

# Measuring house prices: a comparison of different indices

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## Executive summary

- Alternative house price indices are giving different pictures of the state of the housing market. For example, some suggest nominal UK prices had surpassed their previous 2007–08 peak by early 2014, while others do not.
- In part, these differences reflect the fact that the various indices are trying to measure different things. In particular, there is some ambiguity as to whether they are trying to track the average ‘price’ of the stock of housing in general or the average ‘price’ of houses that happen to be sold over a given period.
- However, much of the difference between house price indices arises because of the different ways in which the various indices attempt to overcome common problems.
- The unique issue in constructing a house price index, compared with most other price indices, is that houses are sold infrequently, and as such we only know the price of houses sold in a given month. This raises two challenges. First, these houses may not be representative of whatever the index is trying to measure – namely, the housing stock or typically transacted properties. Moreover, even if they were representative, a simple average of sale prices might increase from month to month just because more expensive properties are being

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sold – even if the price of each property has remained the same. Many of the differences between indices reflect different ways of addressing these issues.

- We describe five house price indices in detail. Although these indices broadly track one another over time, systematic differences between the series persist over quite long periods (say, a decade or more).
- In practice, there is not one ideal index of house prices – each has its own strengths and weaknesses and may be informative about different concepts. Inasmuch as policymakers and commentators are interested in the general trend of house prices, they should look at the general trend across all the indices, analogous to a ‘poll of polls’ in opinion polling, rather than selecting a particular index. Constructing an ‘index of indices’ is also an option, although appropriate weighting of the different indices then becomes an important issue to be considered.

## 1. Introduction

House price indices are some of the most closely watched economic indicators in the United Kingdom. This has been particularly true since early 2013 due to the stronger-than-expected growth in house prices and housing demand. This growth takes place against a background of several government initiatives to stimulate the housing market – most notably the introduction of the policy of Help to Buy, which was designed to allow those with small down payments to purchase a home.

The extent of the recent recovery of the housing market and a preliminary evaluation of the Help to Buy policy were examined in Chandler and Disney (2014).<sup>1</sup> With the extension to one of the components of the Help to Buy policy announced in the March 2014 Budget, the current and prospective trajectory of house prices continues to be an important issue. However, whilst there is no doubt that house prices are on a general upward trend, exactly how fast house prices are increasing and whether

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<sup>1</sup> D. Chandler and R. Disney, ‘Housing market trends and recent policies’, in C. Emmerson, P. Johnson and H. Miller (eds), *The IFS Green Budget: February 2014*, Institute for Fiscal Studies, London, 2014, [http://www.ifs.org.uk/budgets/gb2014/gb2014\\_ch5.pdf](http://www.ifs.org.uk/budgets/gb2014/gb2014_ch5.pdf).

they have attained their previous peak are less clear. This briefing note is designed to shed some light on these issues.

This lack of clarity arises from the fact that there are now several well-established house price indices, as well as the newer internet-based indicators of housing activity that are published regularly – typically on a monthly basis. But these various indices can and do differ significantly from month to month, leading to a confusing picture of what is happening to house prices. For example, the Office for National Statistics (ONS)’s house price index suggests that house prices in nominal terms for the UK as a whole have already exceeded their 2007–08 peak, whereas the Halifax index suggests that (as of 2014Q1) nominal house prices, even in London, have yet to reach that peak.

Moreover, whilst the differences between the various indices tend to narrow over time, some systematic differences remain even over quite long periods (say, a decade or more), and the indices also appear to differ systematically in the timing and magnitude of fluctuations over the economic cycle. Sensible policy evaluation and concern as to potential financial instability therefore hinge on a better understanding of these house price indices themselves.

Hence, this briefing note, which augments a brief online appendix on house price indices to the 2014 IFS Green Budget chapter on housing,<sup>2</sup> seeks to do three things. First, it illustrates the differences in measured current house price growth in the UK across several indices. Second, it describes broadly how the indices are constructed and some of the reasons why they may be showing different growth rates of house prices. Third, it discusses the pros and cons of the various indices, and looks briefly at how the differences between the indices may be explained by differences in the data and methods they utilise.<sup>3</sup>

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<sup>2</sup> [http://www.ifs.org.uk/budgets/gb2014/gb2014\\_ch5\\_appendix.pdf](http://www.ifs.org.uk/budgets/gb2014/gb2014_ch5_appendix.pdf).

<sup>3</sup> A sensible discussion of some methodological issues is contained in R. Wood, ‘A comparison of UK residential house price indices’, in Bank for International Settlements, *Real Estate Indicators and Financial Stability*, BIS Paper no. 21, Basel, 2005, <https://www.bis.org/publ/bppdf/bispap21.htm>. However, several current house price indices, including the current Land Registry index and some of the internet-based indices (see Box 1), were not available when that paper was written.

### Box 1. Other indicators of house prices

#### *Asking prices*

The indices considered in this briefing note are measures of *sale* prices. However, online property company Rightmove.co.uk produces an index primarily based on the *asking* prices advertised on its website, which are frequently different from the actual sale price. Asking prices may be of interest in themselves, and the gap between posted asking and actual sale prices may tell us something about the balance of supply and demand for housing. Asking prices may also be a leading indicator of actual sale prices.

#### *Property valuation*

A major development in terms of house price indices in recent years has been the growth of online property valuations (and therefore local and national price indices), such as that provided by online property company Zoopla, which supplies both asking prices and sale prices. While Zoopla does calculate house price indices at different geographical scales (national, regional etc.) based on Land Registry data, these serve primarily as an input into the valuation of specific properties, and as such are not considered in detail here.

#### *Qualitative measures*

Other organisations produce qualitative measures of house prices based on surveys of estate agents and surveyors: the Royal Institute of Chartered Surveyors (RICS) produces a monthly poll looking at changes in average house prices over the past three months; and Hometrack produces a survey based on estate agents' and surveyors' estimates of the selling price of four standard homes in each postcode sector.

#### *Price expectations*

There are a number of forward-looking measures of house price expectations, including a survey of homeowners' expectations about house prices, carried out by Knight Frank / Markit, and questions in the aforementioned RICS survey about expected prices over the coming 12 months and five years.

