IPF Research Programme

Residual Land Values: Measuring Performance and Investigating Viability

APRIL 2018

MAJOR REPORT

This research was commissioned by the IPF Research Programme **2015 – 2018**

This research was funded and commissioned through the IPF Research Programme 2015–2018.

This Programme supports the IPF's wider goals of enhancing the understanding and efficiency of property as an investment. The initiative provides the UK property investment market with the ability to deliver substantial, objective and high-quality analysis on a structured basis. It encourages the whole industry to engage with other financial markets, the wider business community and government on a range of complementary issues.

The Programme is funded by a cross-section of businesses, representing key market participants. The IPF gratefully acknowledges the support of these contributing organisations:

Residual Land Values: Measuring Performance and Investigating Viability

Report

IPF Research Programme 2015–2018

April 2018

© 2018 - Investment Property Forum

Research Team

Steven Devaney, *Henley Business School, University of Reading*
Neil Crosby, *Henley Business School, University of Reading*
Peter Wyatt, *Henley Business School, University of Reading*

Project Steering Group

Simon Marx, *LaSalle Investment Management*
Richard Yorke, *CoStar*
Sue Forster, *IPF*
Pam Craddock, *IPF*

Acknowledgements

The Research Team would like to thank the IPF Project Steering Group for their guidance and the four (anonymous) organisations that provided feedback on model inputs. The Research Team also thanks CoStar, CBRE and BCIS for assistance with data used in this project.

Disclaimer

This document is for information purposes only. The information herein is believed to be correct, but cannot be guaranteed, and the opinions expressed in it constitute our judgement as of this date but are subject to change. Reliance should not be placed on the information and opinions set out herein for the purposes of any particular transaction or advice. The IPF cannot accept any liability arising from any use of this document.

CONTENTS

EXECUTIVE SUMMARY

- Data on land values is important for market analysis and policy making. This research paper reviews sources of land prices and land value estimates in the UK, as well as recent attempts to create land price series in the US. It finds that there is little data available on land prices or values, particularly for commercial land uses.
- A residual valuation model is used to estimate land values for hypothetical schemes in selected cities and regions. The residual land values are not market prices and do not capture the option value associated with real sites, but they give an indication of value for immediate development before planning obligations. Residual land values are analysed to determine whether changes in the viability of different land uses are driven primarily by costs, rents or pricing.
- Land uses that have been modelled include residential apartments, offices, high street shops, industrial units and retail warehouses. Rents and yields were sourced from CBRE, apartment prices from the Office for National Statistics and construction costs from the Building Cost Information Service, with other inputs detailed in the report. Quarterly estimates of residual land values were produced from 1995 to 2016 for apartments and from 1997 to mid-2017 for the commercial land uses.
- As expected, there is a major North/South divide across the country for some land uses analysed and, in some parts of the country for some uses, development would not be viable without intervention. Industrial schemes in the Midlands and North are a good example, but negative values also occur in some locations for apartments at the beginning and end of the analysis period.
- Movements in residual land values through time are mainly driven by the largest input into the valuation model, development value. One reason for this is the lack of relative volatility in the construction costs estimates used for this analysis.
- As a proportion of development value, residual land values have remained fairly stable across the different property types over the time period studied. The exception is during the 2007/2008 Financial Crisis when land values dropped to lower proportions across all the sectors. This indicates greater falls in land values than in the value of the associated developed asset, reinforcing the gearing effect and greater volatility of land values.
- Land value forms the highest proportion of development value for high street retail and retail warehouses in relation to other uses. For most land uses, land values are also a higher share of total value in London relative to other regions and locations.
- Where possible, the residual land values were benchmarked against existing land value data and indices. The results are variable across the sectors. For example, office residual land values in London increased at a greater rate than the Savills London Office Development Land Value Index in the aftermath of the Financial Crisis.
- This research adds to existing knowledge of land values. It also increases the transparency of land markets and could assist policy-making in relation to land value capture. It establishes a framework for continued recording of land value trends into the future, setting out the limitations of the approach. Finally, it invites discussion on the suitability of this framework for the creation of a development land value series for the UK.

1. INTRODUCTION AND PROJECT AIMS

There is a paucity of information on commercial and residential land values in the UK. This paucity reflects the thinly traded nature of land markets, while the heterogeneous nature of each site makes it difficult to interpret price signals when individual sites are traded. Actual transaction prices reflect a variety of site and location specific factors, including any elements of hope value (additional value created by any expectations of development even when specific permission for that development has not yet been granted) and option value (additional value created by options to, for example, defer the scheme or alter its timing/phasing in response to market conditions) appropriate to the site in question. Therefore, the creation of indexes to track the general level of or trend in land values for a particular land use or location is challenging. In this context, theoretical land values estimated for different places could provide a useful benchmark, subject to a consistent valuation methodology.

Better information on land values is needed for market analysis and, especially in the case of residential land policy making. Based on what information is available for England (see Section 2), land values in certain areas have increased rapidly over recent years. As a result, land has become a significant store of wealth for individuals and corporate entities. This creates interest in how commercial and residential land values in different cities and regions change through time and how land values have been affected by macroeconomic conditions and policy decisions.

The viability of specific sites for residential development is of interest to potential developers and funders, as well as national and local government organisations. For developers, this interest stems from traditional market participants and from institutional investors with an interest in emerging sectors such as residential 'build-to-rent'. While site-specific assessments will always be necessary, aggregate information on land values can help investors to model the drivers of viability and formulate strategies for different regions and urban areas.

Viability is also central to planning policy decisions. Information on land values is important to ensure that there is a fair/policy-compliant distribution of any value uplift between the community and landowners. Land value indexes are likely to assist with setting area-wide policies, in particular. Clear identification of which scheme types are least viable could assist public agencies in regard to regeneration policies and the provision of incentives to stimulate certain types of development activity. Alternative use value is an element of viability testing and so the comparison between commercial and residential development land values may play an important role.

Finally, residual land values are of interest to investors. Subject to any unexpired lease length and default risk, prospective reversionary land values are important for the appraisal of residential and commercial investments. The potential for redevelopment for existing or alternative uses requires an assessment of the development site value compared to the existing use. It can also be important for ground rents and properties let on index-linked leases, where the differentiation between these property investments and other financial instruments lies mainly in the reversion value.

1. INTRODUCTION AND PROJECT AIMS

It is in this wider context that a framework has been developed by this research for the periodic estimation of land values for different locations. The aims of the research project were:

- To set out a framework for measuring theoretical land values in a consistent way;
- To measure land values for different hypothetical scheme types in different regions of Great Britain and in selected cities;
- To examine the time-series characteristics of these measures and compare trends in values across cities and regions;
- To analyse the key drivers of changes in development viability for different uses over time and whether these were led primarily by changes in costs, rents or pricing;
- To provide recommendations on the scope for regular production of such measures, their likely applications and their limitations.

This research report is structured as follows. Section 2 reviews attempts to estimate land values in the UK, as well as recent studies of land values and land prices undertaken in the US. Section 3 discusses the method adopted by this research, along with the inputs and assumptions used. Section 4 presents the time series estimates of land values for different land uses in different locations. Finally, Section 5 discusses the potential application and scope for further production of residual land value measures by the UK real estate industry. Further results are contained within the appendices to the report.

2. SOURCES OF INFORMATION ON LAND PRICES AND LAND VALUES IN THE UK

Land prices are the result of trading activity and, as is the case for real estate markets in general, land is transacted infrequently. Furthermore, while participants in real estate markets for shops, offices, industrial properties and apartments trade assets that are relatively homogeneous, the same cannot be said for land. Each site is unique in its location, accessibility, development potential, and so on. This restricts the comparability of land prices to a greater degree than for property investments, an aspect that is exacerbated by the lack of transparency regarding land transactions.

Land values are estimates of land prices. The preferred method of valuation is comparison with transactions involving similar sites, if they are available. However, a lack of comparable land transactions has led to the introduction of valuation techniques that rely on first principles (using final scheme value minus costs of development). Land valuations are often undertaken for actual sites, both to inform development decision making and in the context of planning negotiations. Meanwhile, for creating land value indexes, a valuation based approach has been common within UK industry practice, whether the indexes have been based on actual sites or on hypothetical land uses and sites.

The issues related to land prices, land valuation and index construction are relevant to the aim of this study, which adopts a valuation based framework in order to construct development land value series. This section reviews previous and existing attempts to construct such indices in the UK and the US.

