Office for National Statistics

Article

Improving estimates of land underlying dwellings in the national balance sheet, UK: 2022

The methodological improvements for estimates of land underlying dwellings in the UK national balance sheet. Detailing the current and proposed methods, as well as the data sources and methodological limitations.

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1 . Main points

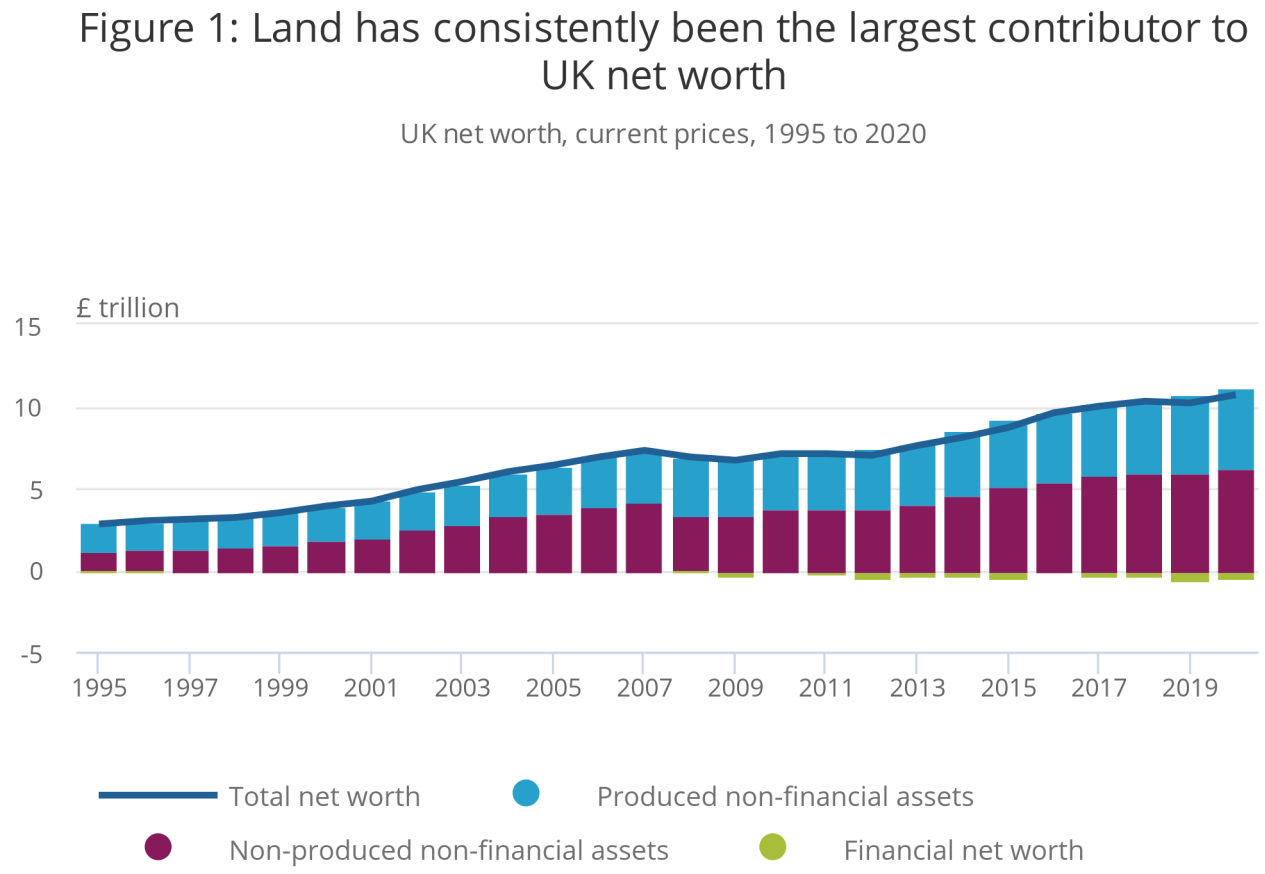
- In 2020 land was the most valuable asset in the economy, estimated at £6.3 trillion, accounting for nearly 60% of the UK's net worth.
- Land underlying dwellings was valued at £5.4 trillion in 2020, and was 86% of the total value of non-produced non-financial assets.
- Using more detailed information from the Valuation Office Agency (VOA) on individual properties can significantly improve the quality of our estimates of land underlying dwellings.
- Applying the House Price Index (HPI) hedonic regression model to VOA property attributes data, which provides details such as local authority area and number of rooms, allows us to calculate housing values using a bottom-up approach.