## 2. Different measures of house prices

There are several major house price indices in the UK. These indices differ both in terms of what they are trying to measure and in terms of the data on which they are based. We focus on the following five indices, because they all seek to measure the price of housing using actual sales data and are relatively long-standing; hence, we can evaluate differences in trends in the series over a longer period:

- the Office for National Statistics (ONS)'s house price index based on UK-wide mortgage lending statistics;
- indices produced by the Nationwide Building Society and by Halifax (now part of the Lloyds Banking Group) based on the mortgage offers they each make;
- the Land Registry house price index, which is based on a complete register of all residential sales in England and Wales;

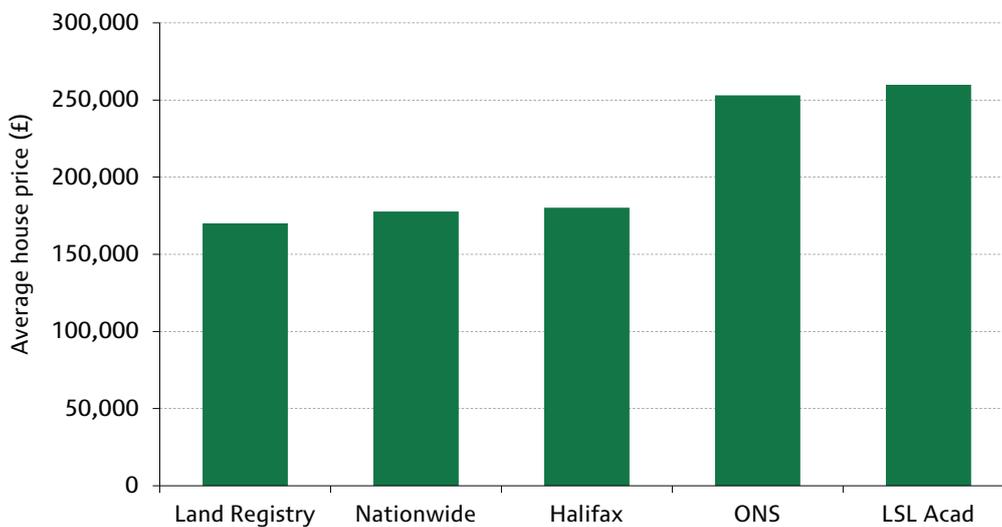
- an index produced by LSL Property Services / Acadata (LSL Acad), which is based on Land Registry data.<sup>4</sup>

### *How do different measures compare?*

The various indices of house prices differ both in terms of their estimated level of the ‘average’ house price and in terms of reported trends over time.

The differences in price levels are substantial: the ‘average’ house price in February 2014 ranged from £170,000 according to the Land Registry<sup>5</sup> to almost £260,000 according to LSL Acad – see Figure 1.

**Figure 1. Average UK house price, February 2014**



Note: Land Registry and LSL Acad cover England and Wales only.

Source: Land Registry, ‘Average Prices (SA)’ in ‘House Price Index background tables’, [http://www.landregistry.gov.uk/\\_data/assets/file/0019/80263/HPI-Tables.xls](http://www.landregistry.gov.uk/_data/assets/file/0019/80263/HPI-Tables.xls); Nationwide ‘UK Monthly Indices (Post ‘91)’, <http://www.nationwide.co.uk/~media/MainSite/documents/about/house-price-index/downloads/monthly.xls>; Halifax, table 10 (AllMon(SA)) in ‘Historical House Price Data’, <http://www.lloydsbankinggroup.com/globalassets/documents/media/economic-insight/house-price-tools/historicdataq12014.xls>; ONS, table 2 (Mix-adjusted average house prices by region) in ‘House Price Index, February 2014: Monthly & Quarterly Tables 1 to 19’, <http://www.ons.gov.uk/ons/rel/hpi/house-price-index/february-2014/rft-monthly-and-qtl-february-14.xls>; LSL Acad, ‘updated’ in ‘National Historic Series’, <http://www.acadata.co.uk/LSL%20Acad%20E&W%20HPI%20National%20Monthly%20Growth%20Series%20and%20Index%20from%201971%20March%202014.xls>. All sources last accessed 28 April 2014.

<sup>4</sup> LSL Acad and the Land Registry update their house price indices as further data are obtained. The data utilised here are derived from their ‘updated’, final or ‘ultimate’ indices.

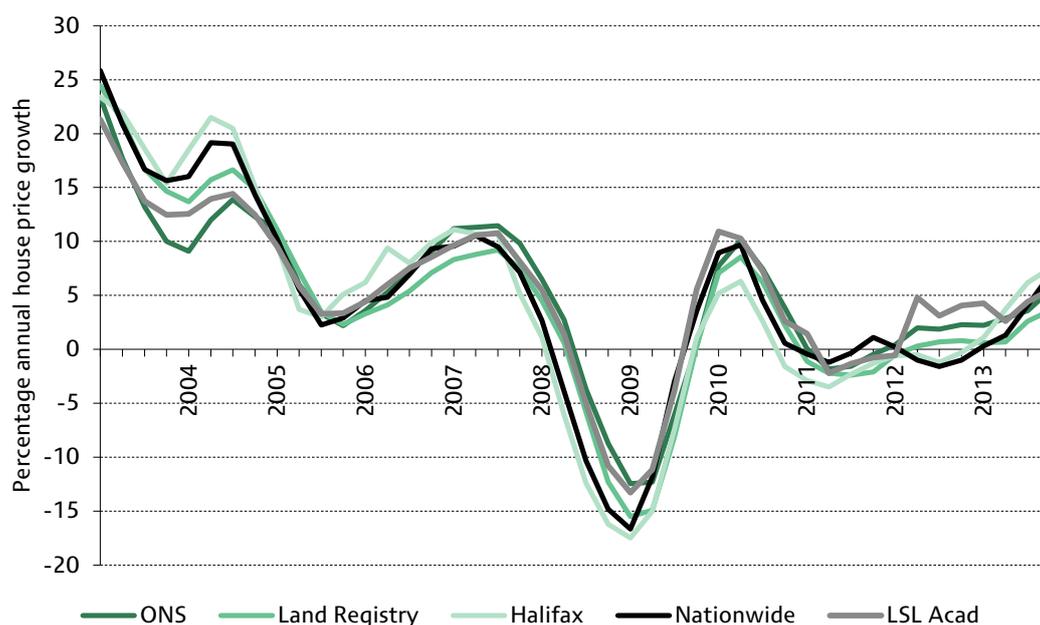
<sup>5</sup> England and Wales only. As we discuss in Section 3, the Land Registry is best interpreted as a measure of price growth rather than price levels.