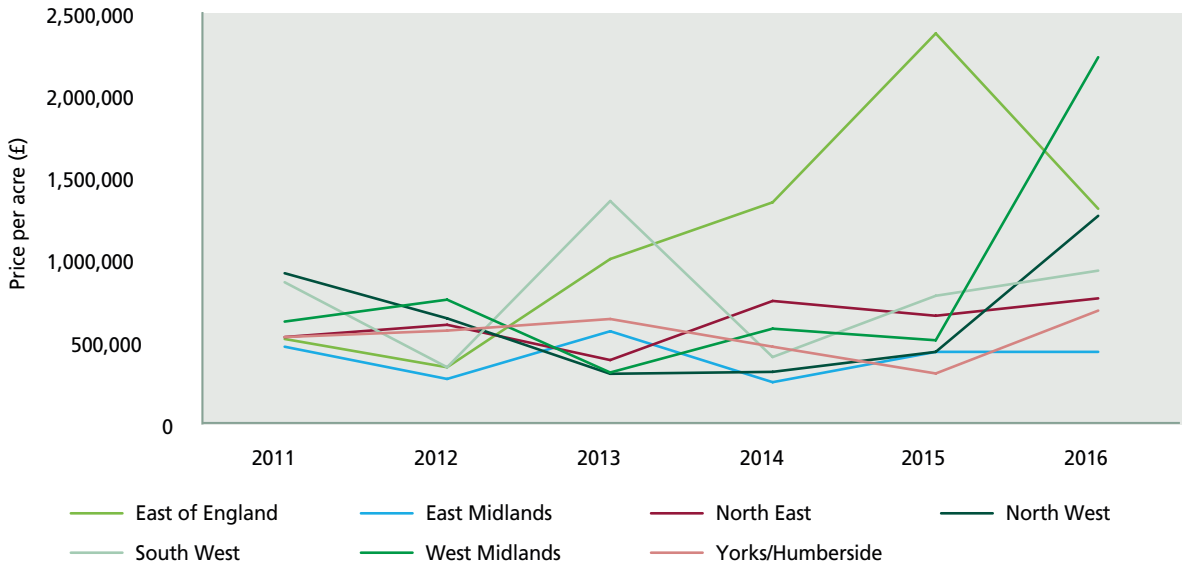
2.1 UK land prices

The Land Registry records details of land transactions as part of their statutory duty to register the ownership of all freehold and leasehold (with a term of three years or more) land and property interests. However, the Land Registry only releases details of residential property sales into the public domain on a volume basis. For other land uses, it is necessary to search the Land Registry on a transaction-by-transaction basis and a fee is payable for each search.

CoStar records the details of commercial land transactions in England, Wales and Scotland. Based on author calculations, Appendix 1 shows the average price per acre of land transactions from 2011 to 2016 in England, Scotland and Wales. Figure 2.1 shows the regional disparities (excluding London and the South East) and illustrates the variability and lack of pattern across regions when average price is used to track land price movements at an aggregated level. This is mainly owing to the fact that, at the site-specific level, land prices display high levels of heterogeneity.

2. SOURCES OF INFORMATION ON LAND PRICES AND LAND VALUES IN THE UK

Figure 2.1: Average Transaction Prices for Development Land from 2011 to 2016 – UK Regions Excluding London and the South East



Source: Compiled by the authors using CoStar data

2.2 UK land price indices

While sophisticated techniques exist for constructing price indexes, such as hedonic regression, these rely on a sufficient volume of sales and sufficient supporting information for the indexes to be measured accurately and for the impact of heterogeneity to be reduced[1]. While CoStar has begun to record both the sale price and additional information for each land sale, including the location, size and existing land use, full information is difficult to obtain, which means that there are gaps in the available data. For example, important variables are the planning status and intended land use, but these are not always known or reported.

In regard to agricultural land prices, Javedicius et al. (2017) highlight the lack of data on farmland prices and so focus on constructing a long-term farmland price index. A source of farmland price data that is available for Britain is the biannually updated Directory of Land Prices published by the Royal Institution of Chartered Surveyors (RICS) together with the Royal Agricultural University (RAU). The directory records the following details for individual transactions: farm name or location, a brief description of the farm, the area in acres and soil quality, the type of tenure, the date of the transaction, the agent name and whether they were a joint or sole agent, method of sale (private treaty or auction), price, and the relationship between the price and the guide price. The data are used by RICS/RAU in their biannual Rural Land Market Survey, which began in 2013. The survey reports a weighted average price (£ per acre) of farmland, an index of farmland prices, the number of reported sales and an average transaction size (acres).

[1] Some success in applying hedonic regression techniques to CoStar land price datasets in the United States is discussed in Section 2.4.

2. SOURCES OF INFORMATION ON LAND PRICES AND LAND VALUES IN THE UK

There is no comparable series as yet in relation to land prices in the UK for commercial land uses. In general, transactions of development land occur infrequently compared to other real estate markets. It is difficult, therefore, to build a picture of trends over time and space. One solution is to use land valuations as a proxy for land prices and several data sources use this approach.

2.3 UK land value indices

Up until January 2011, the Valuation Office Agency (VOA) for England and Wales reported values of agricultural land, of land for residential development and of land for industrial/warehouse development in their regular 'Property Market Report'. These reports were biannual until 2003 and annual thereafter, with figures reported as at 1 January for each year in the later reports. In the case of both residential land and industrial land, figures were reported for over 100 selected 'localities' (typically major towns and cities), while regional tables were based on unweighted averages of the values reported for locations in those regions. In 2010, though, the number of locations for which values were reported was scaled back significantly.

For residential building land, land values in £ per hectare were reported in respect of the following three types of site: bulk land (sites larger than two hectares), small sites (accommodating less than five houses), and sites with planning permission for flats and maisonettes. The values were published at the locality level, but the Inner London values excluded the central area (i.e. Westminster, Kensington & Chelsea and 'bulk land' in Camden)[2]. The VOA regarded the reported values as illustrative rather than definitive, representing typical levels of vacant possession value for sites with no abnormal site constraints and a residential planning permission of a type generally found within the area.

Until recently, the Department for Communities and Local Government (DCLG) used the VOA land value data to compile regional statistics for residential land values for the three categories of site described above. To establish the average value for each region, an average was determined for each district by applying weights to the valuations of the three different types of site. A nominal weight of 5% was applied to the valuation of the "small" plots, and the weights for the bulk plots and flat plots were apportioned on the basis of the number of houses and flats sold in that district during the previous three years (using Land Registry data). The average valuations per district were combined to determine the regional figure by using population weights (which change each year) as a proxy for the relative amount of residential building land within each district.

This residential land value series is no longer updated by the DCLG, but they did publish two reports in 2015, both entitled 'Land value estimates for policy appraisal' (CLG, 2015a; 2015b). These reported residential land values (£ per hectare) as of 1 January 2014 and 1 March 2015 for English local authorities. It is not clear how many locations were valued in each local authority area or how they were aggregated to local authority level. The report also presented two averages for England, one figure that included London and another that did not. These aggregates were created by weighting the local authority numbers using DCLG statistics on net additional dwellings for each district to reflect development patterns.

The values contained in CLG (2015a; 2015b) were estimated by the VOA using a different approach to that used in the Property Market Reports described above. They were 'typical residential site' values estimated using a 'truncated' residual valuation model that involved valuing the assumed scheme and deducting development costs to find site value. The scheme that was assumed varied according to whether a location

[2] The 2010 and 2011 reports were presented in a different format: three value metrics were reported; £ per hectare of site area, £/habitable room and £ per square metre of completed space GIA for suburban sites of 0.5ha in key areas in each government office region. This prevented time series analysis running back through previous years.

2. SOURCES OF INFORMATION ON LAND PRICES AND LAND VALUES IN THE UK

inside or outside London was being considered[3]. Each site was assumed to be freehold with vacant possession, one hectare in size, of regular shape and with a road frontage, to have a net developable area equal to 80% of the gross area, to have services up to the boundary, and to be without contamination, flood risk or abnormal development costs. It was also assumed that full planning consent was in place, that no affordable housing provision was required and that no CIL or other planning contributions were due.

An interesting feature of using a residual approach is that it is possible to generate a negative land value where costs outstrip values. This is reported by DCLG as having happened in a number of cases. However, rather than report negative land values, the DCLG inserted a national-level 'reserve value', which represents "a figure at less than which it is unlikely (although possible in some cases) that one hectare of land would be released for residential development." (CLG, 2015a, 14; 2015b, 15).

The earlier of the two reports published in 2015 also includes an England average agricultural land value estimate and an England average industrial land value estimate[4], but it does not provide estimates by location or region for these land uses. The later report does include regional estimates for agricultural and industrial land values too. The industrial value was created using the hypothetical residual approach assuming a freehold site with vacant possession in a typical urban, brownfield location with no abnormal site constraints or remediation issues, services available to the edge of the site and full planning consent is in place for industrial or warehouse use. Consistent with the residential estimates, the residual value does not include the cost of CIL or other planning obligations.

Since the 2015 reports, there have been no further government publications of land values at the local, regional or national scale. There are, however, some private sector land value indexes that show land value change, usually published on a quarterly basis. Savills (2015; 2017a; 2017b) publishes two residential development land indexes; UK Greenfield and UK Urban. Their indexes are based on estimates of market prices prepared by consultants active in the land market. While there are no published indices of commercial land values in the UK, Savills include residential, office and hotel sites in a central London development land index (Savills, 2015; 2017a; 2017b). Savills (various) also publishes quarterly valuations of six types of agricultural land.

Meanwhile, Knight Frank (various) publishes three indexes based on valuations of approximately 70 UK residential development sites around the country. These indexes are of England greenfield development land, prime central London development land, and urban development land index, respectively. However, in the case of these indexes and the Savills indexes, the data is proprietary and only a limited amount of information is released into the public domain.

