Halifax House Price Index (HHPI) 2019

Index Manual for HHPI model introduced in 2019

1 Significant Index Administration Events

The following Index Administration events apply to each index of the **Halifax House Price Index (HHPI) 2019 family**.

Table 1: Index Administration Events

Date	Index Administration Event
April 2019	IHS Markit officially commences Index Administration
January 2018	Annual attestation of IOSCO compliance
January 1983	**Index Commencement Date**
January 1983	**Index Base Date** (base level = 100)

2 HHPI (2019) Overview

When first introduced in 1984, the Halifax House Price Index (HHPI) represented a major advance in the measurement of house price changes in the United Kingdom.

Unlike earlier series, and house price statistics produced by other institutions, the new figures issued by the then Halifax Building Society were standardised rather than based on simple price averages. By allowing for the influence of the different characteristics of houses on their prices, using a database especially established by the Halifax, and maintained by Lloyds Banking Group (LBG), for this purpose, the new series placed the measures on a truly comparable footing, thereby providing a more accurate indication of like-for-like house price movements than was previously possible.

Broadly speaking, the HHPI methodology was left unchanged since its inception in 1983. Whilst the hedonic regression on which the original model is based remains a pre-eminent method of house price index generation in 2019, during the years that have passed since 1983 there have been several developments that encourage methodological upgrading. For instance, changes in the mix of UK housing stock – both geographical and physical housing attributes – plus the reduced influence of certain property characteristics in price determination led, especially in recent years, to an undesirable effect of increasing HHPI index volatility.

Borne out of both a deep knowledge of the original HHPI model, which we define in this document as HHPI (1983) and a careful assessment of the current literature on house price determination provided by statistics agencies based in the UK and the euro area, IHS Markit has subsequently undertaken a number of methodological enhancements to tackle the aforementioned issues with HHPI (1983). These include:

- refreshing the data exclusion criteria, with particular focus on the inclusion of shared ownership transactions

- replacing existing model characteristics with a more parsimonious set. This selection includes improving the granularity of location characteristics
- creating an enhanced weighting system based on the chain-linking methods used by statistical agencies around the world
- remapping the HHPI sample to current Government Office Region (GOR) specifications to create UK regions consistent with UK official statistics

These enhancements have been combined to create a new set of HHPI indices for users, which we refer to as HHPI (2019), covering the following indices at both the UK national and regional level:

Table 2: List of Halifax House Price Index (HHPI) 2019 family

Index Series	Frequency	Total Number of indices
UK AHAB, SA + NSA	Monthly	6
UK New Homes, NSA		
UK Existing Homes, NSA		
UK First Time Buyers, NSA		
UK Former Owner Occupiers, NSA		
UK+12 Regions AHAB, SA + NSA	Quarterly	66
UK New Homes, NSA		
UK+12 Regions Existing Homes, NSA		
UK+12 Regions First Time Buyers, NSA		
UK+12 Regions Former Owner Occupiers, NSA		
UK+12 UK Regions AHAB, NSA	Annual	53
UK New Homes, NSA		
UK+12 Regions Existing Homes, NSA		
UK+12 Regions First Time Buyers, NSA		
UK+12 Regions Former Owner Occupiers, NSA		

3 Index Methodology

The following sections present an overview of the HHPI (2019) methodology.

The sole source of data for HHPI (2019) remains Lloyds Banking Group (LBG). Using mortgage approval data provided by LBG, it is possible to determine not only the price information related to property transactions, but also several attributes related to the type (detached, semi-detached, terraced etc.), size (bedrooms, floor space in square metres), age (new/old), and location. The dataset is then combined with hedonic regression techniques to generate house price indices.

With the core aim of HHPI (2019) to provide a robust measure of changes in residential property prices, as in the case of HHPI (1983), several types of transaction are excluded from index generation. These include:

- Re-mortgages
- Business use, capital raising, or building mortgages
- Discounted mortgages relative to market value (as determined by observed data that shows the property valuation < 75% of purchase price e.g. the "Right-to-Buy" scheme).

An exception to the discounted mortgage rule is shared ownership mortgages which are, for the first time, included in the new version of the HHPI. We also now include buy-to-let properties and those bought directly from less-conventional vendors e.g. builders.