House price indices also differ in their measure of how house prices change over time. Figure 2 shows annual house price growth, measured in each quarter, for the major house price indices over the past 10 years.

In Figure 2, the different indices show broadly the same movements in prices over 12-month periods (for example, comparing growth in prices from April 2013 to April 2014 according to the various indices). As might be expected, however, the differences between reported indices are much more pronounced if we look at shorter time periods, such as growth from month to month, or across smaller geographical areas.

Despite the broadly similar trajectories in prices when looking at annual growth rates, the differences between indices do not appear to even out over time. Figure 3 shows that cumulative nominal average house price growth over the past decade, as measured by the five different indices, ranges from around 35% according to the Land Registry to almost 60% according to the LSL Acad index.

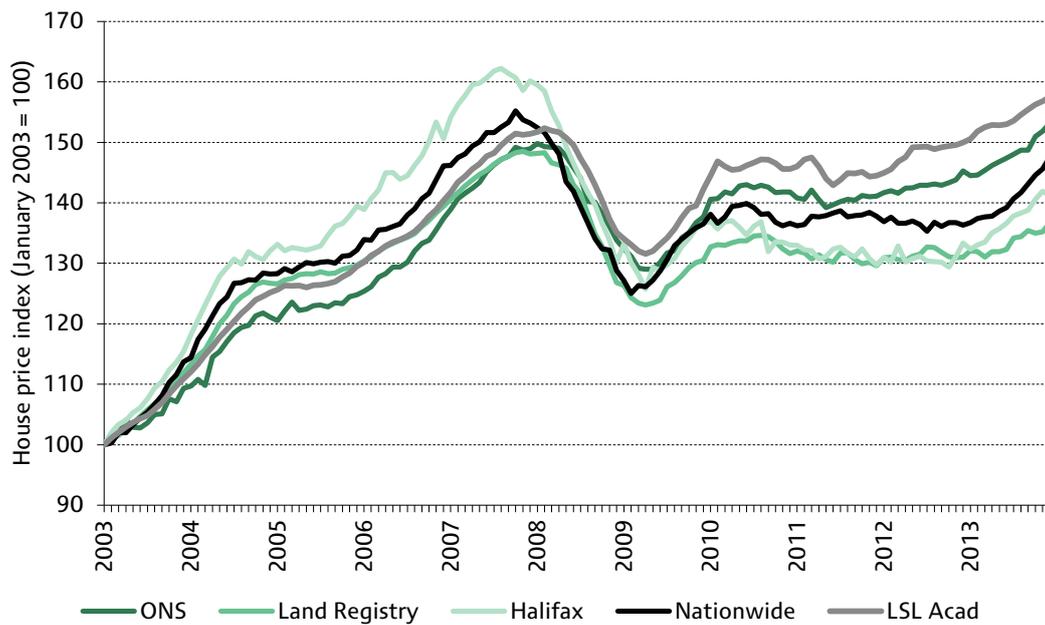
**Figure 2. Annual house price growth: comparison of alternative estimates (UK, quarterly)**



Note: Land Registry and LSL Acad cover England and Wales only. LSL Acad index is published on a monthly basis, so growth rates have been measured comparing March, June, September and December from one year to the next.

Source: Table 17 of ONS, 'House price index (HPI) reference tables', <http://www.ons.gov.uk/ons/rel/hpi/house-price-index/november-2013/rft-monthly-and-qtly-november-13.xls>; LSL Acad, 'National Historic Series', <http://www.acadata.co.uk/LSL%20Acad%20E&W%20HPI%20National%20Monthly%20Growth%20Series%20and%20Index%20from%201971%20March%202014.xls>. All sources last accessed 28 April 2014.

**Figure 3. Cumulative house price growth, 2003–13**

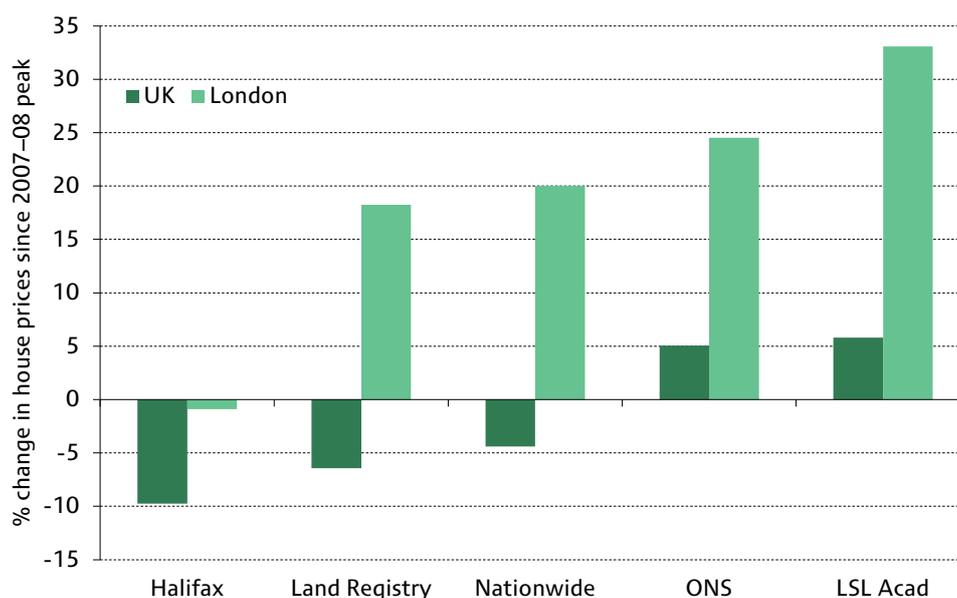


Note: ONS, Nationwide and Halifax cover the UK, while Land Registry and LSL Acad cover England and Wales only.

Source: See Figure 1 for Nationwide, Halifax and LSL Acad. Land Registry, 'Indices (SA)' in 'House Price Index background tables',

[http://www.landregistry.gov.uk/\\_data/assets/file/0019/80263/HPI-Tables.xls](http://www.landregistry.gov.uk/_data/assets/file/0019/80263/HPI-Tables.xls); ONS, table 7 (Seasonally adjusted mix-adjusted house price index and monthly house price change, UK) in 'House Price Index, February 2014: Monthly & Quarterly Tables 1 to 19', <http://www.ons.gov.uk/ons/rel/hpi/house-price-index/february-2014/rft-monthly-and-qtl-february-14.xls>. All sources last accessed 28 April 2014.