2 . Overview

The UK's net worth reached £10.7 trillion in 2020, with land consistently being the most valuable asset in the economy. Estimated at £6.3 trillion, it accounts for nearly 60% of the UK's net worth, with households owning £4.3 trillion of that.

Figure 1: Land has consistently been the largest contributor to UK net worth

UK net worth, current prices, 1995 to 2020



Source: Office for National Statistics – National balance sheet

Notes:

1. The components of net worth may not always add to the total because of rounding.

2. Non-produced non-financial assets almost entirely consist of land.

3. Produced assets are outputs from production processes with a lifespan of more than a year, which contribute to the production of goods and services without being completely used up or transformed in the process.

The fast-changing structure of the economy means it is important to measure these very large numbers coherently. The dramatic changes observed in the economy during the coronavirus (COVID-19) pandemic became the catalyst for research into how the value of land is estimated, given it is the asset with the highest net worth in the economy.

International statistical guidance on land estimation determines the value of land and defines it as an "economic asset". Land is a naturally occurring resource, which means we cannot "produce" more land through the production process. It is a natural resource, which enables us to produce goods and services, for example the soil used to grow crops to generate food, or land used to construct a house on.

It is the ground (including the soil and surface waters) for which ownership rights can be enforced and from which economic benefits can be derived for their owners by holding, using or allowing others to use them. Estimates of land include:

- land underlying dwellings
- land underlying other buildings and structures
- land under cultivation which includes agriculture, forestry and aquaculture
- recreational land and associated surface water
- other land and associated surface water

Estimates of land are found in the national balance sheet (NBS) as a non-produced asset, showing their contribution to UK net worth.