2.4 US land price and land value series

For comparison with UK research, four US studies are now discussed. Two of these examine land values and have adopted a residual value approach to constructing indexes. They also focus on residential property. The other two studies examine land prices and adopt a transaction-based, econometric approach. These report indices for both residential and commercial land uses. All of these studies track either land values or land prices at an aggregate, national level. This enables the results from the different bases and approaches to index construction to be compared.

[3] The model assumed one of two hypothetical schemes. Outside London, the scheme was a development of 35 two-storey, two-, three- and four-bed dwellings with a total floor area of 3,150 square metres. In London, the scheme was a multi-storey development of 269 units comprising one-, two-, three- and four-bed flats with a gross building area of 23,202 square metres and a net sales area of 19,722 square metres.
[4] This value excludes 'paddock' and 'hope' value and so is meant to reflect 'commercial agricultural use'.

2. SOURCES OF INFORMATION ON LAND PRICES AND LAND VALUES IN THE UK

First, Davis and Heathcote (2007) investigated the level and growth of US land values using government agency, census and national accounts data. They used this data to establish the value of the national housing stock and the value of the structure component within that stock, with the rest of value attributed to land. The data were highly aggregated and did not enable measurement of land values for individual locations. Their study has limited similarity to this work, but it establishes a precedent for using property price and construction cost inputs to study trends in land values through time.

Davis and Palumbo (2008) used data on values for samples of houses in each of 46 metro areas, deducting estimates of the depreciated replacement cost of the structure from these values to establish the land value and the share of land in total value in each case. This data was then aggregated into indices and land/structure share estimates for individual metros. This has more similarity to this work, although it uses the values of actual residential buildings rather than of hypothetical schemes and it makes assumptions about depreciation in order to create land value estimates.

Updated versions of the indexes described by Davis and Heathcote (2007) and Davis and Palumbo (2008) are disseminated by the Lincoln Institute of Land Policy and are publicly available[5]. The Lincoln Institute also disseminate land value series at State level, which are created using the same approach. One criticism that could be made of these series is that they do not use transaction prices in their construction. This raises the question of how well they track land prices over time, which might be answered through comparison with the studies that have adopted a transaction based approach.

Sirmans and Slade (2012) and Nichols et al. (2013) both use CoStar US data to estimate land price indexes. These studies do not rely on average prices per unit of area, which was shown above to have limited potential for tracking land price movements. Instead, they use hedonic regression techniques. This is to control for the many differences in physical and location attributes between sites that affect prices paid. The techniques seek to explain the variation in observed land prices through reference to data on variables that represent value-relevant factors.

Sirmans and Slade (2012) only describe a national land price index for the US while Nichols et al. (2013) produce indices for 23 Metropolitan Statistical Areas (MSAs). In both studies, the reported indexes do not identify levels of land value in monetary terms, but adopt an arbitrary base for the purpose of tracking trends and changes in land prices over time. It is possible that price levels for a site of specified characteristics could be extracted, but this then requires that a representative site be defined.

Sirmans and Slade (2012) compare directly the index from their modelling with the residual value based index from Davis and Heathcote (2007). The two types of index share a similar cycle with a similar peak and a similar pattern of decline up to the end of the comparison period. One difference is that the transaction based series starts to rise earlier in the 1990s than the residual based series, with the latter catching up in the early 2000s. Another difference is that the transaction based series is more volatile. Less obvious from the chart is that the series from Sirmans and Slade peaks earlier, at end 2005. However, the national series reported by Nichols et al. (2013) peaks in mid-2006, exactly in line with the Lincoln Institute series.

This analysis does not prove that residual value based indexes will track land prices successfully for other land use types or countries, particularly given differences between nations, as well as differences in the application of methods and data sources. However, it provides reassurance that the method can produce reasonable data

[5] Series available at http://datatoolkits.lincolninst.edu/subcenters/land-values/ as at December 2017.

2. SOURCES OF INFORMATION ON LAND PRICES AND LAND VALUES IN THE UK

on land price trends and has been used successfully for the US real estate market.

2.5 Summary

It is clear from this review that a gap exists in the UK in terms of data on land values, particularly for commercial land uses and especially for office and retail land uses where there have been few attempts to quantify values either through transaction data or valuation-based estimates. Since the VOA discontinued publication of their regular land value series, a gap has emerged in terms of residential land values as well.

In the absence of a large database of land transactions, particularly for earlier years, this study adopts a residual valuation method based on hypothetical scheme types, details of which are set out in the next section. A hypothetical approach is not without problems but the authors conclude that, at present, it is the only feasible approach to the construction of a land value series unless the transparency and quality of land transaction data greatly improves. In this respect the study mirrors the broad approach adopted for published US residential land price series but it also uses specific methods and inputs that reflect the UK commercial real estate market context. These are the subject of the next section.

3. METHOD AND DATA

To date, using a transaction-based approach to construct a time series of commercial real estate performance has proved more problematic than using a valuation-based approach and it is likely to be even more problematic for development land than for standing investments. Given that both the appraisal and performance measurement industries have recognised these problems, a residual valuation methodology based on hypothetical developments is the preferred approach for construction of a land value series at present. This section sets out the detail of the valuation method, the inputs and assumptions used to calibrate the model, and the decisions made with respect to coverage and frequency of the resulting indexes.

3.1 Valuation model

RICS Guidance on the Valuation of Development Land is currently under review but the old Valuation Information Paper No 12 (RICS, 2008) identified two approaches; direct comparison with similar transactions and the residual method of valuation. Where relevant similar transactions are available this may be the preferred method of valuation but the information paper recognises that the individuality of sites will normally imply that both methods should be applied.

Under this established market valuation paradigm, the value of land is a 'residual amount' (RICS, 2008), in which a bidder will assess the value at which the developed product can be sold, and then deduct the costs of production, notably purchase costs, construction costs and required profit, in order to arrive at a land value. The calculation required is more formally expressed in the following equation:

Equation 3.1

$$LV_0 = (1+i)^{-t} \text{ x } [DV_0 \text{ x } (1+p) - DC_0 - I]$$

Where LV_0 = residual land value at time t = 0, i = annual interest rate, t = development period, DV_0 = current estimate of development value, p = profit as a percentage of DV_0, DC_0 = current estimate of development costs and I = finance costs. Figure 3.1 illustrates the application of the model for one square metre of residential dwelling space (a similar approach, with very minor variations, is adopted for the commercial land uses). The model estimates the residual value as a monetary amount, but the land value figure can also be expressed as a percentage of development value. This allows the relative contributions of land and structure to total value to be estimated.

3. METHOD AND DATA

Figure 3.1: Residual Valuation Model for Residential Development

		Values
Dwelling price net of sale costs (£/m² GIA), say		3,000
Building cost (£/m² GIA)		(1,000)
Professional fees (10% build costs)		(100)
Site, infrastructure and other costs (20% build costs)		(200)
Interest @ 5% p.a. on half total costs and fees for build period of 2 years	[1]	(67)
Developer's return (15% development value)		(450)
Residual balance	[2]	1,183
Less interest on residual balance	[3]	0.9070
Residual land value gross of purchase costs		1,073
Residual land value (RLV) today, net of 5.75% land purchase costs (£)		1,015
RLV as a % of Development Value		**34%**

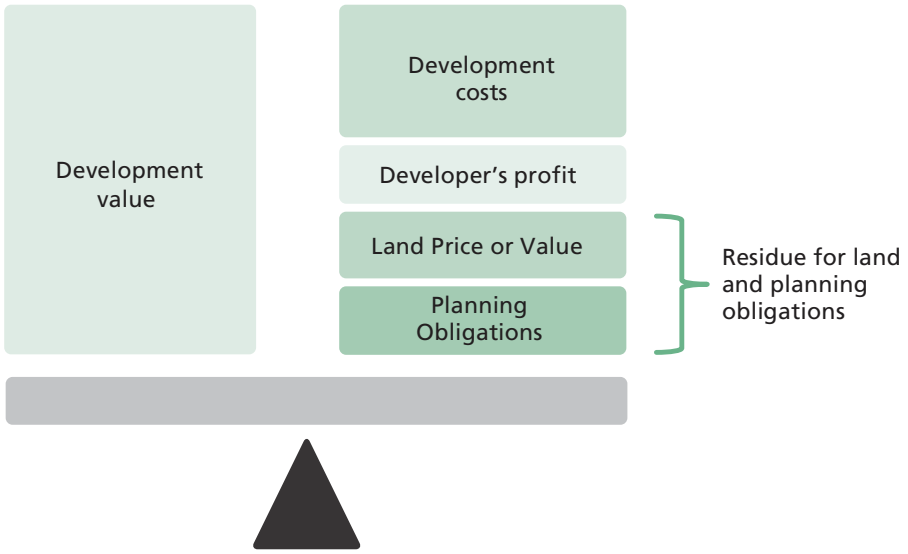
Note 1: Assumes 100% debt finance for development costs and evenly spread drawdown as is typical for this model.
Note 2: This represents the amount available for land as at the end of the development period.
Note 3: Discounted to present value at the finance rate over the development period.