**Figure 4. House prices in early 2014 compared with 2007–08 peak for London and the UK**



Note and Source: See next page.

#### *Note and Source to Figure 4*

Note: Land Registry and LSL Acad cover England and Wales only. All figures compare February 2014 with previous index-specific monthly peak, except London figures for Nationwide and Halifax, which compare 2014Q1 with previous quarterly peak.

Source: For UK figures, see Figure 3. London figures: Land Registry, 'Indices (SA)' in 'House Price Index background tables',

[http://www.landregistry.gov.uk/\\_data/assets/file/0019/80263/HPI-Tables.xls](http://www.landregistry.gov.uk/_data/assets/file/0019/80263/HPI-Tables.xls); Nationwide, 'Seasonal Regional Quarterly Indices',

[http://www.nationwide.co.uk/~media/MainSite/documents/about/house-price-index/downloads/seasonal\\_regional.xls](http://www.nationwide.co.uk/~media/MainSite/documents/about/house-price-index/downloads/seasonal_regional.xls); Halifax, 'All(SA)' in 'Historical House Price Data',

<http://www.lloydsbankinggroup.com/globalassets/documents/media/economic-insight/house-price-tools/historicdataq12014.xls>; ONS, table 1 (Mix-adjusted house price index and annual house price change by region) in 'House Price Index, February 2014: Monthly & Quarterly Tables 1 to 19',

<http://www.ons.gov.uk/ons/rel/hpi/house-price-index/february-2014/rft-monthly-and-qtly-february-14.xls>; LSL Acad, 'Regional Historic Series with Interactive Charts',

<http://www.acadata.co.uk/LSL%20Acad%20E&W%20HPI%20National%20and%20Regional%20Formatted%20Data%20from%201995%20March%202014.xls>. All sources last accessed 28 April 2014.

Finally, by way of comparison, the extent to which prices by late 2013 had recovered their previous peak of late 2007 / early 2008 is of particular interest in the debate as to the sustainability of the current recovery in the housing market. As shown in Figure 4, estimates of how nominal prices in London in early 2014 compare with their pre-recession peak range from about 1% below (Halifax) to more than 30% above (LSL Acad). In terms of the UK as a whole, only the ONS and LSL Acad indices suggest that the previous nominal peak had been attained by that time.

### **3. What explains the difference between house price indices?**

This section sets out some of the practical and conceptual difficulties in measuring house prices over time and looks at the reasons why we might expect the various indices to differ.<sup>6</sup>

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<sup>6</sup> The following discussion of specific indices draws on the following documentation for each index:

ONS, *Official House Price Statistics Explained*, 2013,

<http://www.ons.gov.uk/ons/guide-method/user-guidance/prices/hpi/index.html>;

Nationwide, *House Price Index: Methodology*, 2014,

<http://www.nationwide.co.uk/~media/MainSite/documents/about/house-price-index/nationwide-hpi-methodology.pdf>;

M. Fleming and J. Nellis, *The Halifax House Price Index: Technical Details*, Halifax, 2009,

<http://www.lloydsbankinggroup.com/media/word/HPI/13.08.09TechDetails.doc>;

Land Registry, 'About the House Price Index',

<http://www.landregistry.gov.uk/public/house-prices-and-sales/about-hpi>, accessed 31 March 2014;

### *What is a price index?*

At the most basic level, a price index measures the price of a single good or service of given characteristics in one period relative to the price of that same item in another period. In practice, price indices typically track movements in the price of a group or 'bundle' of goods with different characteristics. This is clearly the case when it comes to housing: houses vary in terms of size, quality, location and a range of other characteristics. Depending on these characteristics, the prices of different types of houses will grow at different rates over time. There is no single 'price' of housing, and as such a house price index is best understood as a measure of central tendency of the prices of a 'bundle' of house types defined by various characteristics.

A typical price index – for example, the retail price index – measures the ticket price of a 'bundle' of goods and services, such as food and clothing, where the price of each item is weighted – for example, to reflect its relative proportion in the average expenditure 'bundle'. Typically, these goods and services are 'non-durable' – that is, they are purchased and consumed almost immediately. Housing is different, as it is a durable good which provides a flow of services.

In the case of 'durable goods' such as housing, we may be interested not just in the average value of houses sold in a given period, but also in the average value of the total stock of houses (of which those available for sale in any given interval will typically be a small proportion). As a result, it is important to be clear about what exactly a house price index is trying to measure: is it the average 'price' of housing transacted (or the *flow* of housing sales) over a specific period of time or is it the average 'price' of the *stock* of housing at a given point in time (or indeed the average price of a house that is in some way representative of the housing stock)? These different measures will not have the same value if the houses transacted in any period are not 'representative' of the housing stock in general – for example, if turnover rates of different types of property differ (i.e. some types of houses are bought and sold more frequently than others).

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C. Meissner and S. Satchell, *A Comparison of the Case-Shiller House Price Index Methodology with the Acadata House Price Index Methodology*, LSL Acad, 2013 (first published 2007), [http://www.acadata.co.uk/Meissner\\_Satchell.pdf](http://www.acadata.co.uk/Meissner_Satchell.pdf).

Indices tracking these different concepts are useful for different purposes. The average price of housing sales gives a measure of the total value of turnover in the mortgage or property market, which might be useful for predicting stamp duty revenues or the revenue of estate agents. Repeated valuations of the housing stock, on the other hand, give a sense of changes in the value of housing wealth, which is important if we want to understand household wealth and its implications for consumption, saving and other behaviour. Tracking the price of a representative house serves a similar purpose, where this house can be representative of the stock or of a typical transaction. The distinction between the average price of housing *sales* and the average price of the housing *stock* is important because some of the differences highlighted in Section 2 could simply reflect the fact that the indices are tracking different concepts.