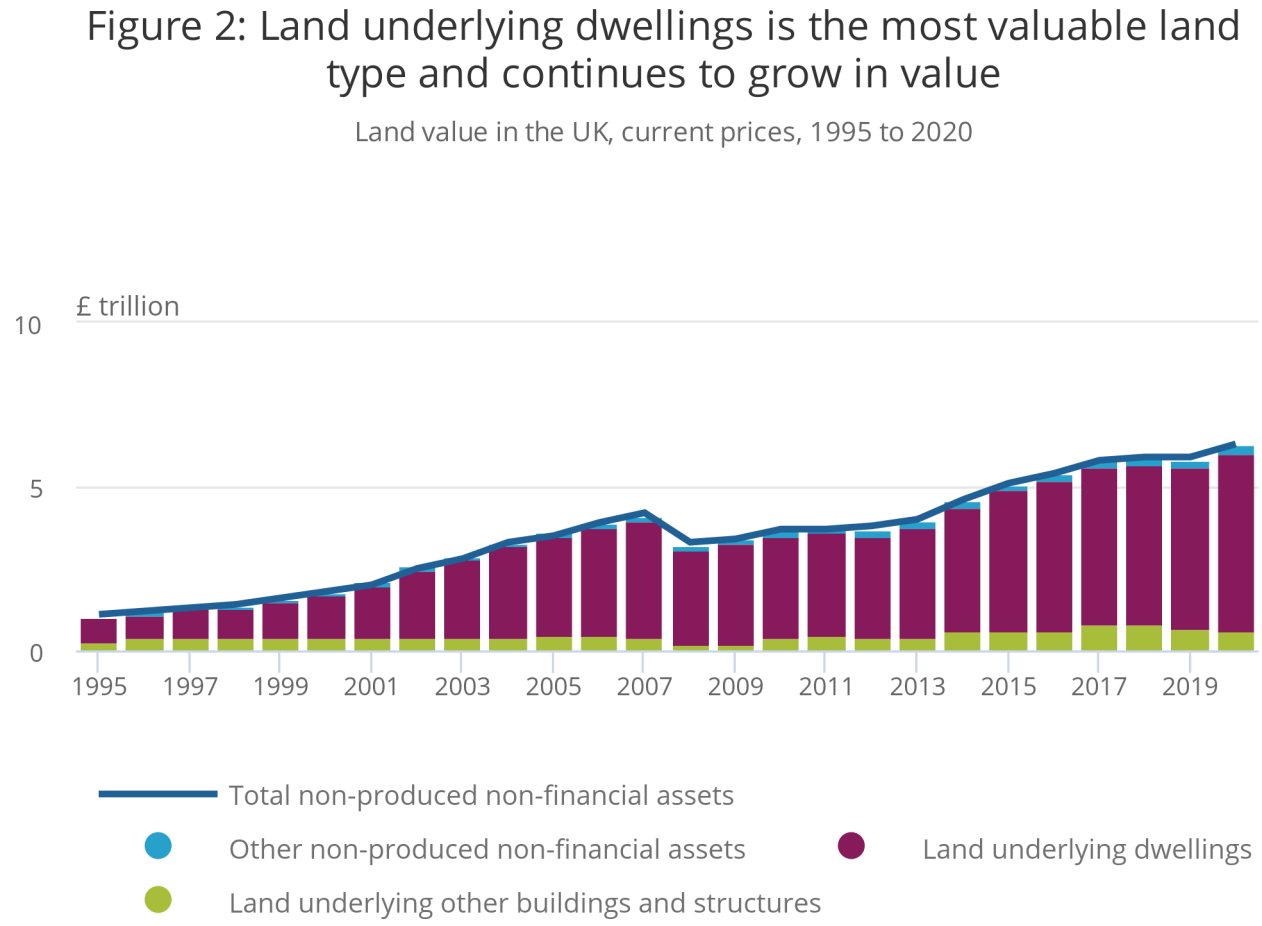
The Office for National Statistics (ONS) have been publishing estimates of land in the NBS publication as National Statistics for many years. These estimates were typically released around a year after the reference period. However, in April 2021, to address user needs for an early indicator of the impact of COVID-19 on net worth, the ONS introduced a preliminary estimate of the NBS. This included estimates of land, only three months after the reference period.

In 2015, an international task force on land collected information on how countries valued land in the National Accounts. The information came from 20 countries within the Organisation for Economic Co-operation and Development (OECD) and European Union (EU). The findings were published in the Eurostat-OECD compilation guide on land estimation, which recognised the complexities of valuing land, particularly when it is underneath dwellings, other buildings and structures, which can pose many challenges.

Land estimates in the UK NBS can be broken down by land under cultivation, land underlying dwellings, and land underlying other buildings and structures. Land underlying dwellings has consistently been the largest component of non-produced non-financial assets and accounted for 86% of the total estimated value of land in 2020.

Figure 2: Land underlying dwellings is the most valuable land type and continues to grow in value

Land value in the UK, current prices, 1995 to 2020



Source: Office for National Statistics – National balance sheet

Notes:

1. The components of non-produced non-financial assets may not always add to the total because of rounding.

3 . How land value is estimated in National Accounts

The Eurostat-OECD compilation guide on land estimation identifies two main methods of measuring land values; the direct and indirect method.

The direct method simply involves valuing the land itself and not calculating land by referencing other assets. South Korea, for example, uses the direct method because it has appropriate data on land values, which is used to tax land and dwellings separately.

There are two indirect approaches to estimating land that are used in National Accounts. These are the land-to-structure ratio (LSR) and the residual method. The choice of method is mainly determined by the data sources available in each country.

LSR calculates the relationship between land value and dwellings. For instance, a ratio of 1:1 would mean that for each £1 million of dwellings there is a value of £1 million attributed to land. National Accounts estimates of investment in dwellings in the UK are only produced at a national level, and the value of land varies considerably both within and across regions. Therefore, it would be difficult to accurately measure the relationship between dwellings and land.

In the UK we use the residual method to measure land underlying buildings. This involves calculating the combined value of buildings and associated land, then subtracting estimates of the buildings, using net capital stock estimates, leaving us with an estimate of land.

