

3 – UK Housing market outlook

Key points

- House prices in the UK were not impacted by the UK's decision to leave the EU as quickly as expected, though price growth stalled in the second half of 2016 and is now showing signs of a slowdown. Transaction volumes appear to have suffered more, but these effects are compounded by other factors such as stamp duty reform.
- We anticipate that the rest of 2017 will see the slowdown in the housing market continue, yielding annual house price growth of around 3.7%, down from 7% in 2016. In our main scenario, house price inflation will pick up slightly again in later years averaging around 4% until 2025. We find that housebuilding at the level proposed by the government, although welcome, may only have a small effect in constraining house price rises in the short term.
- The London housing market has been most severely impacted by economic and policy uncertainty and the recent changes to stamp duty. Price inflation in London in the first four months of 2017 was around 4% compared with around 13% for the same period in 2016. We project that London's housing market will continue to slow with only 2.8% and 3.8% house price growth on average in 2017 and 2018 respectively.
- Elsewhere in the UK, the East and Southern regions of England will continue to grow above the UK average, but Northern Ireland and the North East will continue to lag behind.
- There is a huge disparity in how sub-regional housing markets have performed since the recession. Whilst the average house price across the UK has grown by 17% since mid-2007, over a quarter of all local authorities are still 'under water'. The region that has seen the greatest decline is Northern Ireland, where on average house prices are 44% below their pre-recession peak.
- There has also been a structural shift in London's housing market recently, as house price growth has moved outward from the capital. Growing unaffordability within London, coupled with policy reform, has seen house price rises in prime central boroughs slow whilst price rises in the outer boroughs and the commuter belt have accelerated. Over the last two years, house prices in the outer boroughs have risen 9 percentage points faster than inner boroughs, whilst house price growth in the fastest growing cities within the commuter belt exceeded that in London by 4 percentage points in 2016.

Introduction

In this section, we explore how the UK housing market has been performing recently and present our projections for house price inflation until 2025. We also present new analysis of regional and sub-regional trends in the market showing the shifting patterns of growth since the recession.

The discussion below begins by briefly reviewing recent housing market developments (Section 3.1) and then goes on to assess future UK and regional house price prospects in Section 3.2. Section 3.3 presents our new research into the development of sub-regional markets.

3.1 – Recent housing market developments

Brexit appears to be a drag on price growth, but the effects have come through more slowly than expected

Shortly after the UK's decision to leave the EU last summer we predicted that house price growth would fall to around 3% in 2016 and slow further in 2017. The market did not respond as quickly as we and most other forecasters expected, but we are now seeing a pronounced slowdown in house price growth.

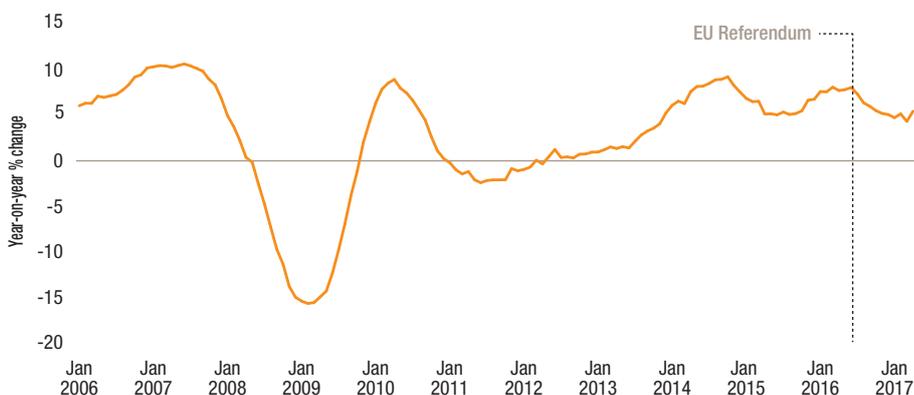
As shown in Figure 3.1, house price inflation slowed in 2016, falling from 8.2% year-on-year in June to 5.2% in December. But it still averaged 7% for the year as a whole, equating to an average UK house price of £198,000 in 2016.

Soft end to 2016 suggests loss of momentum in the market

The latest available ONS house price inflation figures registered growth of 5.6% in April. Whilst this headline figure appears robust, it masks the fact that the market was broadly flat in the second half of 2016 (see Figure 3.2 below). 2017 also started softly but a strong April has brought it in-line with the 2016 profile. A rapid acceleration in prices over the spring will be required to avoid a sharp drop in the annual house price inflation rate.

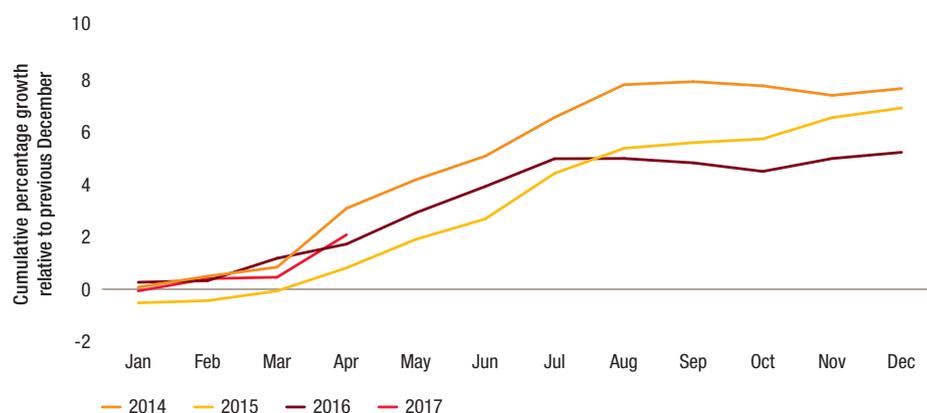
This may be unlikely given that alternative data providers on the housing market such as Nationwide and Halifax have reported price growth slowing more sharply than the ONS so far this year.