In practice, it is surprisingly difficult to find a clear statement of what the indices considered in this briefing note are trying to measure. On the one hand, house price indices are widely interpreted as measuring the change in value of the housing stock, and documentation for most of the indices considered here suggests that this is their ultimate aim. For example, the ONS states that ‘The aim of the ONS House Price Index (HPI) is to measure the change in the average house price for owner-occupied properties in the UK, its component countries and regions’, albeit using the price of a typically transacted property as a proxy, while the Land Registry describes its house price index as using the growth rate of the price of houses that have been transacted more than once as a proxy for the ‘market-wide growth rate for a given period’.<sup>7</sup>

In general, the methods that are actually used – and which we describe shortly – fit best with an interpretation of the indices as tracking changes in the price of a typically transacted house. All the house price indices considered here are based on sales data, and hence reflect the average price of houses sold in a particular period. If the intention, however, were to track changes in the value of the housing stock, then sales data would need to be reweighted to reflect the different mix of houses in the stock versus the transactions in a given period. In practice, although all the

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<sup>7</sup> Page 7 of Calnea Analytics, *Land Registry House Price Index Methodology*, <http://www.calnea.com/wp-content/uploads/2008/12/Land-Registry-House-Price-Index-Methodology-1995.pdf>.

indices adjust monthly sales data (with the exception of the Land Registry, which follows a somewhat different approach), the adjustments make the data representative not of the housing stock, but of typical transactions over a given period. This potential ambiguity in terms of what the various indices are trying to measure makes it more difficult to evaluate them.

### *Challenges in constructing a house price index*

The standard approach to constructing a price index, and a useful benchmark for thinking about house price indices, is to measure the price of exactly the same item, or group of items, over time. If the items are identical between periods, then any increase in quoted price will be a genuine increase in price (rather than reflecting an improvement in quality). An index that tracks the price of a group of items will take a weighted average of the individual prices, where the weights reflect the 'importance' of each item (in some sense).

There are two methodological challenges arising from the fact that we only observe the price of a small and non-random sample of the total stock of housing over any given period, such as a month. First, changes in average sale prices will reflect changes in the values, and hence types, of houses sold from period to period as well as changes in the underlying price of housing. The index will need to adjust for the composition of sales and the values attached by the market to different types of property. Second, houses sold in a given period are not a random sample of the housing stock: some geographical areas have higher housing turnover rates and some types of property are sold more frequently, and these will be over-represented in sales data. If the objective of the house price index is not simply to track the average sale price, but also to reflect changes in the price of a house that is typical of the total stock, then the average sale price will contain a further bias that will need to be corrected to estimate changes in the underlying 'price' of housing.

### *Isolating changes in price from changes in housing characteristics*

A simple average sale price from period to period will reflect changes both in the underlying price of housing and in the type of houses sold. For example, suppose that there is an increase in the number of expensive properties sold in a given month compared with the previous month, but that the price of each house remains the same. A simple illustration of this would be turnover increasing more rapidly in the London area, where

prices are significantly higher, than elsewhere in the country. Other things being equal, a simple average of the prices would register an increase in the average price, even though the price of each house had in fact remained the same.

### Mix adjustment and hedonic regression

One way of dealing with the issues faced by simple averages is known as 'mix adjustment'. Under this approach, the sample of properties is divided into subgroups (known as 'cells') according to particular combinations of characteristics, such as location, number of bedrooms, whether or not the property has a garden or garage, and so on. An average price is calculated for each cell, leading to the development of sub-indices for each property type (for example, a two-bed property, with a garden, in London). The overall index is then a weighted combination of these individual sub-indices. This is the approach followed by LSL Acad, for example, albeit for a limited range of characteristics. By taking averages for each property type (cell), this approach controls for shifts in the volume of sales from one type to another and for variations in turnover rates between areas with different price levels.

The ONS, Nationwide and Halifax employ a similar but slightly more sophisticated method, known as 'hedonic regression'. Under this approach, properties are defined by a set of characteristics (number of bedrooms, location etc.), each of which contributes to the value of the house. A regression model is then used to estimate the value of each characteristic (or combination of characteristics) within the overall value of houses, using data from the set of properties sold in a given period. In principle, then, the values attached to particular characteristics can be combined to construct the price of a synthetic 'average' or 'typical' house, which the index tracks over time. Different indices take different approaches to defining this average house and to how the value of each characteristic varies over time.

In theory, if mix-adjustment and hedonic regression methods control for all relevant characteristics in order to avoid the problems faced by simple averages discussed above, then all such indices would give the same results. If some characteristics are excluded from the hedonic regression or left out when constructing cells, however, then there will be differences in the estimated price of a 'constant-quality' house. In practice, the various

indices do not control for exactly the same characteristics. In particular, it is worth noting that the LSL Acad index controls for a narrower set of characteristics than the ONS, Nationwide and Halifax indices because it is based on the more limited information contained in Land Registry data.

What is the ‘average’ house?

As suggested above, indices based on mix adjustment or hedonic regression try to isolate genuine changes in price from changes in the composition of properties being sold by constructing sub-indices for specific house types or characteristics. These sub-indices are then combined to give the price of an ‘average’ or ‘representative’ house, which serves as an indicator of overall trends. Differences in how indices define the average or ‘representative’ house help to explain both differences in price *levels* and differences in *growth rates*, because the prices of different house types will grow at different rates over time.

In determining weights with which to combine the sub-indices, the first question is whether the aim is to make the data representative of the housing stock or of some definition of the ‘typically transacted’ house, as mentioned previously. In practice, although some of the indices suggest they are interested in the underlying value of the housing stock, they all base their weights on transaction data.

The second question is whether these weights should be fixed in a single base year or whether they should be periodically updated. The Halifax index tracks the price of a house possessing the same characteristics as the average house bought in a single base year (1983). The advantage of an index with constant weights is that it represents pure changes in the price of the defined ‘typical’ house, rather than changes that reflect, for example, an improvement in general housing quality. However, it seems likely that the ‘typical’ house being purchased in 2014 might be quite different from the ‘typical’ house purchased in 1983. For instance, over time, we might expect to see changes in the supply of certain characteristics (for example, due to home improvements or new construction), changes in the preferences of those purchasing a house, or substitution from houses with more to houses with less expensive characteristics – all of which would be expected to change the overall distribution of characteristics in the typically transacted house (or the housing stock overall). As such, if there has been a general increase in house prices due to improvements in

quality (an increase in the proportion of houses with extensions, a greater number of bedrooms in new builds, etc.), the Halifax index will not register this change.

