cent increase in households: 2 per cent increase in house prices)*	Cumulative growth in England population	*1991-2016*	32%	+£17,000
…of which is from net international migration *(1 per cent increase in households: 2 per cent increase in house prices)*	Cumulative increase in the non-UK born population	*1991-2016*	21%	+£11,000
Interest rates *(1 percentage point increase in interest rates: 3 per cent decrease in house prices)*	Cumulative decrease in the base rate	*1991-2016*	*Over 25 years the Bank of England base rate has decreased by 11 percentage points* [Notes 2]	
Incomes *(1 per cent increase in real incomes: 2 per cent increase in house prices)*	Real household disposable income	*1991-2016*	150%	+£80,000
Housing supply *(1 per cent increase in housing supply: 2 per cent decrease in house prices)*	Cumulative net additional dwellings	*1991-2016*	-40%	-£21,000

Notes:

1. All estimates based on the NHPAU model are individual stylised estimates and therefore are not additive.

2. It is not possible to estimate the impact on house prices from interest rates – see the 'Interest rates reduction' section for a full explanation.

Data quality

This publication draws on published data from a range of sources. Where possible, National Statistics have been used in order to promote quality; the exception to this is the Bank of England base rates data which are published on the Bank of England website (see footnote 11 for the source). The data used for the purposes of this release are detailed in the sections above (see footnotes for exact sources).

The other main sources were the 2007 and 2008 reports by the NHPAU, 'Affordability matters'[1] and 'Affordability *still* matters'[2]. These reports described the University of Reading econometric model which captures the relationship between housing supply and affordability through the interplay of demographic trends, incomes, the labour market and the housing market. The reports included estimates of some of the key relationship embedded within the University of Reading Affordability model to further understanding of how the housing market operates in the long run.

All results from models such as this rely on the data available at the time of development. In broad terms the relationships published in the reports are likely to be similar now and therefore were judged to be appropriate for use in this analysis. However, by applying model coefficients to more recent data (spanning periods both within and outside the affordability model's inputs), there are risks that changes in house prices due to different determinants are over/under-estimated.