The effects of including shared ownership mortgages enable the HHPI (2019) to:

- better reflect the current structure of the UK housing market, especially in relation to the trend towards increasing levels of shared ownership among first-time buyers
- enjoy a higher sample size and help to reduce the period-to-period volatility of HHPI both at national and regional levels.

3.1 Index Calculation

The HHPI is calculated by estimating the price of a fixed 'basket' of attributes of houses sold in different time periods (an analogy is with the standard basket of goods in the retail price index). By taking a ratio of two valuations we subsequently estimate the change in property prices across a time period.

To reflect the idea that the mix of properties is not necessarily constant and can change between periods, the HHPI (2019) basket of attributes is fixed to a 12-month period and subsequently updated once a year using three years of LBG transactional data (although an exception is the regional weights for the UK level indices, which are calculated using external data from the Land Registry, HMRC and Council of Mortgage Lenders. This is to help guard against any regional bias that may be present in the LBG transactional dataset).

Given that successive years of data are not directly comparable, each basket runs for a 13-month period from January to January (or in the case of a quarterly index, Q1 to Q1). Individual 'in-year' price indices for each basket of goods are created with the first January (or Q1) index value set to 100. The 'in-year' indices are subsequently 'chained' together to provide a continuous time series by taking the month 13 January figure (or quarter 5 figure) as the first reading of the next year's basket.

This should be viewed as a considerable improvement on the original methodology, which used a standardised house determined in 1983. Throughout recent years there have been a number of changes in property development (such as a rise in the number of bathrooms, the increased use of central heating etc.) that has made the standardised house in 2019 look different to that of 1983. Chain-linking methods subsequently help to address these changes in the housing market and, going forward, provide a natural protection against future changes.

A further update to the methodology is to use a parsimonious and more targeted set of property characteristics. HHPI (1983) utilised a vast array of attributes. Whilst these were relevant in 1983, a number have unfortunately become obsolete or hard to measure e.g. central heating statistics, garage spaces etc. In line with empirical evidence and indices produced around the globe, our new set of characteristics has been chosen to focus primarily on size, type, and location.

Valuing the standardised property with the use of these price-determining characteristics is achieved using the same semi-logarithmic hedonic regression specification employed by the original 1983 HHPI model. In the case of housing, prices reflect the valuation placed by purchasers on a particular set of locational and physical attributes (or characteristics) possessed by each house. The subsequent need for 'standardisation' arises out of the observation that two houses are not alike: they can differ according to a variety of quantitative and qualitative characteristics relating to the physical attributes of the houses themselves or to their locations.

The difficulty is the implicit value placed by a purchaser on each characteristic cannot be observed because transactions take place in terms of a single total price. Therefore, in order to remove that part of price variation due to changes in the mix of house characteristics over time, and so to measure the variation caused by inflationary factors, it is necessary to disaggregate prices into their constituents statistically. This is achieved by using a multivariate regression equation of the form:

$$ln(P_i) = \beta_0 + \beta_1 X_1^i + \beta_2 X_2^i + ... + \beta_j X_k^i + e_i$$

Here P_i reflects the price of an individual property i which is determined by a set of $k = \{1, 2, ..., n\}$ characteristics X_k^i. If the property has a particular characteristic then it takes the value of 1 or 0, with the exceptions of the number of bedrooms (between 1 and 8) and floor area (m^2 bounded between 30 and 500).

The set of $\beta_1, \beta_2, ..., \beta_j$ regression coefficients correspond to the qualitative and quantitative characteristics, whilst the group of unmeasured factors (assumed to be randomly distributed) which are specific to each house but for which data are not available is captured by the statistical error e_i.

The regression is subsequently calculated using the widely-used technique of Ordinary Least Squares (OLS).

3.2 Property Characteristics

The index uses a variety of characteristics to determine a standardised house in the UK which, when taken together, help to explain the majority of the variation in house prices. Compared to HHPI (1983), the new version of the model takes a more targeted approach to the standardised house price, focusing on value-added characteristics such as type, size, age and location.

Taking each of these in isolation:

a. Property Type

LBG attributes a property type to each mortgage offer, these being:

Detached, Semi-Detached, Terraced, Flat, Bungalow

As would be expected, detached properties tend to command higher selling prices than semi-detached, which in turn tend to be higher than terraced properties etc.

b. Size

The LBG mortgage data includes information on the size of each property in square metres. Not surprisingly we find that this is a key, statistically significant, determinant of the price of a property i.e. Ceteris Paribas the larger the property the greater the value.