In contrast, the ONS and Nationwide adopt a rolling definition of the ‘average’ house, updated periodically to reflect current transaction data. Nationwide tracks the price of a ‘typical’ house, the characteristics of which are revised every two years based on both internal and external transaction data. The ONS tracks the price of the ‘average’ house by combining the price of all house types in proportion to the frequency with which properties with those characteristics are actually sold. These frequencies are adjusted annually, based on data for the previous three calendar years.<sup>8</sup>

This process is similar to that used for other consumer price indices, such as the retail price index (RPI) and the consumer price index (CPI), where the representative ‘bundle’ of goods is updated regularly to reflect changes in supply, changes in preferences and substitution effects. By analogy, the ONS and Nationwide are effectively updating the ‘bundle’ of characteristics in the typical house to provide a snapshot of the average property currently being bought and sold in the UK. Moreover, because weights are determined using transaction data, these indices are more likely to reflect the prices of the subset of houses that are transacted, rather than of the entire housing stock. Until the end of 2013, the LSL Acad index used weights for property type and location based on the number of housing transactions that took place in England and Wales between January 2000 and December 2003. From January 2014, it has used weights based on transactions between January 2010 and December 2013.

### Repeat sales

The Land Registry index takes a different approach to isolating genuine changes in house prices from changes in the type or quality of properties

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<sup>8</sup> The ONS index is ‘chain-linked’ between years in order to create a continuous index on a single scale. In practice, this means that, each year, the ONS calculates an index taking the most recent January – when the weights are updated – as its base (meaning the index is equal to 100 in January) and then ‘links’ one year’s index to the next. See pages 22–23 of ONS, *Official House Price Statistics Explained*, 2013, <http://www.ons.gov.uk/ons/guide-method/user-guidance/prices/hpi/index.html>. It is not clear whether Nationwide follows a similar ‘chain-linking’ approach.

being sold. This approach, known as the ‘repeat sales’ method, is based on observing the change in price of individual houses between two points in time and taking an average of these individual increases to represent the general increase in prices. The idea here is that, if the characteristics of a property have remained the same between sales, then any increase in price reflects a ‘true’ increase in the price of housing – at least, for those properties that are transacted. In reality, of course, some properties will deteriorate while others will have been improved between sales; however, there is little reliable data on home improvements or deterioration over time in the UK, so the Land Registry does not fully control for the impact such changes might have on prices.<sup>9</sup> The Land Registry then estimates the average increase in house prices using a regression model that allows for some part of the increase in an individual property’s price being due to random variation, i.e. unmeasured depreciation or improvement in value.

The ‘repeat sales’ method has the major advantage of isolating genuine increases in the price of housing without requiring detailed information about the characteristics of individual properties (so long as some account is taken of unobserved changes in the characteristics of each house).

However, it will still be affected by changes in the composition of houses being sold from month to month. For example, suppose there was a shift towards sales of houses in London, where house prices are growing faster than in the rest of the country. Even if the rate of price growth had in fact remained the same for each property type and location, a shift in the proportion of sales towards properties experiencing faster growth would be registered as an increase in the LR index. More generally, an index based on repeat sales will be biased towards the growth rates experienced by more frequently-transacted properties, simply because they show up more regularly in sales data. This is a problem if the index is interpreted as tracking the average price of the housing stock.

The Land Registry (LR) index also reports an ‘average house price’, but this needs to be thought of in a slightly different way from the average prices produced by the other indices. Rather than tracking changes in the price of an ‘average’ house, the LR index tracks the average change in

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<sup>9</sup> See ‘Land Registry House Price Index’, letter from Malcolm Dawson (Chief Executive of Land Registry) to Sir Michael Scholar (Chair of the UK Statistics Authority), 30 March 2012, <http://www.statisticsauthority.gov.uk/reports---correspondence/correspondence/letter-from-malcolm-dawson-to-sir-michael-scholar-300312.pdf>.

prices. These two things will not generally be the same. The LR measure of the average house price is constructed by applying the average change in prices (as measured by the LR index) to the price of an 'average' house in April 2000. However, there is no obvious way to ensure that the average growth rate calculated by the LR index overall bears a systematic relation to the actual growth rate experienced by the 'average' house as measured in 2000. As such, the LR index is best understood as a way of tracking the average growth in house prices of repeat sales since that date, rather than the price of an average house.

### *Sample size and coverage*

All five main indices of house prices are based on different data, and this can give rise to differences in their estimates of what is happening to house prices.

There are a number of potential sources of sample selection bias, which may help explain some of the differences between indices:

- *Mortgage valuations versus prices on completed sales.* Indices provided by mortgage lenders typically track the values of properties upon which they may make a mortgage offer as estimated by a surveyor or, in some instances, by an automatic valuation model. These offer valuations may, in turn, differ from final sale price as notified to the Land Registry. If valuations lag current offer prices (especially when markets are in sharp upswings or downswings), lender-based indices may lag slightly behind current prices.
- *Sales with mortgages versus cash sales.* The final LSL Acad and Land Registry indices, which are based on Land Registry data, cover all residential purchases, whether these are made with a mortgage or with cash. However, full information on sales is only available with a delay. The ONS, Nationwide and Halifax indices, which are based on mortgage data, do not include cash purchases. If the prices of houses bought with cash move differently from the prices of houses bought with a mortgage, then (without further adjustment) these indices will provide systematically biased estimates of transaction prices.<sup>10</sup>

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<sup>10</sup> To our knowledge, there are no published data comparing cash and mortgage house purchases. However, it is worth noting that the assumption that their prices move in the same way has become increasingly important in recent years. The Council of Mortgage Lenders suggests that the proportion of cash purchases has steadily

- *New sales.* The Land Registry index is based only on properties that have been sold at least once before. As a result, it excludes new properties because, by definition, they cannot have been sold already.
- *Transaction bias.* The Land Registry index, because it is based on repeat sales, is naturally biased towards properties that are sold more frequently. In addition, there is reason to think there might be systematic differences between properties that are sold more and less frequently – for example, that cheaper properties will be sold more frequently (something encouraged by the structure of stamp duty land tax, a tax on housing transactions that is levied at a lower rate on cheaper properties).<sup>11</sup>
- *Lending policies and market coverage.* Nationwide and Halifax base their indices on their own mortgage lending data. It seems likely that the profile of lending made by Nationwide and Halifax will be influenced by their own lending policies and regional market presence, leading to systematic differences in the data both between the two lenders and between these lenders and the ONS, which relies on a survey of most mortgage lenders. (Note that the ‘hedonic regression’ approach discussed above seeks to control for this sort of variation.)