Note that some of the model inputs, such as the percentages assumed for professional fees and the site, infrastructure and other costs, remain constant over time. Others, such as the finance rate and purchase costs (including Stamp Duty), change through time. The basis of the inputs used in the model is further discussed below.

An important point to note is that the model does not include costs of planning obligations (S106 agreements and Community Infrastructure Levy). These costs vary significantly from site to site and cannot be included in a generalized valuation model. The resultant land values are therefore hypothetical and represent the value before the cost of planning obligations are deducted. As such, they are useful for determining the amount of planning obligations that a site might be capable of generating. Figure 3.2 illustrates the relationship between the development value of a site and the costs involved with realizing this value. In a regulatory environment where planning obligations are payable, some of the land value uplift will be used to pay for them.

3. METHOD AND DATA

Figure 3.2: Residual Land Value Split between Landowner and Planning Obligations



Other costs that are usually incorporated into residual land valuations, such as contingencies, marketing costs or external works, are included in the 'site, infrastructure and other costs' line in the model. The model does not capture 'option' value, i.e. the value that a landowner may attribute to the option – while holding the land – to delay development, sell or alter the proposed scheme, together with the potential risk and reward associated with these options. The residual value relates to the amount available to satisfy the bottom two cost elements on the right-hand side of Figure 3.2.

This approach can and does lead to negative values in some property segments and locations. In their 2015 reports (2015a; 2015b) the DCLG did not report negative values on the basis that there may be an existing use value and that land would not be released for development at negative values – or even where the values did not exceed those of existing or more valuable alternative uses. Within this study we have no benchmark for these base values and so have reported negative development land values where they occur. Negative values indicate where development, even in the hypothetical prime position for that use within a location, is not viable. This is an important piece of information for policy makers, developers and investors.

There are a number of residual valuation frameworks that could be adopted, ranging from the traditional residual model set out in the formula above to a full discounted cash flow. Coleman et al. (2012) provide a critique of the issues surrounding the traditional approach, however, it is adopted here for two reasons. First, its simple framework is suited to situations where detailed assumptions are not necessary and only indicative values are required. Second, its use in the UK real estate market is still widespread for estimating development viability and the Market Value of land[6].

[6]In addition, feedback from the Project Steering Group and from organisations that regularly conduct land valuations revealed that the conventional residual valuation method was used and would be appropriate for this particular purpose.

3. METHOD AND DATA

3.2 Data inputs and assumptions

To estimate the value of commercial developments after completion, access is required to a dataset for prime rents and yields. The valuation approach for the completed scheme is then a simple capitalization of the market rent at the prime yield[7]. For this project, the rent and yield points that underlie the CBRE UK prime rent and yield monitor are used. These provide quarterly time series estimates of rent and yield for a large number of UK towns and cities, as well as a number of locations within London. The sectors now covered by this dataset include offices, industrials, high street shops and retail warehouses. The dataset has a very long history with continuous recording for some of the office and retail locations from 1972 onwards, though only data from 1997 onwards is used here. The reason for this is twofold; first, improvements in the coverage of the data from the mid-1990s onwards and, second, to avoid a starting point for the series in a particularly atypical point in the property cycle where values might have been more difficult to assess and excessive lease incentives might have disguised the true level of rent. The early to mid-1990s was characterized by a major downturn and subsequent recovery in the UK real estate market.

The observations of rent and yield are assessed on the basis of a hypothetical building of a given type and specification. The details of the specification currently assumed for each property type are set out in CBRE (2014), while CB Richard Ellis (2007) and CB Hillier Parker (2000) set out the assumptions used in earlier years. In high street retail, the rent points are the 100% trading position in the particular town or city. Where that location changes through time, the hypothetical new building is transferred to the new 100% location. For offices and industrial the properties are assumed to be a standard specification new building in the best location. Again, where this changes, the hypothetical location and building specification also changes. The hypothetical properties are assumed to be let at their market rent (headline rent) on standard lease terms and the yield data represents the net equivalent yield.

The nature of the dataset at any point in time provides consistency between locations in terms of what is being measured. Meanwhile, the changes in specification over time reflect how the requirements for new buildings change as the market for a particular property type evolves. However, it should be noted that the basis of rent and yield observations for the retail warehouse sector differs from the other sectors in that, since 2007, rents and yields are based on specific retail parks rather than on hypothetical buildings. This creates some inconsistency for this particular exercise, the implications of which are explored later.

The residential apartment prices were obtained from the Office for National Statistics' House Price Statistics for Small Areas (HPSSAs). Dataset 13[8], published as part of those statistics, reports the mean price paid for newly built dwellings at a range of administrative geographies. Table 1e within Dataset 13 reports the mean price for newly built flats and maisonettes on a quarterly basis, starting in the fourth quarter of 1995. This table was the source of apartment prices used in this research. The apartment values therefore differ from the commercial and industrial data. They represent average prices, while the commercial and industrial valuations are based on prime location and specification.

[7]Since the yields supplied were net yields, an adjustment is also made for purchase costs to arrive at Net Development Value.
[8]https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/meanhousepricefornationalandsubnationalgeographiesnewlybuiltdwellingsquarterlyrollingyearhpssadataset13

3. METHOD AND DATA

For the purposes of the valuation model it is necessary to convert the prices to prices per square metre. This was done by dividing the price by an estimate for the average size of a flat/maisonette. The average size was obtained from the 2014/2015 English Housing Survey (CLG, 2015), which reported the average size of a flat to be 61 square metres. This figure was cross-referenced with the Dwelling Size Survey for the Commission for Architecture and the Built Environment (CABE) (Wilson, 2010). The CABE report included a gross internal area mean of 60.7 square metres for a two-bedroom flat and median of 58.9. 60 square metres was chosen, therefore, as the average area for a residential apartment in the valuation model.

Although many developers employ cost consultants to prepare a detailed breakdown of building costs at the initial feasibility or financial viability stages, a potential source of construction cost estimates is the Building Cost Information Service (BCIS). This source provides data at the local authority and regional levels. Specifically, BCIS reports the average tender price per square metre for different types of development scheme in each location. These average tender prices can then be extrapolated back through time using the national BCIS All-In Tender Price Index together with data on how tender prices in different local authority areas have varied relative to the national average. Data on these 'location factors' are not normally published, but were made available to the authors by BCIS to assist with this research project.

For each sector, the mean tender prices (£ per square metre GIA including prelims) for the following building types in BCIS were selected:

- Residential: BCIS Building Function 816: Flats (apartments) new-build mean;
- Offices: BCIS Building Function 320 Offices new-build mean;
- Shops: BCIS Building Function 345: Shops new-build mean;
- Industrial: BCIS Building Function 282.1: Advance Factories new-build mean; and
- Retail Warehouses: BCIS Building Function 341.1: Retail warehouses new-build mean.

In the traditional residual model, illustrated in Figure 3.1, 100% debt finance for the total cost of construction is typically assumed along with an evenly-spread drawdown of the loan during the development period. The finance rate has been based on sterling three-month interbank lending rates (source: Bank of England) plus a margin for pre-let commercial developments or residential developments as appropriate (source: Lux (various); Maxted and Porter (various)). The model includes several other assumptions in line with industry practice. The Project Steering Group, plus four organisations that conduct residual valuations, assisted with the selection of input values, which included:

- Professional fees at 12.5% of the build costs;
- Site, infrastructure and other costs at 10-15% of the build costs plus professional fees;
- Development period: this varies according to land use. For residential apartments it is two years, for commercial land uses it is one to one-and-a-half years; and
- Developer's profit margin was assumed to be 15% of development value. Industry feedback revealed that this percentage return would vary according to market conditions. Therefore, it is increased to 17.5% in any quarter where development values for the region had fallen relative to their level six months beforehand. It then returned to 15% in any quarter when development values had risen relative to six months beforehand[9].

A table setting out in more detail the assumptions for each land use type can be found in Appendix 2.

[9]A number of different rules in regard to spatial scale and time horizon were tested for this assumption. The adoption of a region (as opposed to town) level rule and a six (as opposed to three) month threshold was chosen to reduce noise without excessive loss of detail.

3. METHOD AND DATA

3.3 Coverage, scale and frequency

Quarterly dwelling prices dating from the fourth quarter of 1995 were available and this set the analysis period for the apartment land values. Quarterly observations of prime rents and yields were available for much longer, but there was a trade-off between length of series and number of towns and cities that could contribute consistently to the production of land value series. Combined with the need to avoid an atypical start point, rents and yields for the commercial land uses were obtained for a twenty year period from the end of 1997. Estimates were then made for as many quarters as possible given the datasets available at the time of writing: to end-2016 in the case of apartments and to Q2 2017 in the case of offices, shops, industrial units and retail warehouses.

Residual land values are reported at two spatial scales. First, they have been reported for a selection of towns and cities chosen to represent key locations for specific property types (except retail warehouses, as discussed below). These locations are listed below in Table 3.1. Second, they are estimated for all regions in Great Britain, except in the case of apartments where data was available only for English regions.