The price of the property is also partly explained by the number of bedrooms that it possesses. The higher the number of bedrooms the higher the price tends to be. LBG mortgage offers contain information on bedroom numbers and, as such, this variable is included in the regression specification.

c. Age

New houses tend to attract a price premium relative to older properties with similar attributes. Including a categorical characteristic that encapsulates this (i.e. new or not new) is found to be statistically significant in our hedonic regression specification and is subsequently included as an explanatory variable.

d. Location

In line with HHPI (1983), a set of dummy variables that encapsulates a particular UK region that the property resides within continues to be used. A slight variation on the original methodology is the use of Government Office Region classifications (GOR) for England, rather than the original Economic Planning Region (EPR) classification. This provides us with nine English regions: Eastern England, East Midlands, Greater London, North East, North West, South East, South West, West Midlands and Yorkshire & Humberside. These are combined with Northern Ireland, Scotland and Wales to provide 12 UK regions.

A notable difference between the 1983 and 2019 HHPI indices has been greater focus on the treatment of locational property characteristics. The existing methodology used the EPR as the only price-determining locational factor. However, within any given region there will variance in terms of desirability between postcode areas and this will be reflected in respective house prices. Greater granularity within the location variables can be expected to notably improve the ability to accurately estimate house prices.

Whilst a commercially available location variable (ACORN) is used by the Nationwide and the Office for National Statistics (ONS) in the generation of their own, similar, house price indices, IHS Markit has created its own propriety classification system to help determine an area's house-price level in the context of its GOR region and housing-mix.

Note UK and regional HHPI (2019) models may contain differences in explanatory variables employed in respective hedonic regression specifications. These difference are seen in Table 3: HPI Regression Specifications.

Table 3: HPI Regression Specifications

Explanatory Variables (Dependent Variable: ln Purchase Price)	All Houses	Existing Houses / New Houses	First-Time Buyers / Former Owner Occupiers	GOR Regions	
				All, FTB, FOO	EXI / NEW
Property Type					
Detached	*Omitted Dummy Variable*				
Semi-Detached	✔	✔	✔	✔	✔
Terraced	✔	✔	✔	✔	✔
Bungalow	✔	✔	✔	✔	✔
Flat	✔	✔	✔	✔	✔
Size					
Square Metres	✔	✔	✔	✔	✔
Number of Bedrooms	✔	✔	✔	✔	✔
Age					
New House	✔	✘	✔	✔	✘
Property Location - Region					
Eastern England	✔	✔	✔	✘	✘
East Midlands	✔	✔	✔	✘	✘
North East1	✔	✔	✔	✘	✘
North East	✔	✔	✔	✘	✘
North West	✔	✔	✔	✘	✘
Northern Ireland	✔	✔	✔	✘	✘
Scotland	✔	✔	✔	✘	✘
South East	*Omitted Dummy Variable*				
South West	✔	✔	✔	✘	✘
Wales	✔	✔	✔	✘	✘
West Midlands	✔	✔	✔	✘	✘
Yorkshire & Humberside	✔	✔	✔	✘	✘
Property Location - Regional Postcode					
PROP1	✔	✔	✔	✔	✔
PROP2	✔	✔	✔	✔	✔
PROP3	✔	✔	✔	✔	✔
PROP4	✔	✔	✔	✔	✔
PROP5	*Omitted Dummy Variable*				
PROP6	✔	✔	✔	✔	✔
PROP7	✔	✔	✔	✔	✔
PROP8	✔	✔	✔	✔	✔
PROP9	✔	✔	✔	✔	✔

Table header: **HHPI Regression Specifications** — ✔ denotes variables included ✘ denotes variable excluded

3.3 Index Performance

The model changes have resulted in a number of improvements to HHPI performance, which we define from the perspective of three key metrics:

- statistical output from the regression calculations e.g. explanatory power (RSQ statistics), parameter significance as measured by t-statistics
- sample size

- index volatility

Table 4: HHPI (2019) Key Metrics (July 2007 to June 2018) provides some summary statistics related to these metrics at the UK level, not only for the All House All Buyers (AHAB) indices, but also the sub-indices of First-Time Buyers (FTB), Former Owner Occupiers (FOO) and Existing (EXI).