Figure 3.1 – Annual rate of house price inflation



Source: ONS

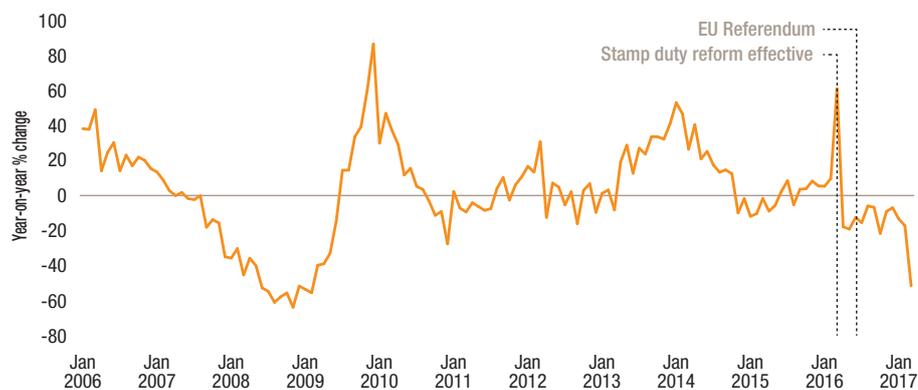
Figure 3.2 – Cumulative house price inflation by year



Source: ONS

3.2 – House price prospects

Figure 3.3 – Annual growth in UK housing transactions



Source:

Housing transactions are declining

Housing transactions, which tend to be more volatile than prices, are where the uncertainty caused by Brexit has manifested itself most strongly, in combination with effects of recent reforms to stamp duty. As shown in Figure 3.3, the latest data show year-on-year transaction growth has been negative for twelve consecutive months. Only 132,000 transactions were completed in the first two months of 2017 compared with 155,000 for the same period in 2016. The gap widens further if March is included, but this comparison is distorted by the temporary surge in transactions in March 2016 to beat the introduction of the 3% extra stamp duty charge for additional homes in April 2016.

In this section, we present our projections for house price inflation in the UK and regional markets. We use econometric time-series models to make our predictions. These link house prices to underlying drivers in the housing market and the economy more generally, such as earnings growth, housing supply and credit conditions, and use these relationships to project how prices may evolve going forward¹.

In our main scenario we assume that real earnings growth will remain close to zero in 2017 and 2018, down slightly on the 2016 figure as inflation continues to rise. We project that real earnings growth will recover slightly after 2019 and reach about 1.5% per annum by 2021. Informed by the Council of Mortgage Lenders' forecast we also expect credit conditions to remain fairly neutral and mortgage lending to grow modestly over the next four years.

We assume that the housing supply growth increases slightly over the projection period, equating to growth in the UK housing stock of around 0.9% a year.

¹ Further details are provided in the technical annex at the end of this article

House price growth slows in 2017 but price-to-earnings ratio still growing

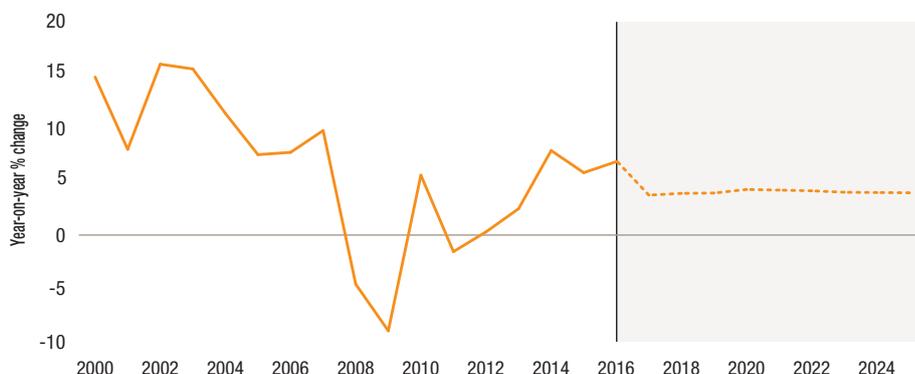
In our main scenario, we project that house prices in the UK will grow at an average of around 3.7% this year. This is slightly less pessimistic than our projection of around 1% for 2017 made this time last year, in light of the less severe impacts of Brexit manifested thus far.

In the medium term, house prices are expected to grow at a slightly higher average rate of around 4% a year as earnings growth is assumed to strengthen. This would imply that house prices continue to outstrip earnings growth as a result of continued structural weakness in supply.

Our analysis suggests that the average residential property in the UK could be worth approximately £220,000 in 2017, £8,000 higher than in 2016, and could rise to over £300,000 by 2025.

Turning to the regional picture, we expect to see some significant changes with London in particular experiencing substantial headwinds. The capital city has seen the highest house price inflation of any UK region in eight out of the last ten years. But we expect this trend to reverse in 2017 and 2018 due to challenging affordability and London's status as the UK's most outward-facing region with the greatest exposure to the risks of Brexit.

Figure 3.4 – UK house price inflation main scenario projection



Source: ONS house price index historical data, PwC projections

Table 3.1: UK main scenario house price inflation and average house prices

Year	Main scenario (% growth)	Main scenario (£)
2016 (Actual)	7.0%	£212,000
2017	3.7%	£220,000
2018	3.9%	£228,000
2019	3.9%	£237,000
2020-2025	4.1% average growth	£302,000 in 2025

Source: PwC analysis based on ONS house price index

Box 3.1 – Will building a million homes solve the affordability crisis?

The Government's recent White Paper on housing² opens with the statement that “the housing market in this country is broken, and the cause is very simple: for too long, we haven't built enough homes.” This view is widely held and has been the subject of significant commentary and analysis – notably the Barker Review of Housing Supply, published as long ago as 2004.

The White Paper concluded that the UK needs 250,000 new homes a year and the current Government has committed to this target by promising to build a million homes by 2020 and another half a million by 2022.

Achieving this target would undoubtedly be welcome, but to what extent will it help affordability? We have used our house price model to simulate what the impact could be.

Over the past three years, approximately 190,000 new homes have been built annually in the UK, 26% more than in the preceding three year period. In our main scenario we project that this upward trend will continue with new build completions reaching around 216,000 by 2020. This equates to growth in the UK housing stock of around 0.9% per year. We compare the price projections from our main scenario to a scenario where 250,000 houses are built each year (which would raise growth in the housing stock to around 1.1% per annum). The results are shown in Table 3.3 below.

