

# ANALYSIS OF UK HOUSE PRICE INDEX USING APACHE PIG

## 1.0 MOTIVATION

Asset price fluctuation, especially house prices is one of the fundamental driving factors in every economy. Analysing this fluctuations overtime provides a good understanding of investments and strategies. House prices and financial time series share a lot of properties together (Begiazi 2009). This makes examining and analysing the housing market very important.

Recent financial activities have increased the level of uncertainty in housing market globally. The United Kingdom especially has been hit with events such as the Brexit referendum, immigration policies and COVID - 19. While the housing market generally has a high correlation with structural breaks, the United Kingdom particularly has a strong evidence of house price crashes. An example is the early 2000 house prices bubble, which was followed by a drastic drop of up to 15% in house prices in 2008.

This study proposes Three analysis which answers questions related to investments, price behaviour over time and the effect of global economic events on the United Kingdom housing market.

## 2.0 ANALYSIS

The following three questions has been proposed. Each question is analysed using Apache PIG. Screenshot of outputs are provided for each analysis to further discussions.

1. How has economic and global events (UK referendum, COVID - 19) affected UK house prices.
2. What is the rate of mortgage to outright property purchase over the years.
3. What time of the year usually experiences high volume of property sales.

## 3.0 DATASET

Data from the UK & NI Residential Property was used to perform analysis and answer the questions. The data repository contains regional sales data across various attributes from 1995 to 2022. From this repository, I have made use of two datasets.

- UK Government House Price Index (HPI)
- Cash-Mortgage sales

[Link to Data Repository](#)

I have also zipped the two data set I used from the repository.

[Link to the two Datasets used](#)

#### 4.0 DATASET FIELD DESCRIPTION

Index	Field	Data Type	Description
0	Date	chararray	The year and month to which the monthly statistics apply
1	RegionName	chararray	Name of geography (Country, Regional, County/Unitary/District Authority and London Borough)
2	AreaCode	chararray	Code of geography (Country, Regional, County/Unitary/District Authority and London Borough)
3	Average Price	float	Average house price for a geography in a particular period
4	Index	float	House price index for a geography in a particular period (January 2015=100)
5	IndexSA	float	Seasonally adjusted house price for a geography in a particular period (January 2015=100).
6	1m%change	float	The percentage change in the Average Price compared to the previous month
7	12m%change	float	The percentage change in the Average Price compared to the same period twelve months earlier.
8	AveragePricesSA	float	Seasonally adjusted Average Price for a geography in a particular period
9	Sales Volume	int	Number of registered transactions for a geography in a particular period
10	[Property Type]Price	float	Average house price for a particular property type (such as detached houses), for a geography in a particular period.
11	[Property Type]Index	float	House price index for a particular property type (such as detached houses), for a geography in a particular period (January 2015=100).
12	[Property Type]1m%change	float	The percentage change in the [Property Type] Price (such as detached houses) compared to the previous month
13	[Property Type]12m%change	float	The percentage change in the [Property Type] Price (such as detached houses) compared to the same period twelve months earlier.
14	[Cash/Mortgage]Price	float	Average house price by funding status (such as cash), for a geography in a particular period.
15	[Cash/Mortgage]Index	float	House price index by funding status (such as cash), for a geography in a particular period (January 2015=100).
16	[Cash/Mortgage]1m%change	float	The percentage change in the [Cash/Mortgage]Price compared to the previous month
17	[Cash/Mortgage]12m%change	float	The percentage change in the [Cash/Mortgage]Price compared to the same period twelve months earlier
18	[Cash/Mortgage] Sales Volume	int	Number of registered transactions [Cash/Mortgage] for a geography in a particular period
19	[FTB/FOO]Price	float	Average house price by buyer status (such as first time buyer/former owner occupier), for a geography in a particular period
20	[FTB/FOO]Index	float	House price index by buyer status (such as first time buyer/former owner occupier), for a geography in a particular period. (January 2015=100)
21	[FTB/FOO]1m%change	float	The percentage change in the [FTB/FOO]Price compared to the previous month
22	[FTB/FOO]12m%change	float	The percentage change in the [FTB/FOO]Price compared to the same period twelve months earlier
23	[New/Old]Price	float	Average house price by property status (such as new or existing property), for a geography in a particular period
24	[New/Old]Index	float	House price index by property status (such as new or existing property), for a geography in a particular period. (January 2015=100)
25	[New/Old]1m%change	float	The percentage change in the [New/Old]Price compared to the previous month
26	[New/Old]12m%change	float	The percentage change in the [New/Old]Price compared to the same period twelve months earlier
27	[New/Old] Sales Volume	int	Number of registered transactions [New/Old] for a geography in a particular period