In the UK, like many other countries, the available data sources do not separate out values of buildings and land, for example property sales. Therefore, we propose to continue using the indirect residual method. Valuation Office Agency (VOA) data provide estimates of housing stock and HM Land Registry data on property transactions, which can be used to derive estimates of the combined value of dwellings and land. Dwellings estimates are calculated by using a long-time series of investment, allowing for depreciation, as recommended in the Measuring Capital OECD Manual and these capital estimates are then subtracted from the combined value.

4 . The current methodology on measuring land underlying dwellings

Generally, a “quantity times price” approach is used to estimate the combined value for dwellings and land, which involves multiplying the number of dwellings by their price.

The quantity estimates are calculated using annual Valuation Office Agency (VOA) estimates on the number of dwellings by region and council tax band.

Price estimates use the mid-prices of council tax bands for properties (valued in April 1991 prices for England), except for the highest and lowest bands. Estimates for the highest and lowest bands use the relationship in prices for England, Scotland and Wales between the mid-bands and the tail, which are then multiplied by average prices for band B to G, as shown in the following equation.

Band A house price (region) = Band B to G average house price (region) * conversion factor (country)

For example, for regions in England the average house price of Band A is calculated to be just under a third of the average house prices in Bands B to G.

To convert estimates from 1991 prices into current prices, regional house price index estimates are used, as shown in the following equation.

Housing value current prices (region) = Housing value April 1991 prices (region) * House Price Index (region)

The value of housing in Northern Ireland is calculated separately from England, Scotland and Wales by taking estimates expressed in a 2005 value and using the change in average house prices to calculate prices in other periods.

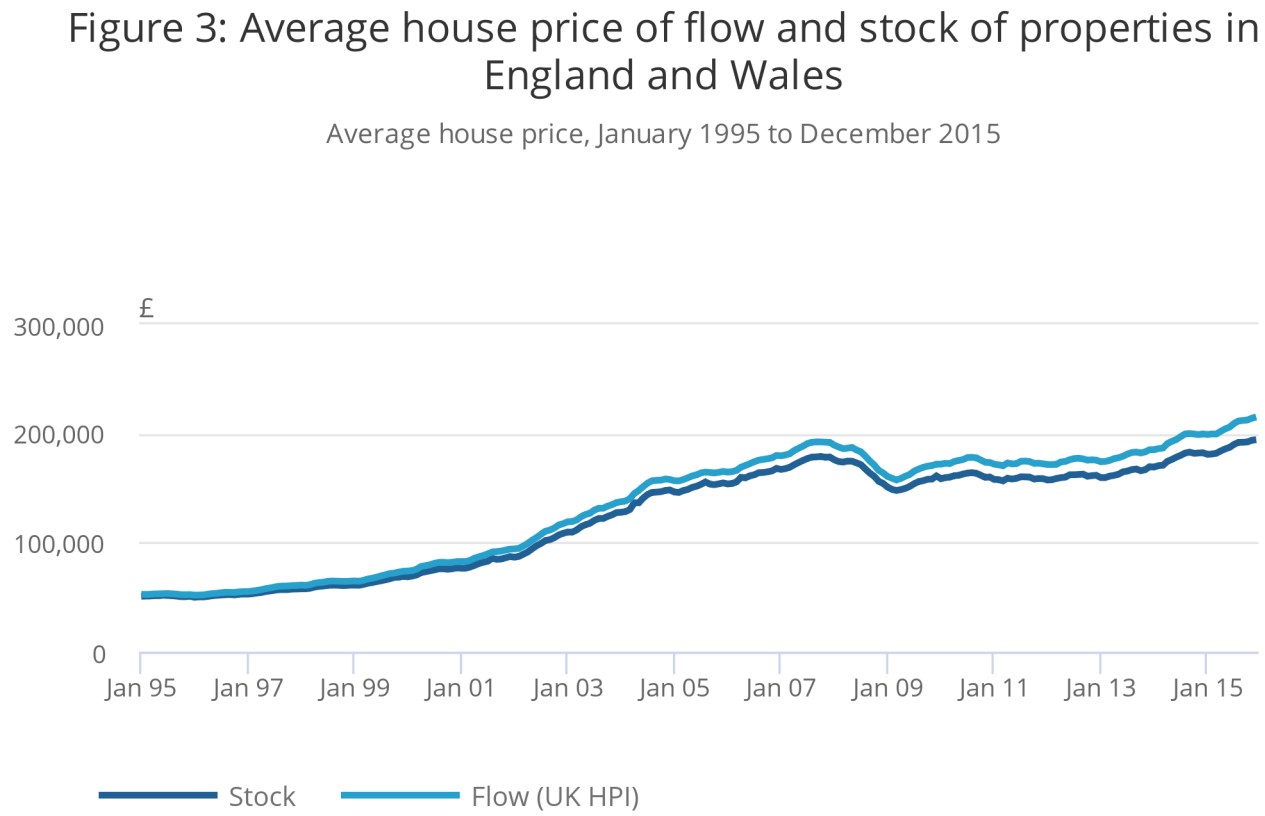
Public sector housing uses administrative data sources, with central government estimates sourced from HM Treasury Whole of Government Accounts. Housing estimates in the public corporation sector have been forecasted after 2013, due to the discontinuity of source data.