Table 3.1: Selected Towns/Cities for Different Land Use Types (excluding Retail Warehouses)

All land uses	Birmingham
	Bristol
	Glasgow (but not residential – see text)
	Leeds
	Manchester
Residential apartments	London (Camden, Croydon, Newham, Southwark)
	Brighton & Hove
	Liverpool
	Newcastle
High street shops	Glasgow
	London (Central and Croydon)
	Cardiff
	Edinburgh
	Liverpool
	Nottingham
	Sheffield
Office buildings	London (City, Mid-Town, Southbank, West End)
	Cardiff
	Edinburgh
	Reading
Light industrial units	London (Heathrow, Park Royal, Stratford)
	Leicester
	Milton Keynes
	Sheffield
	Stoke-on-Trent

3. METHOD AND DATA

Two processes were used to select individual locations. In the case of the commercial land uses, reference was made to VOA data on floorspace by local authority (England & Wales) and CoStar data on floorspace by major market area (all UK). This allowed the largest markets in terms of built stock to be identified. Meanwhile, reference was also made to general data on the size of the UK's major urban areas.

Measuring city size is complicated, but, according to Demographia (2017), 13 of the largest UK urban areas are in the world's top 1,000 urban areas by population. These include London, Manchester, Birmingham, Leeds/Bradford and Glasgow, which are at or near the top for the UK when measured in terms of continuous urban area. The largest city in the south of England other than London is Bristol, so land values across all sectors were included for these locations. In measuring continuous urban areas, Demographia amalgamates Portsmouth and Southampton to create an urban area larger than Bristol, but Bristol was felt to be a more appropriate location as it is larger as a city than either of those two places. Demographia also amalgamates Leeds/Bradford, but Leeds alone also ranks very highly in the ONS list of city populations. Edinburgh, Liverpool and Sheffield rank very highly as well, but their regions were already represented by Glasgow, Manchester and Leeds. Nonetheless, these locations are partly included in samples for residential (Liverpool), retail (Edinburgh, Liverpool and Sheffield), office (Edinburgh) and industrial (Sheffield).

For London, data was available within CBRE at a greater level of disaggregation than for any other location. There was therefore an element of sampling across locations for the different sectors: Residential using both Inner and Outer London Boroughs, High Street Retail using one Inner and one Outer London location, Offices using the City, West End and two other central London locations, and Industrial using three locations around London including Heathrow. A small sample of other important regional locations were used including Reading Office, Newcastle Residential, and Cardiff Office and Cardiff High Street Shops. Industrial locations near motorway links include Milton Keynes, Stoke-on-Trent and Leicester.

For the retail warehouses, sampling was more complicated. The CBRE data set has a major structural break in Q2 2007. Prior to that time, the data were compiled in similar manner to the other property types. During the 1980s and 1990s, retail warehouses were mainly bulky goods stores and the data was collected for sample locations adopting the same hypothetical 100% location for such stores, shifting that location if the need arose within each sample area. The changes in the nature of this property type were then acknowledged in 2007 by the creation of three retail warehouse categories; Bulky goods parks, Fashion parks and Open A1 parks. In addition, the hypothetical series for specific locations were discontinued and the new estimates were based on specific named retail warehouse parks in different parts of the UK. For this reason, a series for specific towns and cities is not reported. However, a series for bulky goods from 1997 and for the three different types of retail warehouse from 2007 are reported. There is also a regional series based on all park types from 2007 onwards as part of the material in Appendix 3.

Retail has three major elements; high street, retail warehouses and shopping centres. However, a shopping centre development land value series was not constructed owing to the confidentiality aspects of the data (with only one major shopping centre in many locations). Meanwhile, the industrial sector is in the process of change with the growth of specialist logistics assets over the period. The industrial land value series presently conforms to the specification of the CBRE light industrial unit within their rent and yield series and so we do not track land values for logistics.

Estimating residual land values at the geographical scale of individual cities (and their local authority areas) and at the regional level requires data for the key model inputs of scheme values and building costs to be

3. METHOD AND DATA

available at these two spatial scales. This is straightforward for building costs and the residential apartment prices; both are reported at local authority and regional scales and are based on averages of building tender prices and apartment sale prices within the relevant areas respectively.

It is less straightforward for the commercial land uses, though. Here, CBRE produce yield levels at a regional scale, but not rent levels – only indexes of rental growth. So regional residual land value series were built up by using residual values for all underlying locations in a region that were capable of providing rent and yield inputs throughout the study period. The number of underlying locations for each regional series is shown in Table 3.2. The residual values in each period for a given location in a given region are then weighted according to the share that the development value for that location would have in a total development value for the region based on holding a site in each of the component locations.

In other words, the regional series for the commercial land uses are value-weighted whereby the most valuable locations in terms of synthetic capital value have the greatest weight in the analysis. This mirrors the procedure used for weighting rent and yield points in the CBRE rent and yield monitor when regional series are created for that publication (see CBRE, 2014).

Table 3.2: Number of Locations Underlying the Regional Series

	Office	High street shop	Industrial	Retail warehouse
East Midlands	5	13	5	4
East of England	12	24	11	6
London	34	53	14	6
North East	4	7	2	3
North West	3	21	4	9
Scotland	8	17	8	6
South East	20	33	20	10
South West	7	16	7	5
Wales	3	7	3	6
West Midlands	7	9	6	7
Yorks & Humber	3	13	4	8
TOTAL	**106**	**213**	**84**	**70**

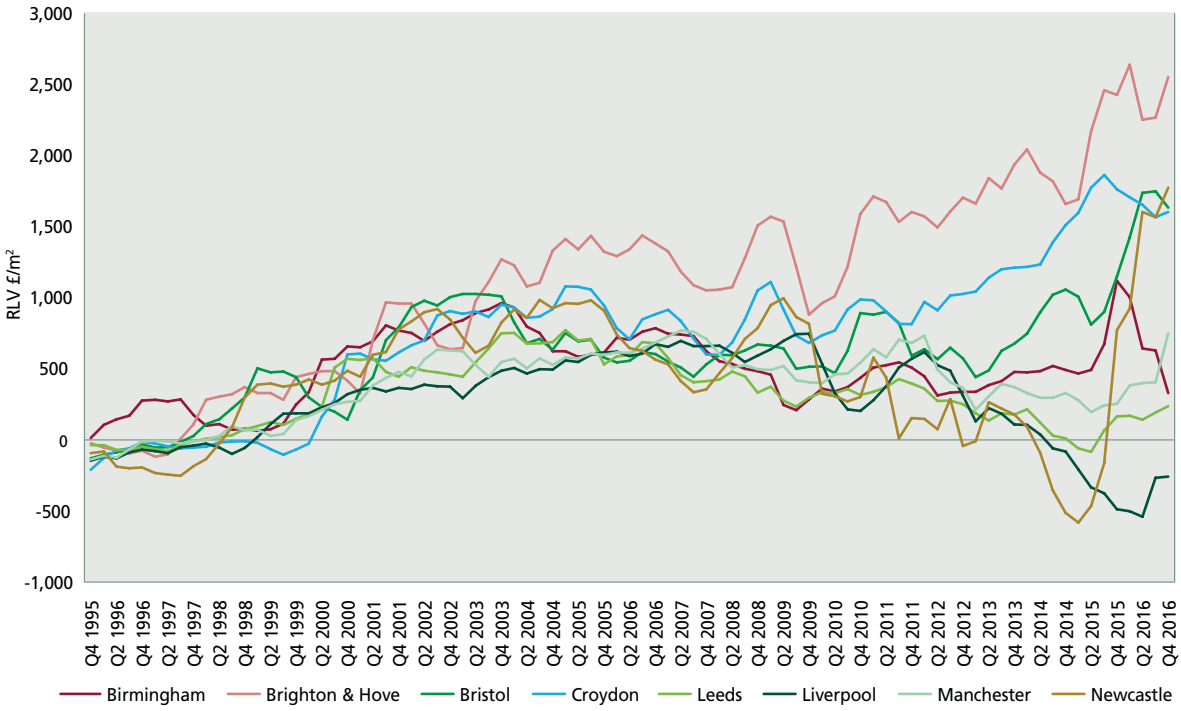
4. RESULTS

To facilitate detailed analysis by readers, the quarterly land value figures for each location and region are reported in a set of spreadsheets that accompany this report. The results are based on two specific measures produced for each location in each quarter. These are the residual land value expressed as a price per square metre of developed space and the residual land value as a percentage of development value. The discussion and charts below focus on the location level series, while charts for the regional series can be found in Appendix 3.

4.1 Residential Apartments

Figures 4.1 and 4.2 set out results for selected locations for apartment land values based on the value per square metre measure. Figure 4.3 identifies the same locations in terms of their residual value relative to development value.