Table 3.3: UK house prices– the potential impact of increased supply

Year	House prices, PwC main scenario	House prices, additional building scenario	Difference
2016 (Actual)	£212,000	£212,000	N/A
2017	£220,000	£220,000	No change*
2018	£228,000	£228,000	No change*
2019	£237,000	£237,000	No change*
2020	£247,000	£246,000	£1,000
2021	£258,000	£256,000	£2,000
2022	£268,000	£266,000	£2,000
2023	£279,000	£276,000	£3,000
2024	£290,000	£287,000	£3,000
2025	£302,000	£297,000	£5,000

Source: PwC analysis using the ONS house price index and DCLG net supply of housing

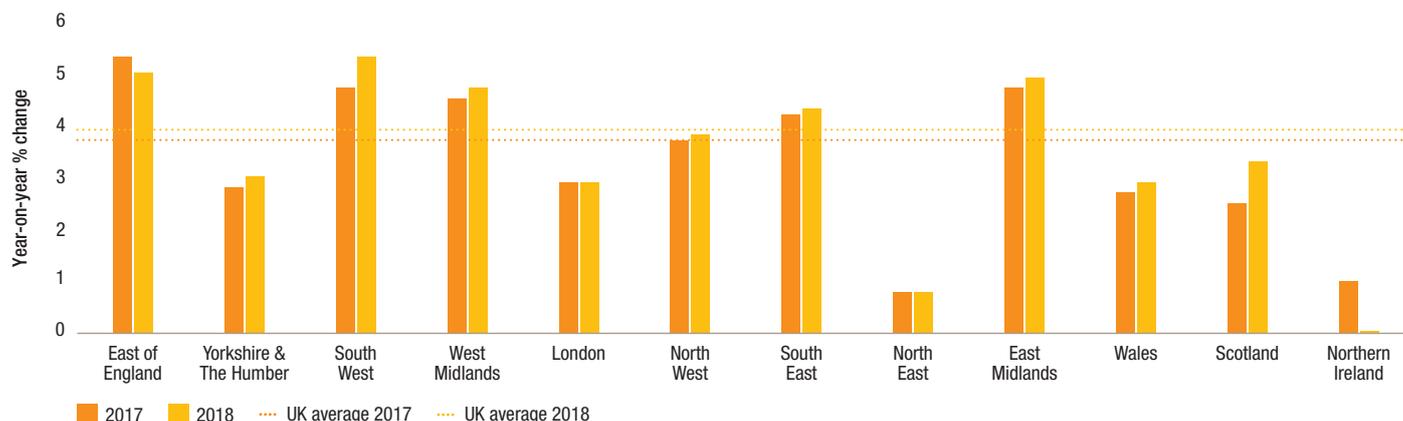
* No change after rounding to nearest £000

Our results suggest that an increase in building of this magnitude would restrict future house price growth slightly, but not fundamentally change the affordability picture. The cumulative effect of the additional building scenario is estimated to be only around £5,000 by 2025.

The reason is that the UK has been building too few houses for the last 40 years and to undo this would require a similarly prolonged period of above average new building. Our analysis suggests that simply achieving the par level of building for 7-8 years will have only a limited impact on the supply-demand balance and so on prices.

2 DCLG (2017), “Fixing our broken housing market”

Figure 3.5 – Projected house price inflation in UK regions 2017 and 2018



Source: PwC analysis based on ONS house price index

London expected to be amongst the weakest performing regions

House price growth in London in the first four months of this year was less than a third of the equivalent in the first four months of 2016 – averaging around 4% compared with 13% growth in the same period last year. It is important to note, however, that house prices in London still remain significantly higher than in other regions and the average value of a home in London is set to surpass half a million pounds in the next few years.

We expect the strongest price growth in the UK to be in the southern regions of England and the Midlands. The East of England is projected to see the fastest house price growth in 2017, at just over 5%, with Northern Ireland and the North East the weakest performing. Table 3.2 and Figure 3.5 indicate the projected house prices and growth rates for all of the UK regions between this year and 2020.

Table 3.2: Regional house price growth and house price values (£000's) in the main scenario

Region	2016	2017P	2018-2020P Average	2016	2017	2020P
East of England	12.2%	5.3%	4.3%	266	281	319
East Midlands	6.9%	4.7%	4.4%	170	178	202
South West	8.4%	4.7%	4.5%	233	244	279
West Midlands	6.2%	4.5%	4.3%	175	183	208
South East	12.1%	4.2%	4.1%	304	317	358
North West	4.8%	3.7%	4.0%	147	153	172
London	14.0%	2.9%	3.9%	468	481	539
Wales	4.3%	2.7%	3.7%	144	148	165
Scotland	-0.2%	2.5%	4.0%	139	142	160
Yorkshire & The Humber	5.6%	2.8%	3.7%	149	153	171
Northern Ireland	5.9%	1.0%	2.6%	123	124	134
North East	3.4%	0.8%	2.9%	124	125	137
UK average	7.0%	3.7%	3.9%	211	219	247

Source: PwC analysis based on ONS house price index

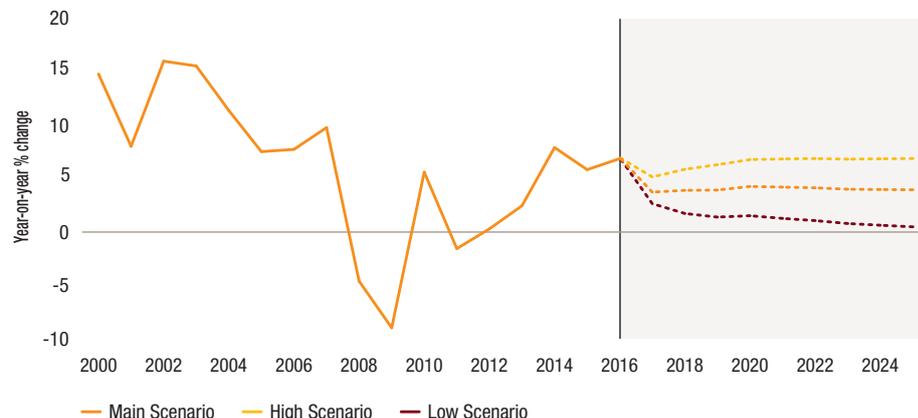
Alternative UK house price scenarios

Projecting house prices involves many uncertainties, especially in the current period where the UK is likely to undergo major structural changes due to Brexit. To reflect this we always develop two alternative house price inflation scenarios based on different inputs for the model drivers (see Figure 3.6).