In addition, it is worth noting that different indices are based on samples of different sizes. The LSL Acad index is based on the largest sample, as it uses the complete record of property transactions in England and Wales provided by the Land Registry (almost 100,000 transactions per month between 1997 and 2007, although around 75,000 in December 2013).<sup>12</sup> As mentioned above, the Land Registry index only uses data from properties that have been sold at least twice since 1995, which at present means that around 40% of sales are used in calculating the index.<sup>13</sup>

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increased over time from around 20% of transactions in 2006 to around 35% in 2013, reflecting the contraction in credit availability in the 2008–10 recession (see <http://www.cml.org.uk/cml/publications/newsandviews/150/585>).

<sup>11</sup> For a brief discussion of why price growth might differ systematically between price brackets, see page 14 of Calnea Analytics, *Land Registry House Price Index Methodology*, <http://www.calnea.com/wp-content/uploads/2008/12/Land-Registry-House-Price-Index-Methodology-1995.pdf>.

<sup>12</sup> Land Registry, ‘Sales Volumes’ in ‘House Price Index background tables’, [http://www.landregistry.gov.uk/\\_\\_data/assets/file/0019/80263/HPI-Tables.xls](http://www.landregistry.gov.uk/__data/assets/file/0019/80263/HPI-Tables.xls).

<sup>13</sup> Acadata, ‘Which house price index?’, forthcoming.

Of the indices that look only at mortgage transactions, the ONS measure has the largest coverage, being based on a sample of mortgage completions from lenders covering around 75–80% of the mortgage market (across 2012, the average sample size was 27,000 transactions per month).<sup>14</sup> The Nationwide and Halifax indices, on the other hand, are based on their own lending data, which necessarily cover only part of total mortgage lending. The indices also differ in when in the process of the transaction the price is measured: whereas the Nationwide and Halifax indices are based on valuations for mortgage approvals, the Land Registry and ONS measures are based on actual property transactions. Because some properties that receive a mortgage offer are not in fact sold, the Nationwide and Halifax measures may provide a biased estimate of sale prices. However, the advantage of publishing data based on approvals is that these indices are more timely: there can be a lag of up to a few months between an offer being accepted (Nationwide and Halifax), a mortgage being completed (ONS) and a property being registered with the Land Registry. As such, properties that are recorded in the Nationwide and Halifax indices in January may not show up in Land Registry data until at least March or April. Finally, some indices provide for a degree of smoothing over the quarter, whereas others report monthly fluctuations in the index as they occur.

#### **4. Evaluation**

As we have seen, there are a number of reasons why different indices might differ: in part, they can be interpreted as measuring slightly different things; but even when they purport to be measuring the same thing, they employ slightly different methodologies and use different underlying data. Table 1 summarises these differences.

In this section, we offer some general comments on the pros and cons of the different indices and provide a brief discussion of how these differences might explain what we currently see in the data.

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<sup>14</sup> Page 15 of ONS, *Official House Price Statistics Explained*, 2013, <http://www.ons.gov.uk/ons/guide-method/user-guidance/prices/hpi/index.html>.

**Table1. UK house price indices summarised**

| <b>Index</b>  | <b>Data</b>                         | <b>Coverage (property type)</b>   | <b>Geographical coverage</b>                        | <b>Time in house-sale cycle</b>         | <b>Adjustment methodology</b> | <b>Target concept</b>  |
|---------------|-------------------------------------|---|---|---|-------------------------------|--|
| ONS           | Survey of 75–80% of mortgage market | Excludes cash sales   | UK  | Mortgage completion                     | Hedonic regression            | Price of typically transacted property, based on sales data from the previous three calendar years   |
| Nationwide    | Nationwide mortgage lending         | Excludes cash sales   | UK  | Mortgage offer                          | Hedonic regression            | Price of typically transacted property, based on Nationwide and external sales data from the previous two years                                    |
| Halifax       | Halifax mortgage lending            | Excludes cash sales   | UK  | Mortgage offer                          | Hedonic regression            | Price of property typically sold by Halifax in 1983  |
| LSL Acad      | Land Registry price paid data       | All registered sales  | England & Wales; also Scotland and Wales separately | Registration of sale with Land Registry | Mix adjustment                | Until Dec 2013: price of property typical of sales Jan 2000 to Dec 2003<br>Since Jan 2014: price of property typical of sales Jan 2010 to Dec 2013 |
| Land Registry | Repeat sales data                   | Excludes properties that have not sold at least twice since 1995 (i.e. excludes all new properties) | England & Wales                                     | Registration of sale with Land Registry | Repeat sales regression       | Average increase in house prices (geometric mean price change applied to ‘average’ house in April 2000)  |

### *Pros and cons of different indices*

No index is clearly superior in terms of the underlying data on which it is based

Two considerations are relevant in evaluating the data on which the various house price indices are based.

The first is sample size: other things being equal, indices based on a larger, unbiased, sample are likely to provide estimates closer to the true value of house prices. The LSL Acad index uses the largest sample, being based on what is effectively a census of all housing transactions in each month.

While LSL Acad uses data compiled by the Land Registry, the Land Registry's own index only uses a subset of these data, being restricted to properties with at least one recorded prior sale since 1995. Of the indices based on mortgage data, the ONS one is based on the largest sample, with data taken from a range of mortgage lenders, while Nationwide and Halifax use smaller samples based on their own sales data. However, an advantage of using mortgage rather than Land Registry data is timeliness: there can be a number of months between a property being approved for a mortgage and the transaction being registered with the Land Registry. Hence, there is a degree of trade-off between the size of the sample on which inferences of current house price changes are based and the comprehensiveness of the data.

The second consideration is sampling bias, arising from the ways that the data are collected for the different indices. In particular, all the indices are based on transaction data, which are unlikely to be representative of the overall housing stock, with properties that are sold more frequently being over-represented. At least in theory, the ONS, Nationwide, Halifax and LSL Acad are able to address this via mix adjustment or hedonic regression (see Section 3). The Land Registry index, on the other hand, does not take account of this, and as such is biased towards changes in the price of properties with high turnover. The fact that indices based on mortgage data (ONS, Nationwide, Halifax) exclude cash purchases is another potential source of bias, though it is unclear from the available data whether there are systematic differences in the price of properties bought with mortgages or with cash.