Figure 4.1: Residual Land Values for Apartments in Selected Locations ex. London (1995 to 2016)



4. RESULTS

Figure 4.2: Residual Land Values for Apartments in London (19195 to 2016)

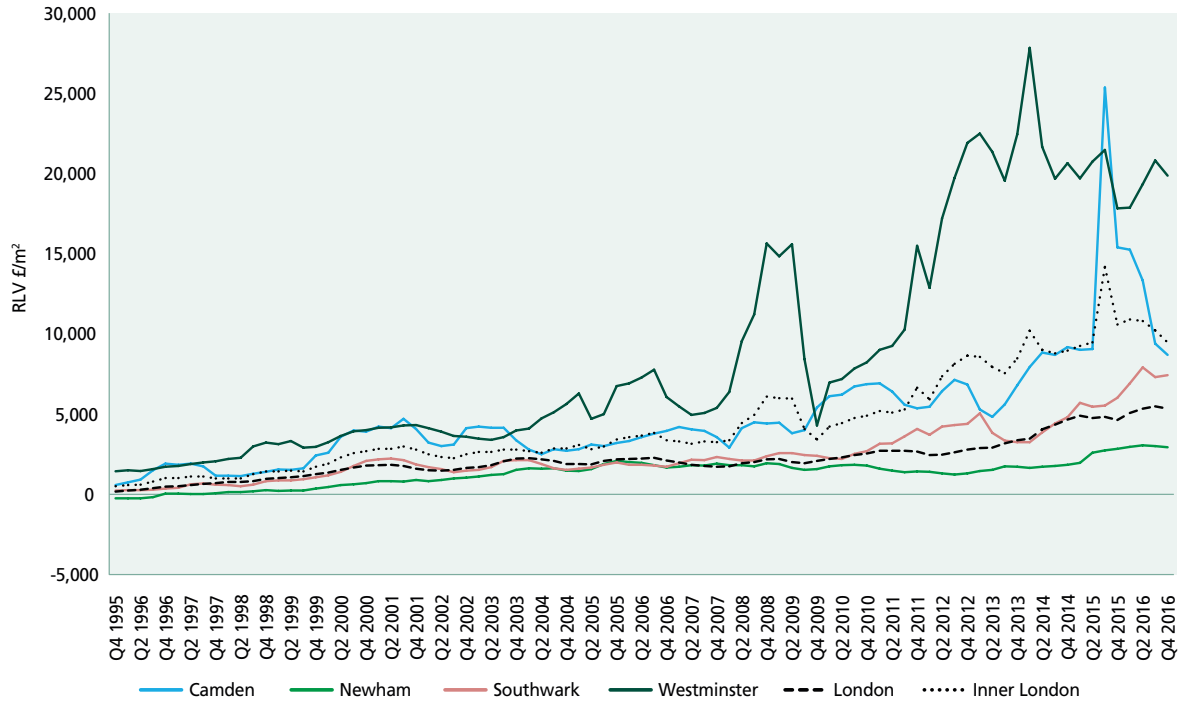
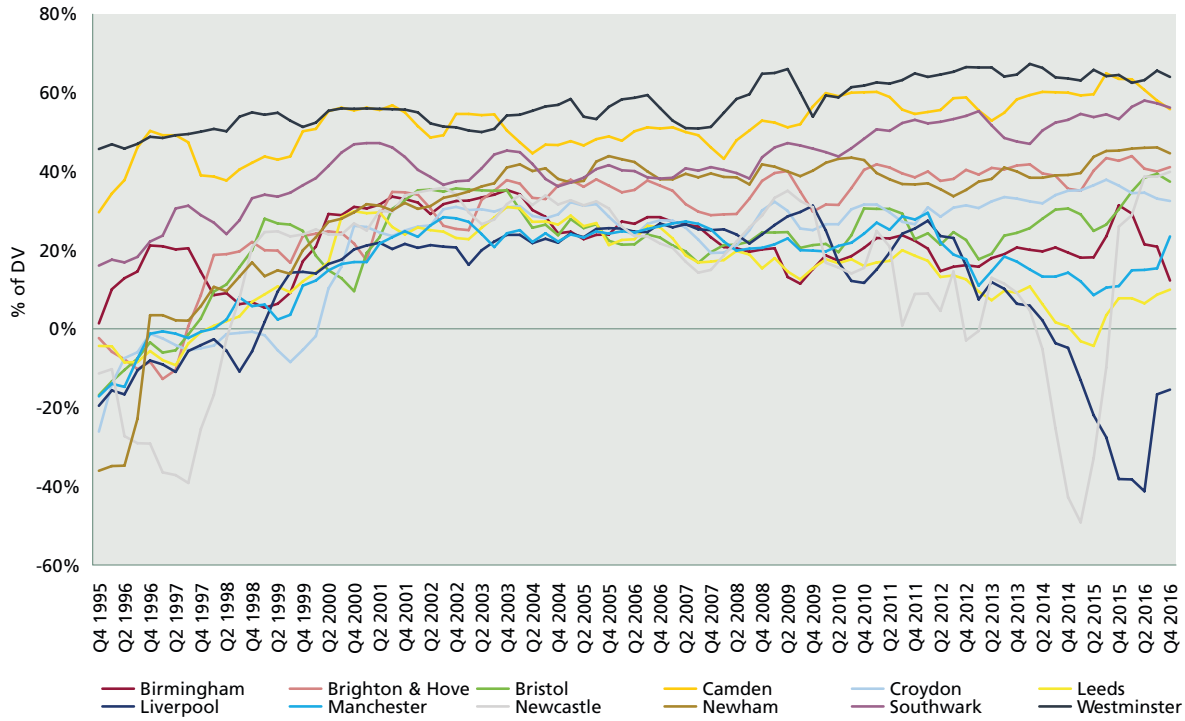


Figure 4.3: Ratio of Residual Land Value to Development Value for Apartments (1995 to 2016)



4. RESULTS

There is substantial variation in both the level and trend in residual land values through time across the sample of locations studied. The value per square metre metric enhances the differences as higher development values drive higher site values and, for this reason, the London results have been reported separately to illustrate this more clearly. Outside London, all locations appear to have rising residual land values for apartment schemes up until 2006, after which the fortunes of different locations diverge – some continuing to rise while others fall.

There is also substantial variation across locations when examining land values as a percentage of development value. This variation is pronounced at the start and end of the period, but there is a significant narrowing of the band between 2000 and 2008. Variation between southern and northern locations is notable. By 2016, Leeds and Liverpool residual values were negative. For Liverpool this represents a return to the level of negative values present at the start of the analysis period. Newcastle appears to be similar to Liverpool until the last year when there was a recovery from negative to positive land value ratios. In contrast, Westminster is running at 60%+ land to gross development value throughout the post-financial crisis period. The other Inner London Boroughs of Camden and Southwark show similarly high and stable land to development value ratios. Other southern locations, such as Brighton and Hove, also experienced low volatility in the post-financial crisis period, running at circa 40% land value to development value ratios.

The difference between north and south is significant whichever metric is used. While Manchester has a residual land value of £750 per square metre in 2016, Westminster is at £20,000 psm. Despite also running at a 60% ratio, Southwark and Camden have residual values of £7,500 psm and £9,500 psm, respectively, in 2016. Brighton and Hove is at £2,500 psm and Bristol at £1,750 psm. Only Newcastle appears to have bridged the divide in the last two years, going from a negative £700 at the beginning of 2015 to a positive £1775 at the end of 2016.

The increased volatility of residual land values in low value areas is partly the result of the structure of the residual model. Where the residual value is a function of two much larger inputs, small changes in the larger inputs will have a significant impact on the small residuals. Newcastle stands out in this respect. The volatility is caused by some huge variations in apartment prices across a relatively short time scale. The average price fell from around £120,000 in Q1 2014 to less than £75,000 in Q1 2015. It then jumped back to £100,000 by Q3 2015, doubled to £200,000 by Q1 2016, and had reached £275,000 by Q4 2016.[10] This has created significant volatility in the land value measures for this location. In comparison, the costs of development were relatively very stable.

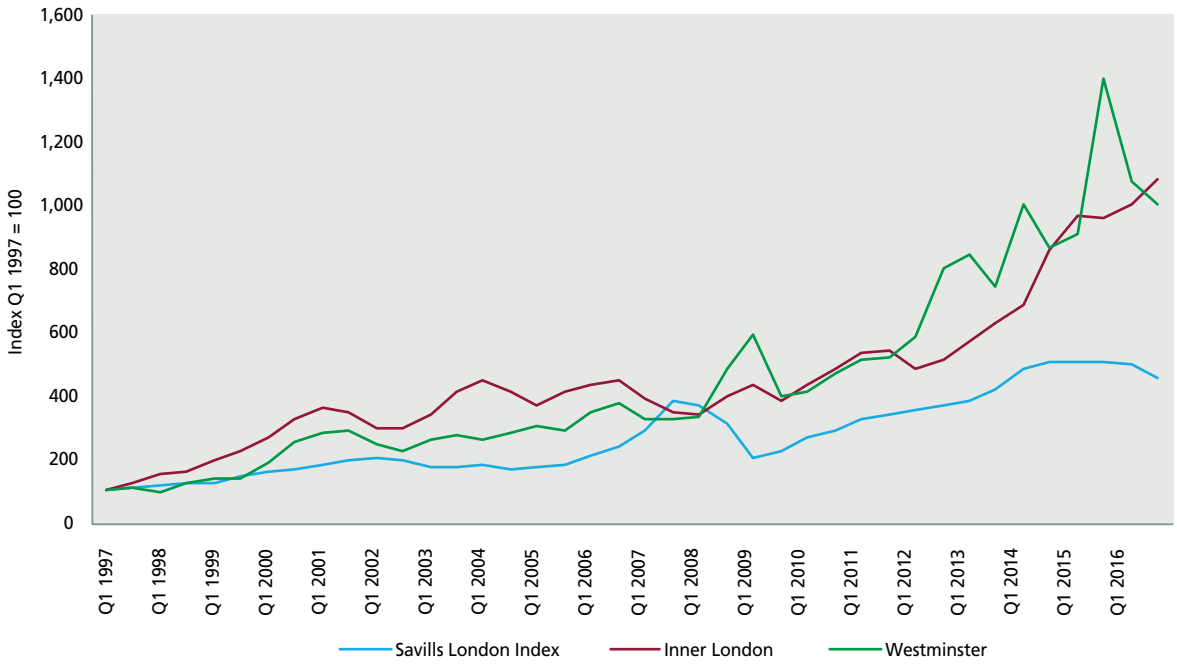
The regional results are set out in Appendix 3 and illustrate even more markedly the north/south divide in land values, which appears to be widening. Figure A3.1 shows the value per square metre of developed space. The split between North and South sees the Midland regions being grouped with the northern ones. Where residual value is shown as a percentage of development value, there are three distinct bands; London, a grouping of southern regions (East of England, South East and South West) and the rest including the whole of the Midlands and the North.