Limitations of the quantity times price approach

To convert April 1991 prices to current prices we use the House Price Index (HPI), which uses a flow-based measure that is not representative of the stock of houses. A stock-weighted HPI shows that house prices have increased at a slower rate when compared with weighting by flow.

Figure 3: Average house price of flow and stock of properties in England and Wales

Average house price, January 1995 to December 2015



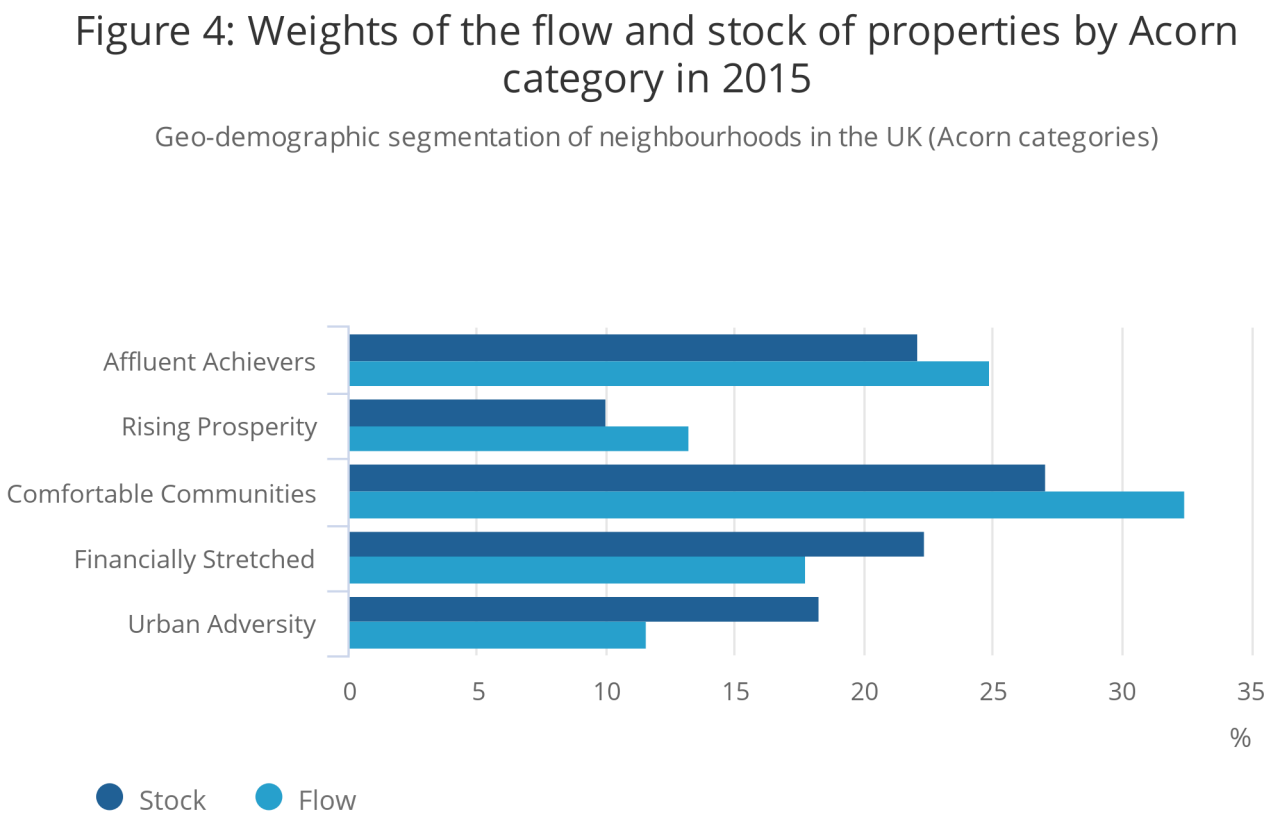
Source: Office for National Statistics – UK House Price Index