Different methods for quality adjustment all have something to add

As with many issues involving disaggregated data sets, tracking the same individual (person, house or object) is an attractive strategy since, under certain circumstances, matched data eliminate unobserved heterogeneity in the objects or persons of interest over time. Hence a 'repeat sales' index would seem to be an attractive means of measuring the value of the 'same' property over time, just as 'panel data analysis' has become increasingly popular in the analysis of household behaviour.

There are, however, two big drawbacks in using the analogy of panel data. First, household panel data sets are generally drawn randomly from the population whereas 'repeat sales' data are not. It is harder to derive a population-weighted index of price changes in the context of repeat sales than it is to form an average effect for a random panel. Second, as mentioned before, houses may take on different characteristics over time due to depreciation, home improvements and so on.

Because indices based on 'repeat sales' data are quite different in construction from indices based on hedonic regressions (which require knowledge of the detailed characteristics of each house), they form a useful comparison method. They tend to provide more information on markets where there are high volumes of turnover; indeed, it is arguable that the data underlying 'repeat sales' indices are themselves of some direct interest since they reflect differential characteristics of specific housing markets.

It is not clear how often 'mix-adjusted' series should be revised

At first sight, it seems odd that the Halifax index relies on a 'mix-adjusted' stock calculation for 1983. By analogy, if the RPI or CPI had not changed their weighting of purchases to reflect changes in consumer tastes since the early 1980s, while they would reflect the pure change in price for a given bundle of goods and services, they would in all likelihood be representing the price of goods and services that have long gone out of fashion or, indeed, may no longer exist.

Hence it might seem natural to update the weights in a mix-adjusted or hedonic index at more frequent intervals. How often these weights should be adjusted depends on the frequency with which the characteristics of the houses whose prices we are trying to measure change. If the aim is to

represent the current value of the housing *stock*, then frequent revision might not be necessary, given that the balance of house types within the housing stock changes slowly. If the index is designed to make sales data representative of typical housing transactions, then more frequent revisions might be in order. Even so, there is a balance to be found: if weights were updated each month, then the index would effectively be an average of sale prices, with all the difficulties discussed earlier. The weights should therefore be updated as frequently as we think there will be genuine changes in the characteristics of the typically transacted house.

### *Can we explain current patterns in the data?*

We started this briefing note with an overview of the observed differences between the various indices. We have discussed a range of reasons why these differences exist. Ideally, we would like to be able to link specific differences between indices to differences in their underlying data or methodology. In practice, this is well beyond the scope of this briefing note, both because of the wide range of factors that lead the indices to differ and because of a lack of sufficiently detailed data.

Nonetheless, we can offer some potential explanations of current patterns in the data. Of particular interest is the fact that the indices differ so substantially in terms of the extent to which prices have grown since late 2007 / early 2008 (see Figure 4).

The most likely explanation for these differences relates to the extent to which the indices are adjusted to reflect changing volumes of sales. In particular, we know that transactions in London have held up more strongly throughout the recession than transactions elsewhere in the UK, and that price growth in London has exceeded price growth elsewhere since 2008. As a result, we would expect those indices that are weighted to reflect current transaction volumes (ONS, Nationwide) to show faster growth in prices, as they give an increasingly large weight to London, than those based on fixed weights (Halifax, LSL Acad until December 2013). In practice, we do observe faster growth for the ONS and Nationwide indices than for the Halifax one. However, we also see strong growth for the LSL Acad index, which may reflect both the change of weights at the end of 2013 and, perhaps more tentatively, the fact that this index employs a less detailed form of mix adjustment.

It is not clear what we would expect to see in the Land Registry index. This index will be biased towards properties that sell more frequently. If the types of property that turn over more frequently experience slower price growth, the Land Registry index will have a downward bias compared with other measures of price growth, and vice versa. In fact, the index lies in the middle of the range of recent changes among the indices (Figure 4). In order to say anything more concrete about this index, we would need to undertake some analysis of turnover of property types and locations, which is beyond the scope of this paper.

## 5. Conclusion

Despite mortgage providers' natural preference for using their own index, and some slightly misleading statements by commentators, it appears that there is, in practice, no one ideal house price index. This leads to three conclusions:

- First, it is important to understand *why* indices may differ in their trajectories. This is particularly important when it is apparent that the housing market is exhibiting different patterns of price changes across sub-markets (for example, parts of London versus the rest of the country).
- Second, rather like opinion polls, if there is no clear criterion for preferring one index above another, it is sensible to have a moving average of the various indices analogous to a 'poll of polls' used at the time of general elections, rather than media commentators treating each new reported result as an update of previous information. More ambitiously, consideration could be given to combining the existing indices in some way to provide a composite 'super-index' capturing the features of all the various methods. Leaving aside the considerable methodological problems in doing so, there is the obvious issue of how to weight the various indices within the overall index.<sup>15</sup>

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<sup>15</sup> Following a review of official house price statistics conducted in 2010, the ONS has said that it will develop a new house price index, which will be published alongside existing measures, and will seek National Statistic status (see Government Statistical Service, *National Statistician's Review of House Price Statistics*, 2010, <http://www.statisticsauthority.gov.uk/national-statistician/ns-reports--reviews-and-guidance/national-statistician-s-reports/national-statistician-s-review-of-house-price-statistics.pdf>). The new index will aim to 'represent the prevailing market price of

- Finally, there may be other indicators that give a 'better' picture of the state of demand in the housing market. In particular, the volume of transactions (relative to the stock) in housing markets is an important indicator of housing activity that correlates strongly with house price indices as a whole.<sup>16</sup> Such information forms a useful adjunct to house price data.

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residential property at completion of sale' and will measure both the level and growth of house prices, based on the price paid for transacted properties. Unlike the existing ONS index, it aims to include both mortgage and cash sales. However, further details of the methodology to be used have not been published.

<sup>16</sup> See D. Chandler and R. Disney, 'Housing market trends and recent policies', in C. Emmerson, P. Johnson and H. Miller (eds), *The IFS Green Budget: February 2014*, Institute for Fiscal Studies, London, 2014, [http://www.ifs.org.uk/budgets/gb2014/gb2014\\_ch5.pdf](http://www.ifs.org.uk/budgets/gb2014/gb2014_ch5.pdf).