[10] The apartment price data is not controlled for any changes to the nature of the stock sold in a particular period. It is an average price and so is subject to issues of heterogeneity discussed earlier in the report. The volatility in these prices could be solely a function of the samples and the volatility arises whether the median or mean apartment price is used. The commercial series, using a consistent property specification and valuations rather than prices, is much more stable.

4. RESULTS

Figure 4.4 sets out the Central London residential land index of Savills against the residual land values for Inner London and for Westminster estimated by this study, also expressed as an index. The index is based at Q1 1997 and the last observations for all three series are as at Q3 2016.

Figure 4.4: London Residential Land Value Indices



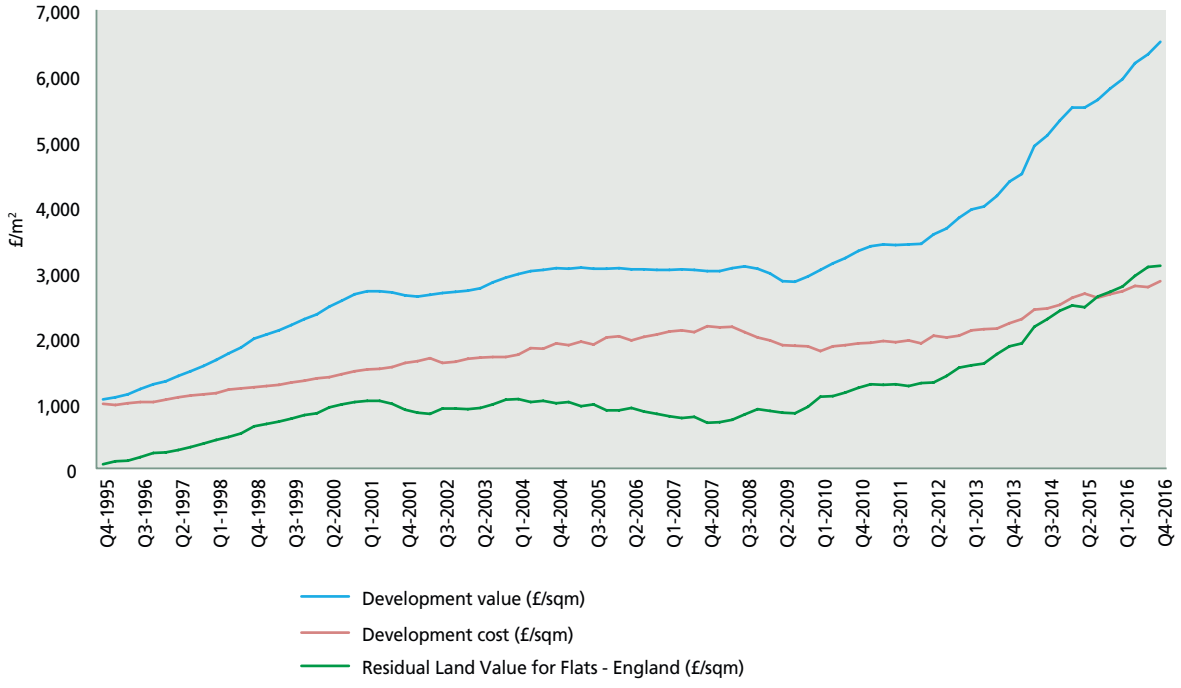
The residual land value index for both Westminster and Inner London outpaces the Savills index over the whole period by a significant margin. There is a brief coming together around the time of the financial crisis. The Inner London and Westminster residual land value indices peaked in Q3 2006 and then started to fall. In stark contrast the Savills index grows by well over 50% in the period Q3 2006 to Q3 2007 and then falls by 50% in the next 18 months. Yet this is precisely the time that the residual land values start to increase significantly on the back of strong rises in the average sale prices of London apartments. In Q1 2008, the mean Inner London price for apartments was £437,500, but this increased to £650,000 within nine months. Despite falling back to under £500,000 in 2009 and 2010, mean values are over £1 million in 2016. This has driven a major increase in residual land values that, particularly since the beginning of 2014, has not been matched by the Savills index, which now stands at around 50% of the residual land value index for Inner London.

The higher rate of increase in residual land values in Inner London compared to the Savills Index is particularly apparent at the beginning and end of the analysis period. Had the base year been Q1 2000, the Inner London residual land values index would have been significantly lower than Savills around the end of 2007 but would have caught up by Q3 2016. If the base year had been Q1 2004, the Savills Index would still be a small margin higher than the Inner London residual land value series at the end of the 2016. Regardless of the base year, the residual land value series for Westminster is significantly higher than both Savills and the average for Inner London.

4. RESULTS

For England as a whole, Figure 4.5 illustrates the behaviour of apartment prices, costs and land values over the analysis period. There appear to be three phases of value change over the study period, driving a similar three periods for the residual land values. The start date of 1995 was not long after the major property market crisis of the late 1980s, which lasted well into the 1990s. Apartment prices increased by an average of around 2.5 times between 1995 and the end of 2000. At this point the residual land values were a very small percentage of the development value and therefore this increase had a very positive impact on the residual land values for apartments. This was also due to a much lower rate of increase in costs. By contrast, in the commercial property boom of the 2000s up to Q2 2007, apartment price growth slowed down and was only about 10% in that period. Residual land values actually fell on the back of a steady increase in costs. Apartment prices then remained fairly static until they started to rise again in 2010 and by the end of 2016 had increased by around 2.25 times (125%) in those six years. According to the BCIS, construction costs only increased by around 50% in the same period, leading to a 225% increase in residual land values.

Figure 4.5: Average Apartment Values, Costs and Residual Land Values – England (1995 to 2016)



4. RESULTS

4.2 Offices

Figures 4.6, 4.7 and 4.8 set out the results for the sample locations in the office sector.

Figure 4.6: Residual Land Values for Offices in Selected Locations ex. London (1997 to 2017)