The larger increase in the flow weighted HPI indicates that houses that have increased in price within a period tend to be transacted more frequently. Consequently, the flow-based measure will overstate increases in the housing stock between 1995 and 2015.

In 2015 demographic groups such as “affluent achievers”, “rising prosperity” and “comfortable communities” had a higher weighting for flow of properties when compared with using stock.

Figure 4: Weights of the flow and stock of properties by Acorn category in 2015

Geo-demographic segmentation of neighbourhoods in the UK (Acorn categories)



Source: Office for National Statistics – UK House Price Index

The quantity times price approach means that differences in characteristics between properties will only be captured if they are in a different council tax band or region. For example, 53% of houses in the North East were in council tax Band A in 2021, which will all be multiplied by the same value. This means that any future changes in composition within that band will not be captured.

Building an estate of new houses that are valued just underneath the Band B threshold will raise average prices for Band A, however these will not be reflected in the average price estimates used. The conversion of a Band A house into two Band A flats will double our estimates of housing value for that property, as all Band A dwellings are given the same price.

As well as changing composition impacting on the accuracy of price estimates over time, the current methodology may not correctly capture the relationship between the highest and lowest bands, compared with band B to G estimates. This is because of relationships in the average price of bands varying by region. For example, in areas such as the North East with over half of houses in Band A, we would not expect Band A house prices to have the same relationship to band B to G for England as a whole (in England Band A house prices are estimated to be just under a third of the average house price for Band B to G).

An issue with using the mid-price is that this will not reflect the distribution within the price bands. We can expect that in the left-tail of the distribution, mid-price estimates will tend to underestimate the average price, whereas in the right-tail mid-price this will overestimate the average price. Using the mid-price will, to some extent, lead to offsetting the underestimation and overestimation, but as this only affects Bands B to G this may not be the case in all regions.

A further limitation with the flow-based HPI is that it uses a geometric mean, which ensures that high values do not distort estimates. Given that the national balance sheet looks to measure the value of dwellings and land, it should incorporate the value of high value properties.

5 . The proposed methodology

We propose to use Valuation Office Agency (VOA) property stock and attributes data. These capture the characteristics of individual residential properties, instead of using council tax bands and regions to capture the differences in property characteristics. This also enables us to calculate the combined value using a bottom-up approach.

VOA property stock and attributes data provide more detailed individual property information such as local authority area and property type from 1995. However, some imputations will be required to account for the missing property attributes.

The hedonic regression model used to calculate the House Price Index (HPI), models the relationship between property characteristics and price. Price-determining property characteristics include local authority area, geo-demographic segmentations of neighbourhoods, number of rooms, floor area, property type and whether it is a new build.

By applying the hedonic regression model to VOA property stock and attributes data, it will enable house prices to be estimated, reflecting much more detailed attributes when compared to using the council tax band and region.

The current method of sectorising estimates of land underlying dwellings assumes that these are in proportion to the sectorised values of net capital stock. This is not likely to be an accurate assumption, as ownership of houses differ significantly between geographic locations, along with the value of the land. To improve the sector splits of land underlying dwellings, we propose to map VOA property attributes data to HM Land Registry data on corporate ownership and the Inter-Departmental Business Register (IDBR). This directly provides us with the estimated housing value for sectors other than households and the rest of the value would then be assigned to households.

