In the United Kingdom several official house price indices exist. These indices vary in their coverage and methods. The ONS is currently developing a “definitive” house price index, by incorporating cash sales to its hedonic regression model. This poster provides analysis of the results of adding cash sales to the current index, and an outline of the index that ONS aims to produce.

**UK Housing Market**

- **England and Wales household tenure (Census 2011)**
  - Home owners: 63.5%
  - Private renters: 17.6%
  - Social renters: 16.7%
  - Other: 2.2%

- **First time buyers**: 40%
- **Former owners / movers**: 60%

- **Flats**: 15%
- **Houses & bungalows**: 85%

**Yearly UK transactions (HMRC)**

- 2007: 1,600,000
- 2008: 1,400,000
- 2009: 1,200,000
- 2010: 1,000,000
- 2011: 800,000

**Home owners**

- Detached: 40%
- Semi: 30%
- Terraced: 15%
- Flat: 15%

**Private renters**

- Detached: 10%
- Semi: 10%
- Terraced: 20%
- Flat: 60%

**Social renters**

- Detached: 5%
- Semi: 5%
- Terraced: 15%
- Flat: 70%

**Other**

- Detached: 5%
- Semi: 5%
- Terraced: 15%
- Flat: 70%

**ONS HPI**

- **HPI index value**
  - 2008: 190.0
  - 2009: 180.0
  - 2010: 185.0
  - 2011: 190.0

- **HPI year on year % change**
  - 2008: -15.0
  - 2009: -10.0
  - 2010: -5.0
  - 2011: 0.0

**Cash Sales**

- **Cash sales by dwelling type**
  - Detached: 30%
  - Semi: 20%
  - Terrace: 40%
  - Flat: 10%

- **Average price change**
  - Detached: 20%
  - Semi: 18%
  - Terraced: 16%
  - Flat: 14%
  - All: 12%

Cash transactions are excluded from the ONS HPI. Since 2008 cash sales represent a larger proportion of property transactions and preliminary evidence suggests that they behave differently than mortgage transactions. In the 2005-2009 period, the price of cash transacted property increased at half the pace of mortgage transacted property. ONS is currently investigating adding cash sales to its HPI to develop a “definitive” HPI which covers all market price property transactions.

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We present an overview of the processes and methods used by ONS to calculate the House Price Index (HPI) on a monthly basis. Future developments to include cash sales are highlighted in the different sections. The annual processes which update the weights used in the HPI calculation are also described at the end of the poster.

**Data**
- Mortgage completions as collected by Council for Mortgage Lenders (CML) via the regulated mortgage survey.
- Coverage: 75% of the mortgage market.
- Cash sales, buy to let mortgages and remortgages are excluded.

**Data Cleaning**
- Records highlighted by a number of validation checks are investigated.
- Outliers are removed.
- In 2012, on average 0.1% of the sample was excluded each month.

**Apply Observation Weights**
- Gives incomplete observations less influence in the model.
- Observations with missing data have a weight of between 1 and 0.
- Complete observations have a weight of 1.

**Regression Model**
- Hedonic regression is used to model the price of a house based on a set of characteristics and how the price changes depending of the value of those characteristics.

**Model Variables**
- Number of bedrooms
- Type of dwelling (flat, terraced,...)
- Old or new property
- First time buyer or former owner occupier
- County/London borough
- Neighbourhood type (Acorn)
- Local authority
- Dwelling type x old or new property
- Acorn group x Dwelling type
- Acorn group x first time buyer or former owner occupier

**Future development: A definitive HPI to include cash sales**

**Including cash sales will require an additional stage for data linking**

**The weights will be updated to incorporate cash sales.**

**A new model variable will be included to identify cash sales**

**Chain Linking**
- The HPI is chain linked to take account of the transaction weight update in January.
- This will produce a continuous series on the same scale.
- Allows year on year comparisons.

**HPI Calculation**
- Calculated as the average house price in the current month divided by the average house price in January of that same year multiplied by 100.

**Average House Price Covering All Cells**
- The estimated average house price of all dwellings is calculated as a weighted arithmetic mean of the average price for each cell.
- The weights are the transaction weights.

**Apply Transaction Weights**
- These weights are used to produce a mix adjusted average house price.
- Prevents the composition of houses sold each month from distorting the index.

**Average House Price for Each Cell**
- Approximately 100,000 different combinations of characteristics that could define a property.
- Each of these combinations is known as a cell.
- For each cell the regression model estimates an average price.

**Annual Processes**
- Data from the previous October and November are used to update the observation weights. The hedonic regression model is fitted for each combination of missing variables. The mean squared error of the fit is compared to the mean squared error for the model fitted to complete data; the inverse ratio of the two yields the observation weight.
- The transaction weight for each cell is calculated using the proportion of sales of each property type over the previous three calendar years.