## 5.0 ANALYSIS AND DISCUSSION

### 5.1 Question 1 (The effect of economic and global events (UK referendum, COVID - 19).

**Dataset** - UK Government House Price Index (HPI)

In this analysis we will explore the impact of BREXIT on average house prices in different region. Using the fact that the UK announced its exit from the European Union on the 31<sup>st</sup> of January 2020 (Wikipedia). I filtered the required relation base on one year data before the announcement (2019) and one year data after the announcement (2021). I then calculated the percentage increase or decrease by:  $((\text{Before average prices} - \text{After average prices}) / \text{After average prices}) * 100$ .

```
(City of Aberdeen,2.36)
(Camden,1.68)
(City of London,-0.52)
(Slough,-0.62)
(City of Westminster,-1.0)
(Reading,-2.12)
(Chelmsford,-2.19)
(Southwark,-2.49)
(Greenwich,-2.72)
(Aberdeenshire,-2.78)
```

The result shows that there is an increase in price of houses in most regions across the UK with some regions having up to 19% increase. However, Aberdeen is among the few cities experiencing a decrease in house prices on average. Aberdeen being a oil city, the value of properties and assets in the city is tied to the performance of crude oil in the global market (Young 2022). The price of crude oil having dropped during COVID -19 and after the referendum may have led to this outcome ('The Effect of Brexit on Heating Oil Prices' 2022).

### 5.2 Question 2 (What is the rate of mortgage to outright property purchase over the years)

**Dataset** - Cash-Mortgage sales

Mortgage buyers are buyers who buy on credit or using loan while cash buyer owns the property outrightly after purchase. Interest rate determines how much interest is to be paid on a mortgage. With the UK's interest rate currently at its highest in 14 years (BBC 2022), we will explore how it has affected the housing market over the years. For this question I have used the volume of mortgage sales, the volume of cash sales by the years.

```
(2022,266.47%)
(2019,260.17%)
(2020,250.83%)
(2018,244.56%)
(2021,238.2%)
(2016,219.54%)
(2017,216.9%)
(2015,210.02%)
(2012,208.85%)
(2014,201.79%)
(2013,199.78%)
```

The result of the analysis shows a continuous increase in the rate at which people purchase houses using mortgage compared to cash. Although an increase in interest rate makes paying mortgage more difficult and buyers are supposed to opt for cash purchase, result from this data shows the opposite. This further indicates that most people can not afford to buy a house outrightly and will rather go for mortgage, putting them in more dept.

### 5.3 Question 3 (What time of the year usually experiences high volume of property sales)

**Dataset** - UK Government House Price Index (HPI)

Market scrappers are always interested in using price fluctuation across the year to take advantage of the market. We will explore what time of the year is best for investing in the UK housing market. For this question I have used month, sales volume, and average sales to perform the analysis.

```
(08,1373.26,173623.91)
(07,1351.47,172054.31)
(06,1347.56,170405.22)
(10,1297.14,169624.02)
(09,1288.91,169301.21)
(12,1285.69,169936.72)
(11,1284.16,169789.54)
(03,1206.69,166848.19)
(05,1183.93,168790.08)
(04,1086.38,167551.9)
(02,970.85,166545.57)
(01,935.28,166426.09)
```

From the result we can see that house sales peak mostly in the second quarter of every year with most of the sales happening in august. We can also see that this comes with a high price on average for listed properties in this period.

### 6.0 CONCLUSION

The property market in the UK generally is experiencing an increase in valuation in almost all the regions. Analysis has shown that the BREXIT is a contributing factor to this increase. Other factors include Immigration policies, which has also influenced the increase in demand for house rents across the country (Sanchis-Guarner 2017). Although interest rate is increasing, analysis has shown that there are more mortgage buyers compared to cash buyers. Market scrappers can take advantage of buying properties around the first quarter of the year (low sales volume) and selling around the send quarter (high sales volume).

### 7.0 REFERENCES

Begiazi, K. and Katsiampa, P., 2019. Modelling UK house prices with structural breaks and conditional variance analysis. *The Journal of Real Estate Finance and Economics*, 58(2), pp.290-309.

YOUNG, J.W., 2022. *Aberdeen house prices fall while the rest of Scotland is on the rise*. [online]. Press and Journal. Available from: <https://www.pressandjournal.co.uk/fp/lifestyle/home-gardens/property/4308233/aberdeen-house-prices-fall-while-the-rest-of-scotland-is-on-the-rise/> [Accessed 19 Dec 2022].

*The effect of Brexit on Heating Oil Prices*, 2022. [online]. homefuelsdirect.co.uk. Available from: <https://homefuelsdirect.co.uk/home/heating-oil-news/the-effect-of-brexit-on-heating-oil-prices> [Accessed 19 Dec 2022].

UK interest rates raised to highest level for 14 years, 2022. *BBC News*, 15 Dec [online]. Available from: <https://www.bbc.co.uk/news/business-63977963>.