The redeveloped method will significantly improve the estimates of land underlying dwellings. By using the HPI hedonic regression model we can estimate housing value in current prices using a range of characteristics, which generally explain 80% of the variation in prices. The remaining factors include qualitative attributes such as the condition of properties, which are not captured in the data source. In addition, the property attributes dataset may exclude changes in existing properties up until they have been sold, therefore maintaining a time lag between the changes in property characteristics being reflected in the datasets.

Adjustments to current estimates

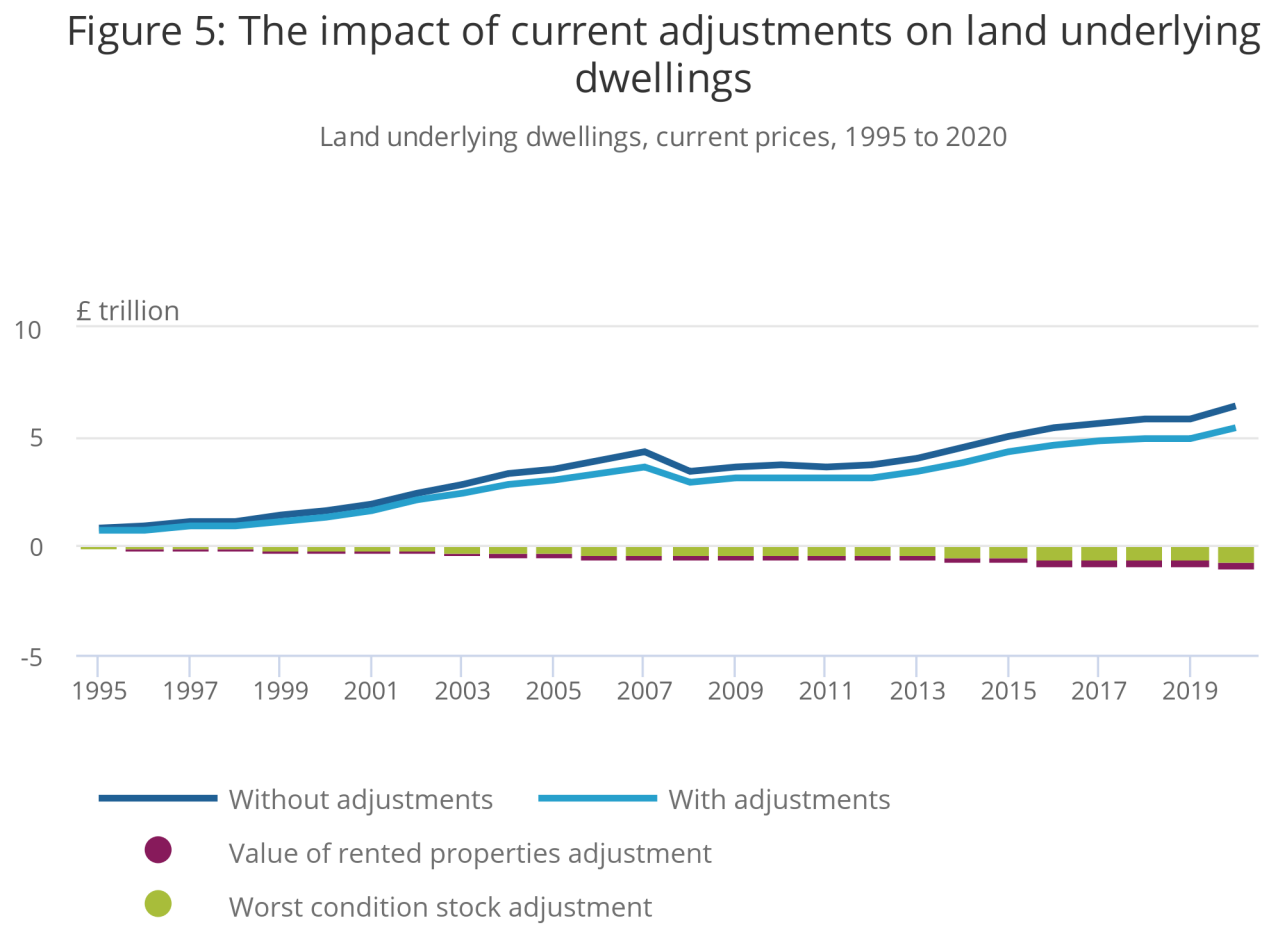
A range of significant adjustments applied to the combined value estimates of dwellings and land have been reviewed. The first adjustment removes “worst condition stock” of housing using 1991 estimates and therefore assumes that these have no value. This adjustment reduces housing value by £652 billion in 2020, which means the combined value is 8% lower. This low-quality stock will have some value, therefore should be reflected in our estimates.