Table 4: HHPI (2019) Key Metrics (July 2007 to June 2018)

Index Series (United Kingdom)	Sample Gain	RSQ	Volatility Improvement (y/y inflation rates)	Standardised Price (at Jun-18)	Price Difference to HHPI1 (% 5-Year Average)
AHAB	**35%**	**82.4%**	**43.1%**	**£231,903**	**2.2%**
First-Time Buyers	36%	82.3%	49.0%	£183,536	5.2%
Former Owner Occupiers	33%	83.7%	48.3%	£278,868	4.2%
Existing Houses	20%	84.2%	63.5%	£220,398	-4.7%
New Houses	n/a	84.1%	n/a	£244,815	n/a

Notes: Gain columns reflect the difference between equivalent HHPI1 (1983) and HHPI (2019) data. In this instance, a positive number equates to a higher reading for HHPI (2019) models. Note all comparisons cover the period July 2007 to June 2018 and, reflective of their market sensitivity, we do not include raw sample size numbers. We measure volatility by taking the square root of the average squared monthly movement in annual rates of change for both the HHPI (1983) and HHPI (2019) indices. Using a ratio of these two numbers provides an estimate of the relative difference between the monthly movements of the two data series. A positive number in the tables reflect favourable performance for HHPI (2019) models.

Table 4: HHPI (2019) Key Metrics (July 2007 to June 2018) highlights the positive impacts that the model refinements have made on all of our key performance metrics.

Firstly, amendments of the data cleansing rules to include shared-ownership, buy-to-let and non-typical vendors such as builders has led to a noticeable gain in sample size over the test period. At the UK level the increase is 35%. There is a slightly stronger increase in the number of first-time buyers (FTB) and we also have a greater representation of new properties in our sample (as implied by the number of existing houses rising by 20% on average). Note this is broadly expected given the inclusion of shared ownership and direct purchases from builders. With this in mind, we have taken the opportunity to supply a New Houses Index which had been previously discontinued.

Secondly, the addition of our new property location characteristics, allied with a parsimonious regression specification focusing on size, age, location and property type leads to noticeable and considerable gains in the explanatory power of the indices compared to HHPI (1983).

The AHAB UK model, with a RSQ average of 82.4%, is a considerable improvement on HHPI (1983) – an increase of 14.2 ppts. The three other currently available models – FTB, FOO and EXI – also enjoy noticeable gains in explanatory power, whilst the RSQ reading for new houses is over 80%.

Thirdly, the implied volatility of all indices is reduced, reflective of the new parsimonious regression specification which has removed variables that have proven difficult in recent years to identify coefficient values for i.e. central heating, garage spaces etc. At 43.1%, the improvement in volatility seen at the UK level is considerable, with even larger improvements seen for FTB (49.0%), FOO (48.3%) and EXI (63.5%).

4 Index Governance

4.1 Index Committees

IHS Markit has established two governance committees that are responsible for ensuring oversight of the Halifax House Price Index (HHPI) 2019 family.

The **Benchmark Oversight Committee (BOC)** performs the role of oversight function, as required under BMR, and is governed by the BOC Terms of Reference.

In addition, the Administrator has established a management committee, the **Index Advisory Committee (IAC)**, to review, challenge and approve the model performance and monthly determination of the Halifax House Price Index (HHPI) 2019 family. The IAC also operates as an approval gateway to the BOC.

These governance arrangements are intended to eliminate the opportunity for any person to exercise undue control or influence over the Administrator.

Refer to *http://www.markit.com/Documentation/Product/Halifax_House_Price_Index/Regulation* for the Committees' terms of reference.

4.2 IHS Markit Administrator Code of Conduct

IHS Markit implements the IOSCO Principles in a manner proportionate to the size of, and risks posed by, each Benchmark. IHS Markit has developed policies and procedures based on the Principles to develop, administer, calculate and disseminate products and services classified as "Benchmarks". These are set forth in the Administrator Code of Conduct which is available on the **IHS Markit Website** : *http://www.markit.com/Documentation/Product/Halifax_House_Price_Index/ Regulation*.

4.3 Conflicts of Interest

IHS Markit administers Benchmarks in a manner that is reasonably designed to protect the integrity and independence of the Benchmark administration process.