Our **high scenario** reflects a stronger macroeconomic environment where earnings growth returns to rates expected prior to the decision to leave the EU and mortgage credit growth is more robust. In this scenario, house price growth could be somewhat stronger in the short term, potentially growing at around 5% instead of 3.7% in 2017, and could be quite significantly stronger in the medium term with average growth of approximately 7% between 2020 and 2025. This scenario would mean that the average UK house price could reach around £370,000 by 2025.

Our **low scenario** reflects a more severe impact from Brexit on earnings growth, which we assume remains very weak in the medium term. The scenario also supposes tighter credit conditions. In this low scenario, house price inflation could average only around 1% a year in the medium term.

Figure 3.6 – Alternative house price inflation scenarios



Source: PwC analysis based on ONS house price index

3.3 – Sub-regional housing trends

The creation of the new official house price measure from the ONS and Land Registry last year has generated a new sub-regional set of data on the UK market. In this section, we present three themes that we have identified by analysing these figures:

1. Despite the general perception of a UK affordability crisis, in around one quarter of local authorities house prices are still lower on average than they were 10 years ago.
2. The London market has seen a significant structural shift over the course of the last ten years, with growth radiating out from inner to outer boroughs.
3. More recently the challenging affordability outlook in London has seen demand, and therefore the strongest house price growth, spill over to towns and cities in the London commuter belt.

In the remainder of this section we explore these trends in more depth.

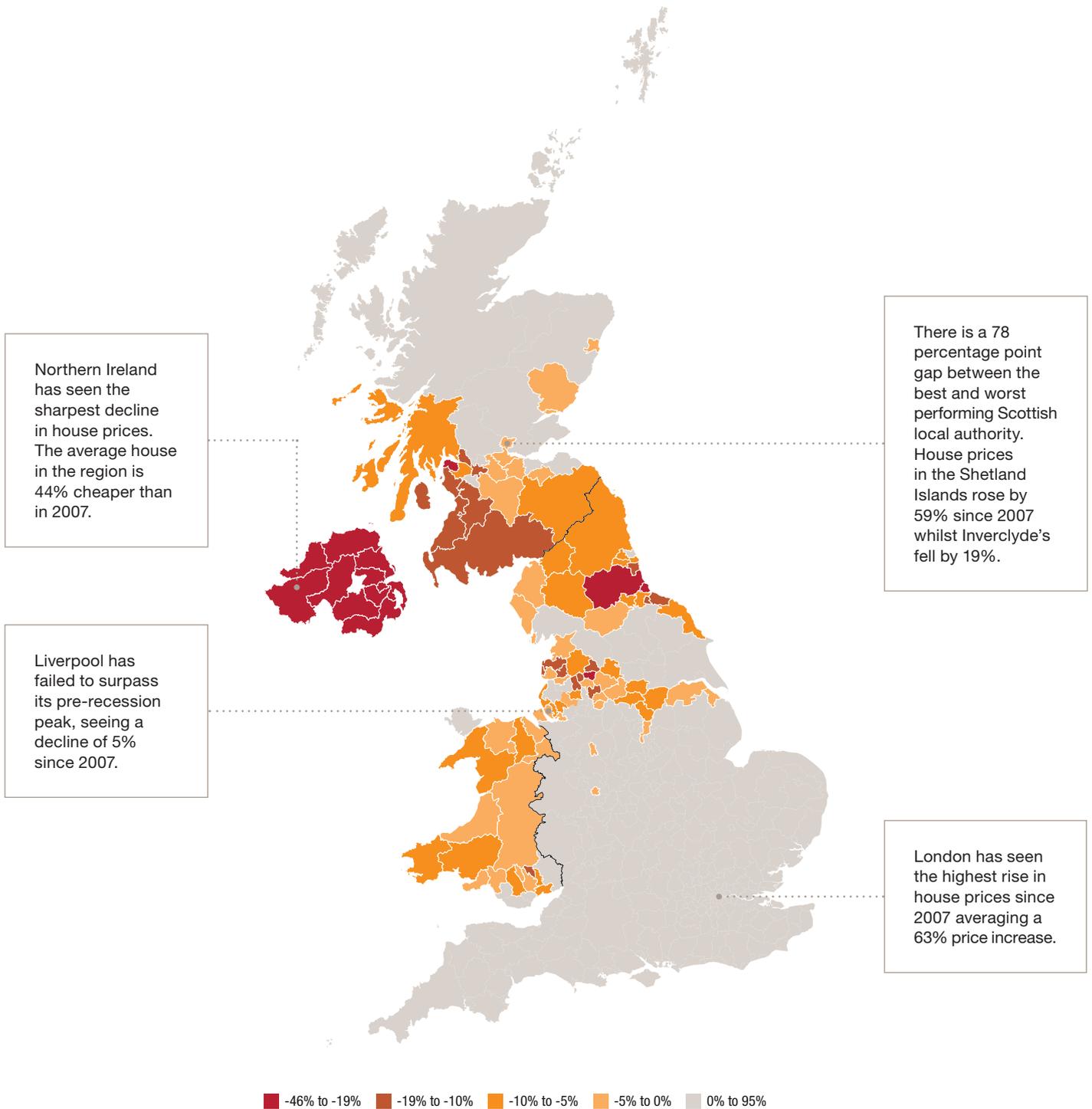
In a quarter of UK local authorities, house prices remain below pre-recession peaks

It is widely accepted that there is an affordability crisis in the UK housing market. Whilst this is true at the aggregate level, given that measures like house price to earnings ratios are at record highs, there have been marked differences in regional market trends since the financial crisis.