Sales of property might not be representative of the condition of properties. For example, those in poor condition may be transacted less frequently, and if so, the HPI hedonic regression model may overestimate house prices for the stock. In the absence of information on differences in transaction rates for stock of different condition, we propose to remove this adjustment.

A second adjustment is applied to account for differences between the sale price of tenanted and vacant properties. Given that leases are only included as an asset in National Accounts if sub-letting is permitted (see System of National Accounts 2008, paragraph 10.190), applying such an adjustment would create an anomaly that changes in tenure would alter estimates of dwellings and land. Price differentials between vacant and tenanted properties are unlikely to be as significant as in 1995 when this adjustment was calculated. The adjustment accounted for £309 billion in 2020.

Figure 5: The impact of current adjustments on land underlying dwellings

Land underlying dwellings, current prices, 1995 to 2020



Source: Office for National Statistics – National balance sheet

Notes:

1. The impacts of the adjustments may not always add to the difference between land underlying dwellings with and without the adjustments because of rounding.

6 . Potential impacts on estimates

The use of the stock-weighted House Price Index (HPI) as opposed to the flow-weighted HPI is likely to lead to downward revisions in estimates of land underlying dwellings.

By contrast, removing the "worst condition stock" and rented properties adjustments is likely to result in an upward revision. There will also be a further impact using property attributes data to account for the differences between property characteristics as opposed to using council tax bands and region.

7 . Capital stocks

Using the residual method, land underlying dwellings is calculated by subtracting net capital stocks of dwellings from the combined value of dwellings and land.

Capital stocks measures for dwellings require a long series of investment, price changes, and assumptions around how dwellings depreciate. We will review estimates of capital stocks for dwellings after calculating new estimates for the combined value of dwellings and land underlying dwellings.

8 . Future developments

This article has presented the current and improved methodologies in estimating the value of land underlying dwellings. It is the first of three articles. The next release will cover the estimation of land underlying other buildings and structures, which will be published later this year.

The Office for National Statistics (ONS) will be publishing estimates of land incorporating these improvements in December 2022 as experimental statistics. These will complement the National balance sheet publication and will be introduced in the Blue Book 2023.

Keeping in touch with our users and understanding how their needs are changing is important to us. The national balance sheet user forum event scheduled on the 17 March 2022 will be the first opportunity for us to gather and discuss our work with you and to hear your views. You can register here for this virtual event.

To send us your feedback and for any further information, please contact us on capstocks@ons.gov.uk.

Acknowledgements

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9 . Related links

National balance sheet estimates for the UK: 2021
Bulletin | Released 2 December 2021
Annual estimates of the market value of financial and non-financial assets for the UK, providing a measure of the nation's wealth.

Capital stocks and fixed capital consumption, UK: 2021
Bulletin | 25 November 2021
Annual estimates of the value and types of non-financial assets used in the production of goods or services within the UK economy and their loss in value over time.

UK House Price Index: December 2021
Bulletin | 16 February 2022
Monthly house price inflation in the UK, calculated using data from HM Land Registry, Registers of Scotland, and Land and Property Services Northern Ireland.

Stock-weighted House Price Index, England and Wales: 1995 to 2015 preliminary estimates
Article | 20 February 2018
Preliminary estimates for the value of an average house across the entire residential stock of housing in England and Wales between 1995 and 2015.