IHS Markit policy and procedures around Conflicts of Interest are available on the IHS Markit Website in the IHS Markit Administrator Code of Conduct on *http://www.markit.com/Documentation/Product/ Halifax_House_Price_Index/Regulation* and in the Conflicts of Interest Policy.

5 Index Market Disruption Events, Force Majeure Events

In the event of market stress and disruption, the Index Administrator applies the rules as specified in the relevant Index Rules. The Administrator also promptly publishes information about the disruption event and the input values used.

6 Expert Judgment

In the event that Expert Judgment is required in the Benchmark determination process, IHS Markit shall do so in line with the policy and procedures outlined in the IHS Markit Administrator Code of Conduct: *http://www.markit.com/Documentation/Product/Halifax_House_Price_Index/Regulation.*

7 Change in Methodology of the Index and Termination

The Index Administrator publishes or makes available the rationale of any proposed material change in its Methodology along with the procedures for making such changes. The procedures clearly define what constitutes a material change and the method and timing for consultation on, or notification of, changes to Subscribers (and other Stakeholders where appropriate, taking into account the breadth and depth of the Benchmark's use). In addition, the Administrator has developed Stakeholder consultation procedures in relation to changes to the Methodology that are deemed material by the oversight function.

Further information about Benchmark Methodology changes and Termination can be found on the IHS Markit Website in the Administrator Code of Conduct: *http://www.markit.com/Documentation/Product/ Halifax_House_Price_Index/Regulation*.

8 Errors and Adjustments

In the event that the Index Administrator identifies, or is made aware of, any errors in previously published information relating to an Index or a Benchmark, analysis of the affected index values or the Benchmark is undertaken and the Benchmark Oversight Committee will be informed. If IHS Markit decides to revise the Index values, the reason for the revision together with revised material is published.

The Index Administrator Restatement policy is available on the IHS Markit Website and also in the Administrator Code of Conduct: *http://www.markit.com/Documentation/Product/ Halifax_House_Price_Index/Regulation.*

9 Complaints Procedure

IHS Markit provides a dedicated system for stakeholders to lodge complaints via email or post. All complaints are duly investigated and responses provided to the complaint within a reasonable timeframe in accordance with our IHS Markit Complaints Policy, which is available on the IHS Markit Website: *http://www.markit.com/Documentation/Product/Halifax_House_Price_Index/ Regulation*.

10 Whistleblowing

Misconduct in any activity performed by the Index Administration is expected to be reported in compliance with the IHS Markit Whistleblowing Policy.

11 Annual Review

The Index Administrator reviews on an annual basis the index documentation and design of benchmarks to ensure that they are representative of the benchmark's objective. Decisions made following the review are published on the IHS Markit website shortly after both the Index Administration and the Benchmark Oversight Committee have deliberated.

Please refer to the Administrator Code of Conduct available on the IHS Markit website - *http:// www.markit.com/Documentation/Product/Halifax_House_Price_Index/Regulation* for more details.

12 Construction of this Index Manual

The Index Manual is published by the Index Administrator. In the event of any inconsistency between the English language version of this Index Manual and that translated into any other language, this English version shall prevail.

13 Disclaimer, Licensing and Trademark

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14 Further Information

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For any general index enquiries, please contact the IHS Markit Index Administration support group at *support@ihsmarkit.com*.

Ownership: the **Index Owner** is IHS Markit.

A Glossary

Term	Definition
Benchmark Oversight Committee (BOC)	has responsibility for effective scrutiny of the Administrator. See Section 4.1 — Index Committees.
HHPI	means Halifax House Price Index (HHPI) 2019 family.
IHS Markit Website	means the following website: *http://www.markit.com/Product/Halifax-House-Price-Index* .
Index Administrator	means IHS Markit.
Index Advisory Committee (IAC)	is the second line of defence to Halifax HPI Administration. See Section 4.1 — Index Committees.
Index Base Date	is the date of the initial level of the index. See Table 1: Index Administration Events.
Index Commencement Date	is the date the **Index Level** was first published. See Table 1: Index Administration Events.
Index Level	means, in respect of an Index, the level of that Index determined in accordance with IOSCO Principles.
Index Manual	means this document, as amended, replaced or substituted, from time to time.
Index Market Disruption Event	please refer to Section 5 — Index Market Disruption Events, Force Majeure Events.
Index Owner	means IHS Markit.

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