The top of the pre-crisis house price cycle came in September 2007, but as Figure 3.7 illustrates, prices in many local authority areas clustered in Northern Ireland, Wales, Scotland, and in the North of England have still not surpassed this peak almost ten years on.

In contrast, no local authorities in the South East, South West, Eastern or London regions have average house prices that are still below their pre-recession peak levels. In the highest growth local authorities, prices have almost doubled over the same period.

Figure 3.7 – Local authority areas where house prices are still below pre-crisis peak levels in 2007



Sources: ONS/Land Registry, PwC Analysis

*Please note: The map above compares the 3 month average of house prices during their UK peak in 2007 (July-September), and measures them with the 3 month average of current house prices (February – April 2017).

Northern Ireland has experienced the greatest house price declines

The local authorities that have experienced the greatest falls in house prices since 2007 are all based in Northern Ireland. Part of this is due to the Irish property bubble, which spilled north of the border, stoking unsustainable house price gains of 78% between 2005 and 2007 in Northern Ireland. When the crash came it was far more severe there than in any other part of the UK. Prices still remain far below their 2007 peak: the largest gap is found in Armagh Banbridge and Craigavon, where prices remain 47% below peak levels.

The weakest house price performance beyond Northern Ireland has been in the North of England (see Table 3.4). Hartlepool has experienced the greatest price decline of any English authority (-21%), while Inverclyde has seen the largest price decline in Scotland (-19%).

These trends have boosted affordability for first time buyers in these areas in particular. In Blackpool, for example, the average house price to earnings ratio has fallen from 6.2 in 2008 to 4.9 in 2016. County Durham has seen a decline in this ratio from 5.1 in 2008 to 4.4 in 2016. This is in contrast to England as a whole, where the house price to earnings ratio has risen from 6.9 in 2008 to 7.7 in 2016.

By way of contrast, we show the highest growth local authorities in Table 3.5. London dominates with all boroughs experiencing price growth of over 50%. The Shetland Islands³ and areas of the East and South East that are close to London round out the top ten.

Table 3.4: Areas experiencing the greatest house price declines (2007 – 2017)

Region	Local Authority	Price change relative to pre-recession peak
Northern Ireland	All local authorities in Northern Ireland	Declines vary from -47% in Armagh Banbridge and Craigavon to -39% in Derry and Strabane
North East	Hartlepool	-21%
North East	County Durham	-19%
North West	Burnley	-19%
Scotland	Inverclyde	-19%
North West	Blackpool	-18%
Scotland	East Ayrshire	-17%
Scotland	North Ayrshire	-17%
North West	Hyndburn	-14%
Scotland	West Dunbartonshire	-13%
North East	Sunderland	-13%

Source: ONS/Land Registry, PwC Analysis

Table 3.5: Areas experiencing the greatest price increase (2007 – 2017)

Region	Local Authority	Price change relative to pre-recession peak
London	All London boroughs	Increases range from 51% in Havering to 95% in Westminster
Scotland	Shetland Islands	59%
East	Cambridge	59%
East	Hertsmere	58%
East	St Albans	57%
East	Three Rivers	56%
South East	South Bucks	55%
South East	Slough	55%
East	Broxbourne	53%
East	Watford	52%
East	Dacorum	51%

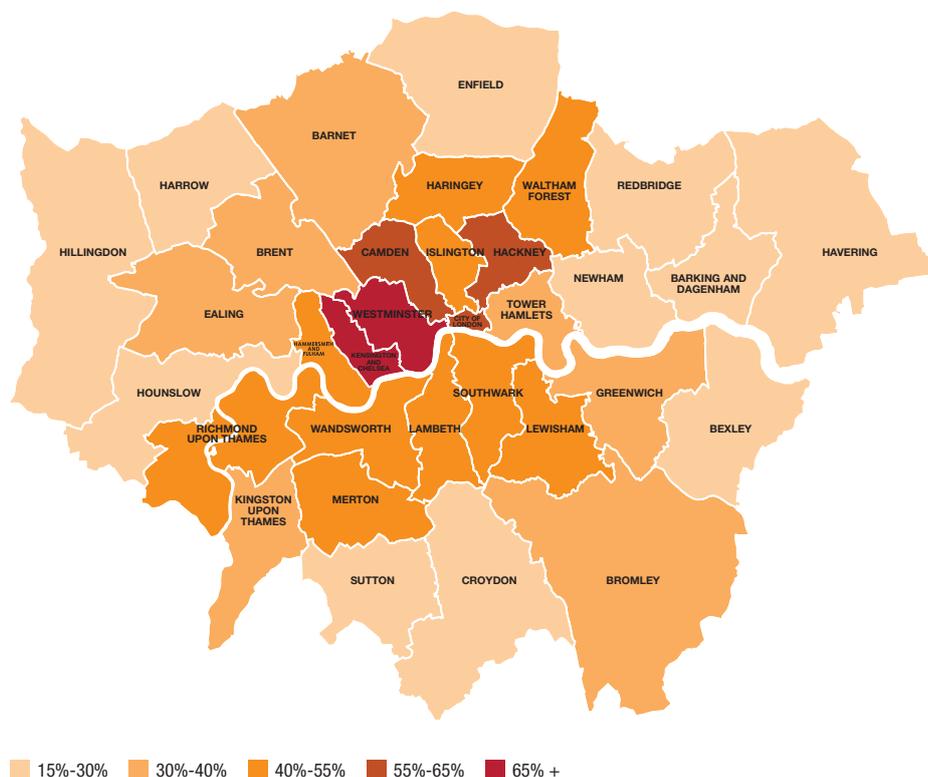
Source: ONS/Land Registry, PwC Analysis

³ Property prices in the Shetland Islands have risen rapidly as a result of strong oil prices in the years after the financial crisis and efforts to diversify considerably in response to softer oil prices since mid-2014, which have supported income levels.

London's outer boroughs begin to outperform its inner boroughs⁴

Over the past two years, there has been a major structural shift in the pattern of price growth within the capital. As shown in Figure 3.8, from 2007 to 2014, central boroughs such as Kensington and Chelsea and Westminster saw the greatest increase in average house prices of 71% and 79% respectively. In contrast, Havering and Barking and Dagenham only achieved price growth of 15% over this seven year period.

Figure 3.8 – Relative cumulative house price rises in London boroughs (2007-14)⁵



Sources: ONS/Land Registry, PwC Analysis

4 We use the ONS's statistical definition to classify London boroughs to inner boroughs and outer boroughs. Inner boroughs: Camden, City of London, City of Westminster, Hackney, Hammersmith, Haringey, Islington, Kensington, Lambeth, Lewisham, Newham, Southwark, Tower Hamlets, Wandsworth. Outer boroughs: Barking and Dagenham, Barnet, Bexley, Brent, Bromley, Croydon, Ealing, Enfield, Greenwich, Harrow, Havering, Hillingdon, Hounslow, Kingston upon Thames, Merton, Redbridge, Richmond upon Thames, Sutton, Waltham Forest.

5 The map above compares the percentage difference between the average house price in London boroughs during their 2007 peak (July-September) and the 3 month average of house prices prior to the first major stamp duty reform (October – December 2014).

Stamp duty reforms and affordability have dampened the inner London market

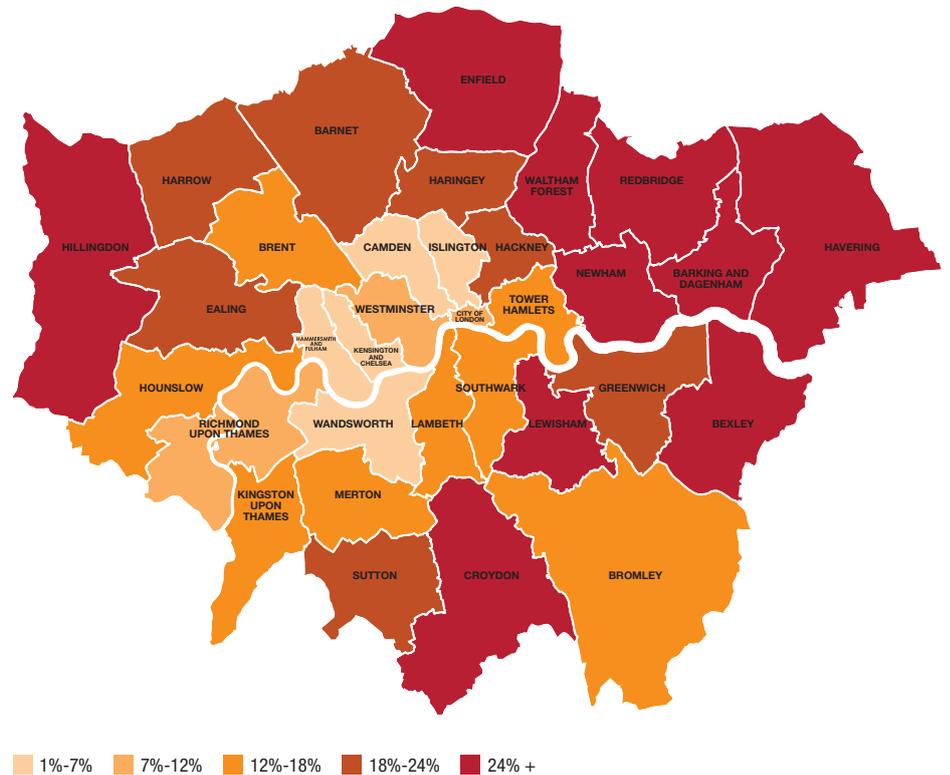
But this trend has gone into reverse since the end of 2014, with outer boroughs markedly outperforming their central London counterparts (see Figure 3.9). The stamp duty changes introduced in December 2014, which significantly increased transaction taxes on properties worth more than £937,000 (the average price of a property in Westminster is £1,051,000), have undoubtedly had an impact.

This was followed up with another reform in April 2016: applying an additional 3% stamp duty charge for purchases of second homes and additional properties. Taken together, the buyer of a £1.5m property could pay up to £138,750 in tax after the reforms, almost twice the previous bill of £75,000. Demand in these prime central London markets may also have been impacted by other recent events like Brexit and softer oil prices since mid-2014 limiting demand from Russia and the Middle East.

Prices in outer London boroughs have powered ahead since 2014

From 2014-2017, we see outer boroughs growing at a markedly faster rate than inner boroughs (see Figure 3.9). In particular, boroughs in the North East of London, such as Barking and Dagenham and Havering, have seen the highest rise in house prices over the past two years at 31%. The slowest growing are Kensington and Chelsea and Islington, which have only seen rises of 3% and 4% respectively. On average, we find that house prices in outer boroughs have grown 9 percentage points faster than inner boroughs during this period.

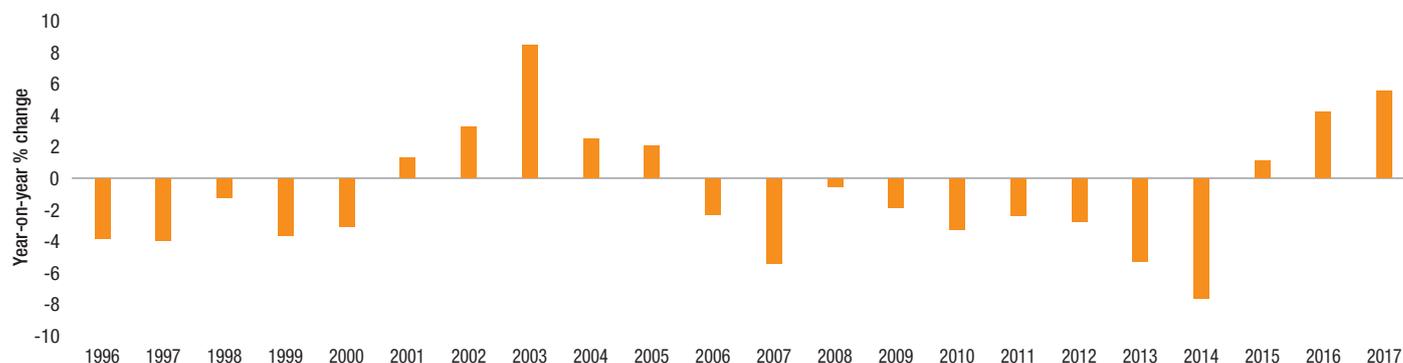
Figure 3.9 – Relative cumulative house price rises in London boroughs (2014-17)⁶



Sources: ONS/Land Registry, PwC Analysis

⁶ The map above compares house prices from a 3 month average prior to the first major stamp duty reform (October – December 2014) to a 3 month average of the latest data available (February – April 2017).

Figure 3.10 – Difference between house price inflation in the 15 fastest growing commuter belt cities and London



Source: ONS, PwC analysis

2017 value represents year to date figures up to April

Commuter belt cities begin to outperform London for price growth

The final theme we highlight in this section is that the outward shift in demand within the London boroughs is beginning to be seen beyond the boundaries of the capital. Many towns and cities within the commuter belt have recently experienced stronger price growth than London.

Figure 3.10 shows the difference in house price growth between 15-high performing commuter areas and London. London achieved stronger growth over much of the period, including the late 1990s and 2006 to 2014. However, since 2015, the commuter towns and cities have significantly outperformed London with average growth 4 percentage points faster in 2016 and 6 percentages faster in 2017 so far.

London prices hit by the affordability crisis

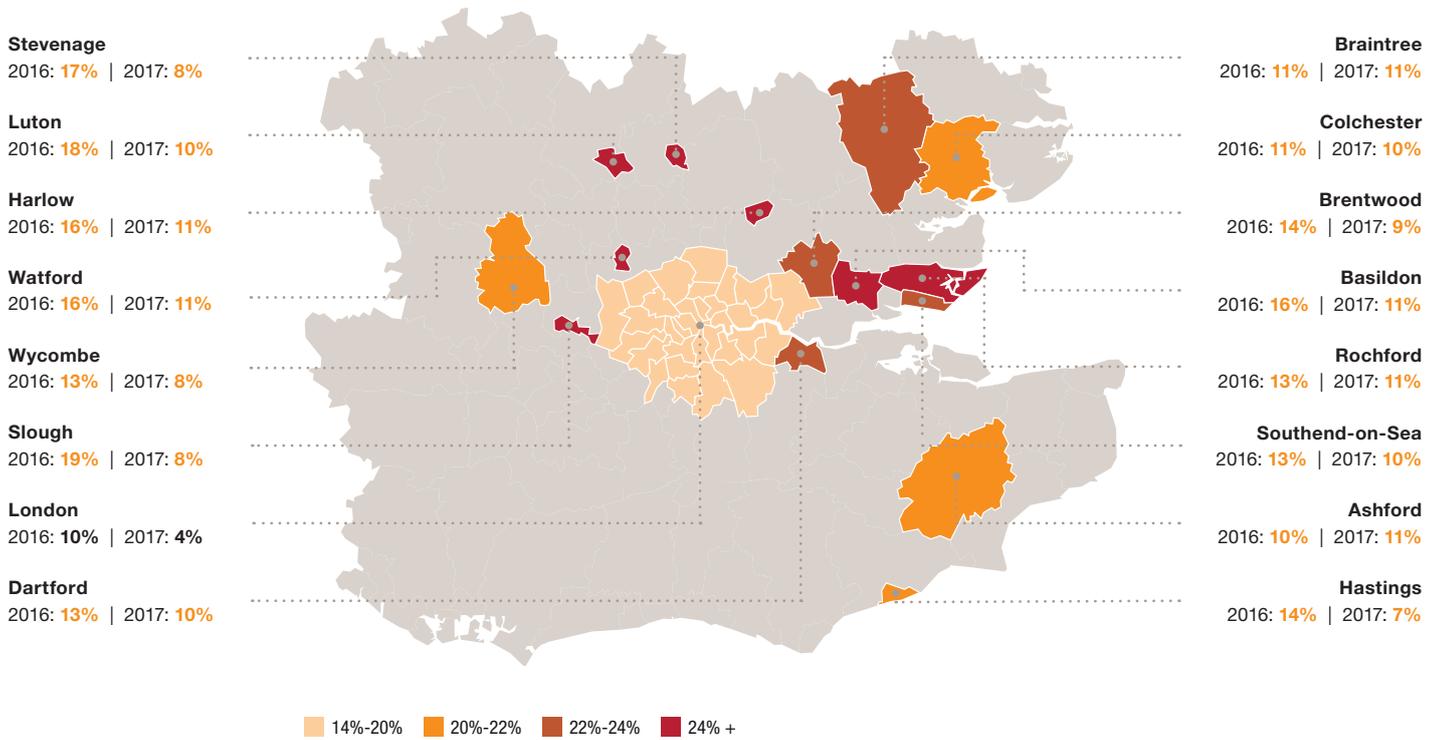
One of the primary reasons for this is the affordability crisis within London, which has seen first-time buyers in particular struggling to buy in the capital. In 2016, house prices in London were 13 times median earnings, while the 15 commuter belt towns offer a lower (albeit still high) ratio of 9 times earnings.

The fastest growing commuter towns and cities

In Figure 3.11, we present the top performing commuter towns and cities in 2016 and 2017 so far. The areas with the fastest growth rates are situated to the North and East of London, with Basildon and Rochford recording 11% annual growth in the first four months of 2017. Overall Essex appears to be the key hotspot, probably because house prices there have been lower than those in commuter towns west of London.

Cost may explain the lack of high growth towns and cities in 2016-17 to the South West of London. Areas like Guildford and Woking had average prices of £411,000 and £444,000 respectively in April 2017. This was not far below the London average of £483,000, so people seeking an affordable option may need to look elsewhere.

Figure 3.11 – The fastest growing commuter towns and cities by house price growth (2016 - 2017)⁷



Sources: ONS/ Land Registry

3.4 – Summary and conclusions

UK house price growth was not affected by the Brexit vote as quickly as expected, but headwinds have been evident towards the end of 2016 and during the first months of this year. We anticipate that house price inflation will be more modest going forward. However, in our main scenario, the house price-to-earnings ratio will continue to grow and even achieving 250,000 new homes per year is unlikely to provide a quick fix for this affordability problem given many decades of undersupply.

London has seen a slowdown in its housing market over the past two years, particularly within the prime central boroughs, linked to severe affordability concerns, stamp duty changes and probably also the greater extent to which economic and political uncertainty impacts the prime central London market.

House prices in the UK have grown fastest in the past 2-3 years in the outer boroughs of London and cities located in London’s commuter belt.

Our model indicates that the East and Southern regions of England will continue to outperform house price growth in London and be the prime engine of UK house price growth over the next few years. By contrast, Northern Ireland and some parts of Northern England and Scotland still have average house prices below their pre-crisis 2007 peaks.

⁷ We use January – April 2017 figures to measure our 2017 price growth, as this is the latest data available

Annex

Supplementary data on local house price trends

Table 3A.1: House price by London borough, % change 2007-2014 and 2014-2017

Rank 2007-14	Borough	% Change	Rank 2014-17	Borough	% Change
1	Westminster	79%	1	Barking and Dagenham	31%
2	Kensington and Chelsea	71%	2	Havering	31%
3	City of London	64%	3	Newham	30%
4	Camden	59%	4	Hillingdon	28%
5	Hackney	57%	5	Bexley	28%
6	Southwark	53%	6	Enfield	27%
7	Hammersmith and Fulham	50%	7	Redbridge	27%
8	Islington	49%	8	Waltham Forest	26%
9	Haringey	46%	9	Croydon	25%
10	Lambeth	46%	10	Lewisham	24%
11	Wandsworth	44%	11	Barnet	22%
12	Richmond upon Thames	43%	12	Greenwich	22%
13	Merton	43%	13	Harrow	22%
14	Lewisham	42%	14	Haringey	22%
15	Waltham Forest	41%	15	Hackney	20%
15	Brent	39%	15	Sutton	19%
17	Ealing	38%	17	Ealing	18%
18	Kingston upon Thames	35%	18	Hounslow	18%
19	Tower Hamlets	35%	19	Bromley	17%
20	Greenwich	34%	20	Brent	17%
21	Barnet	34%	21	Merton	16%
22	Bromley	32%	22	Kingston upon Thames	15%
23	Harrow	29%	23	Tower Hamlets	14%
24	Hounslow	28%	24	Southwark	13%
25	Sutton	27%	25	Lambeth	13%
26	Hillingdon	24%	26	Richmond upon Thames	10%
27	Enfield	24%	27	Westminster	9%
28	Bexley	23%	28	City of London	7%
29	Croydon	23%	29	Camden	7%
30	Newham	20%	30	Wandsworth	7%
31	Redbridge	17%	31	Hammersmith and Fulham	5%
32	Havering	15%	32	Islington	4%
33	Barking and Dagenham	15%	33	Kensington and Chelsea	3%

Source: ONS/ Land Registry, PwC Analysis

Table 3A.2: House price growth by commuter city, % change April 2016 – April 2017

Rank	Commuter City/Town	House Price Growth (April 2016-April 2017)
1	Dartford	13.1%
2	Watford	11.6%
3	Colchester	10.8%
4	Braintree	10.7%
5	Basildon	10.2%
6	Rochford	10.2%
7	Luton	10.1%
8	Harlow	9.5%
9	Ashford	8.8%
10	Slough	8.6%
11	Brentwood	8.5%
12	Wycombe	8.4%
13	Southend-on-Sea	8.1%
14	Canterbury	8.0%
15	Tunbridge Wells	7.7%
16	Brighton and Hove	6.9%
17	Stevenage	6.6%
18	Horsham	6.3%
19	Milton Keynes	5.8%
20	Chelmsford	5.6%
21	Sevenoaks	5.2%
22	St Albans	5.0%
23	Oxford	4.8%
24	London	4.7%
25	Winchester	4.3%
26	Guildford	3.7%
27	Crawley	3.0%
28	Woking	2.2%
29	Maidstone	2.0%
30	Reading	1.1%
31	Hastings	1.0%
32	Cambridge	1.0%

Source: ONS/ Land Registry, PwC Analysis

Technical annex:

Modelling methodologies

UK house price projections

Our analysis focuses on ONS and Land Registry house price indices. Data from the ONS vary from those provided by Nationwide and Halifax, though broad trends tend to be similar over time. We focus on the ONS data as they cover a larger sample size, given that Nationwide and Halifax base their indices on only their own mortgage approvals.

The PwC house price model consists of two parts: a long run equilibrium equation and a short run error correction model that indicates how house prices adjust back towards this equilibrium level.

In the long run, real house prices are driven by three key variables: real annual earnings, the ratio of the housing stock to the population ('supply') and a variable which reflects general credit conditions. Monetary values are deflated into real (inflation adjusted) terms using CPI.

In the short run, changes in real house prices are driven by: deviations from the long run equilibrium; changes in real annual earnings; changes in credit conditions; and the previous period's mortgage interest rate (cost of borrowing). The coefficients for these model variables and other summary statistics for both models are shown in the tables below.

The parameters of the model were estimated using the standard ordinary least squares (OLS) econometric technique based on annual data from 1975-2016.

Regional house price projections

The regional house price projections relate to the main scenario only, but it should be borne in mind that uncertainties are even greater at the regional than the national level, so these projections can only be considered illustrative. Our regional projections are based on a regression between house price to earnings ratios and mortgage rates. The results are then adjusted so as to aggregate to the UK average estimates.

Long run model (Cointegrating equation)

R-squared = 0.93

Dependent variable:
Real house prices

No. of observations=42

	Coefficient	t-statistics
Earnings	16.40	10.9
Supply	-1666.5	-4.7
Credit	13898.4	2.0
Constant	391948.7	3.6

Short run model

R-squared = 0.63

Dependent variable:
Change in Real house prices

No. of observations=41

	Coefficient	t-statistics
L. co-integrating equation residual	-0.11	-1.5
D.Credit	24431.1	4.6
D.Earnings	7.4	3.7
L.Mortgage rate	-594.6	-2.3
Constant	6272.9	2.6

Note: 'D' refers to the first difference of a variable (i.e. change on previous year). 'L' refers to the lagged value of a variable in the previous year.

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