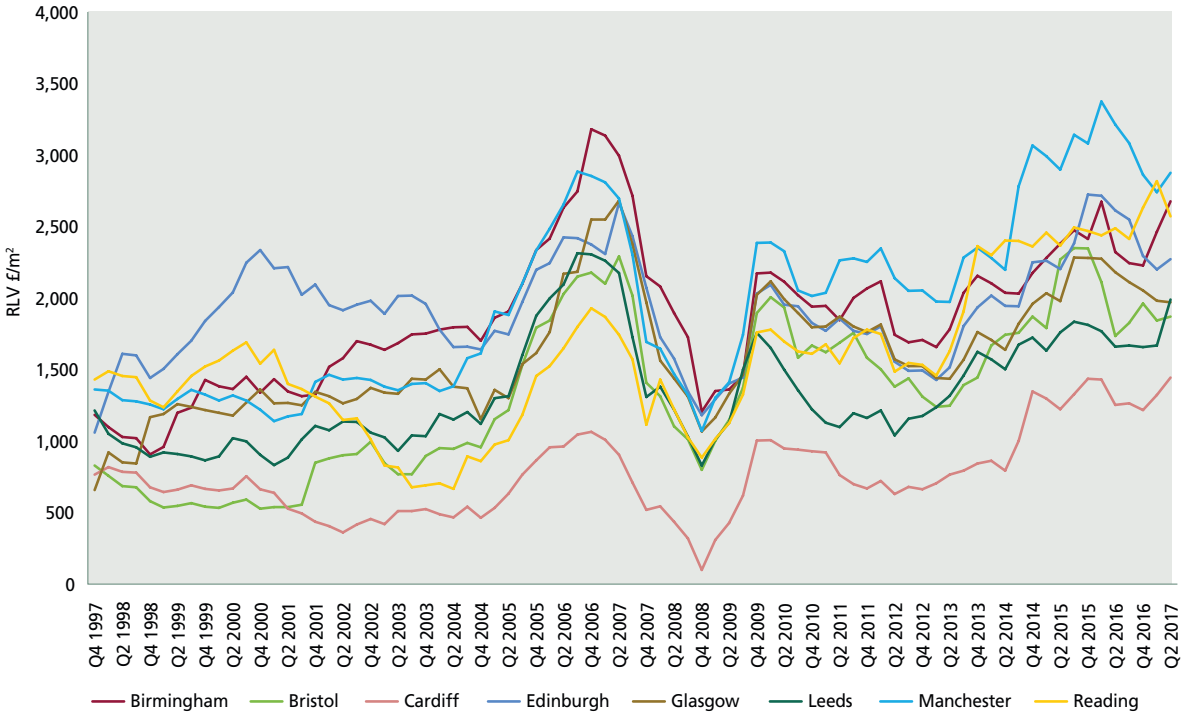
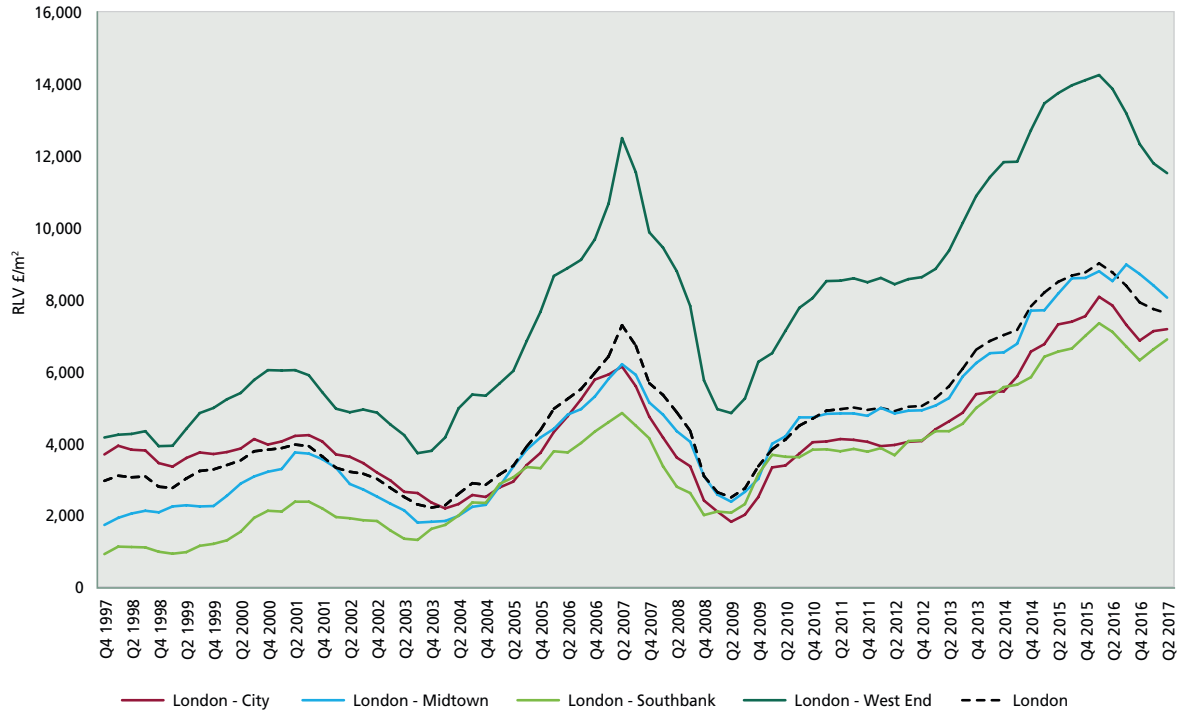
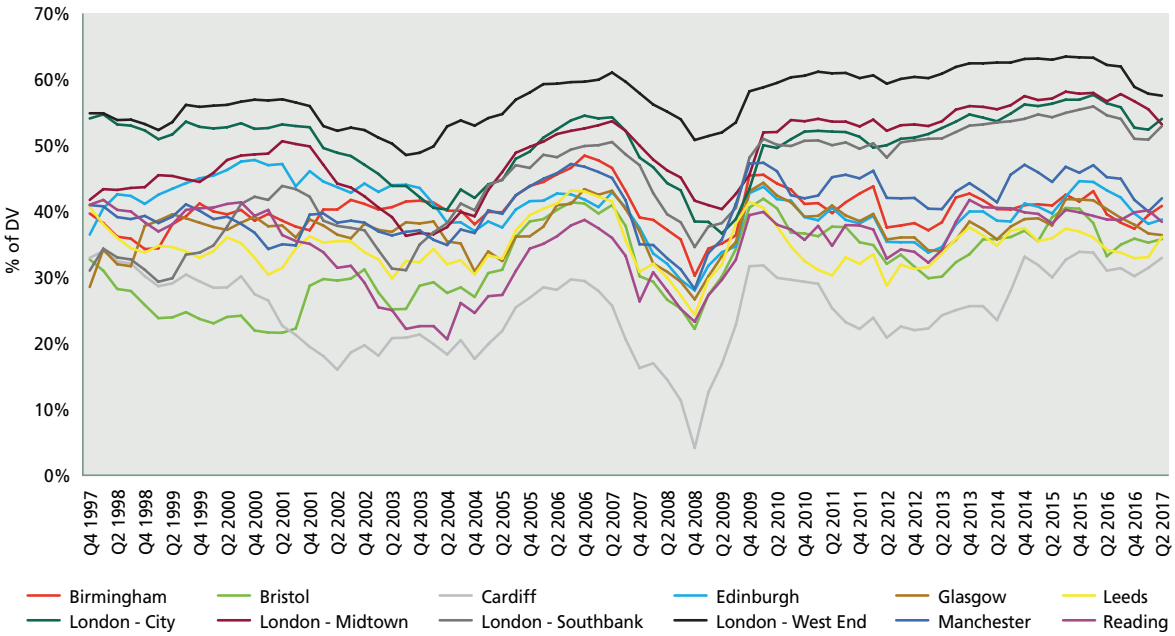


Figure 4.7: Residual Land Values for Offices in London (1997 to 2017)



4. RESULTS

Figure 4.8: Ratio of Residual Land Value to Development Value for Offices (1997 to 2017)

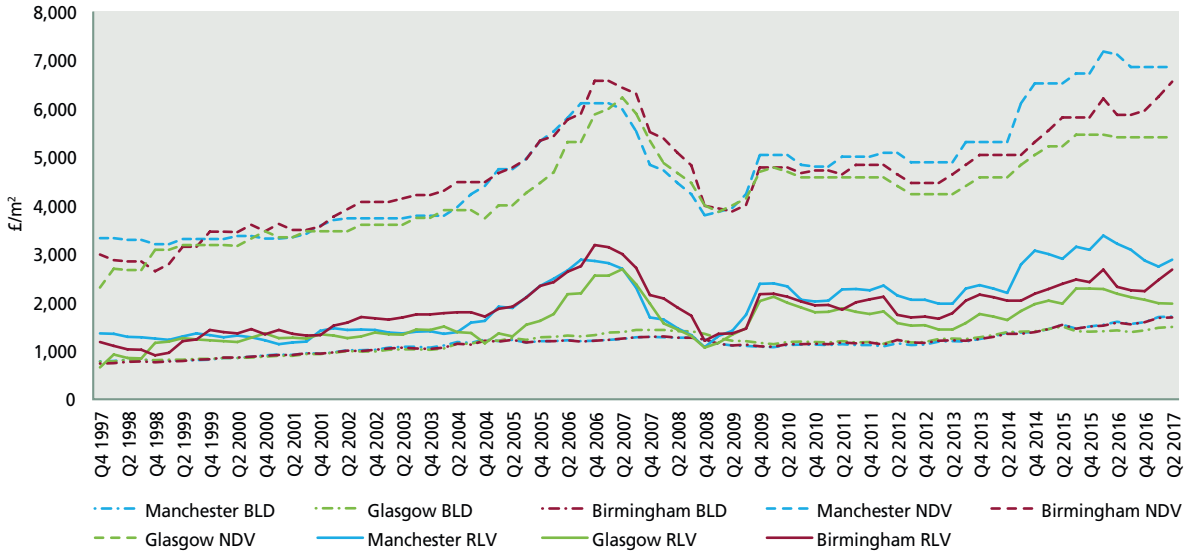


Office residual land values generally follow the behaviour of the built office market through the period – a recovery in values across the country in the mid to late 1990s, followed by a fall in some land value series in the post tech boom economy of the early 2000s that hit certain parts of the country more than others. There is then a boom in values in the period up to 2007, a major crash in 2007 to 2009 and a recovery thereafter, mirroring the office market more generally. Figure 4.9 illustrates the lack of relative volatility in building costs for three major office markets in the sample: Manchester, Birmingham and Glasgow. This shows that movements in residual values in this sector tend to follow the market values of the completed development.

Rather than a North/South divide, for office residual land values the divide is between London and the rest of GB both in terms of residual land values per square metre and residual value as a percentage of development value, with only London locations able to command land values at more than 50% of development value.

4. RESULTS

Figure 4.9: Variability of Residual Model Inputs for Manchester, Birmingham & Glasgow Offices (1997 to 2017)

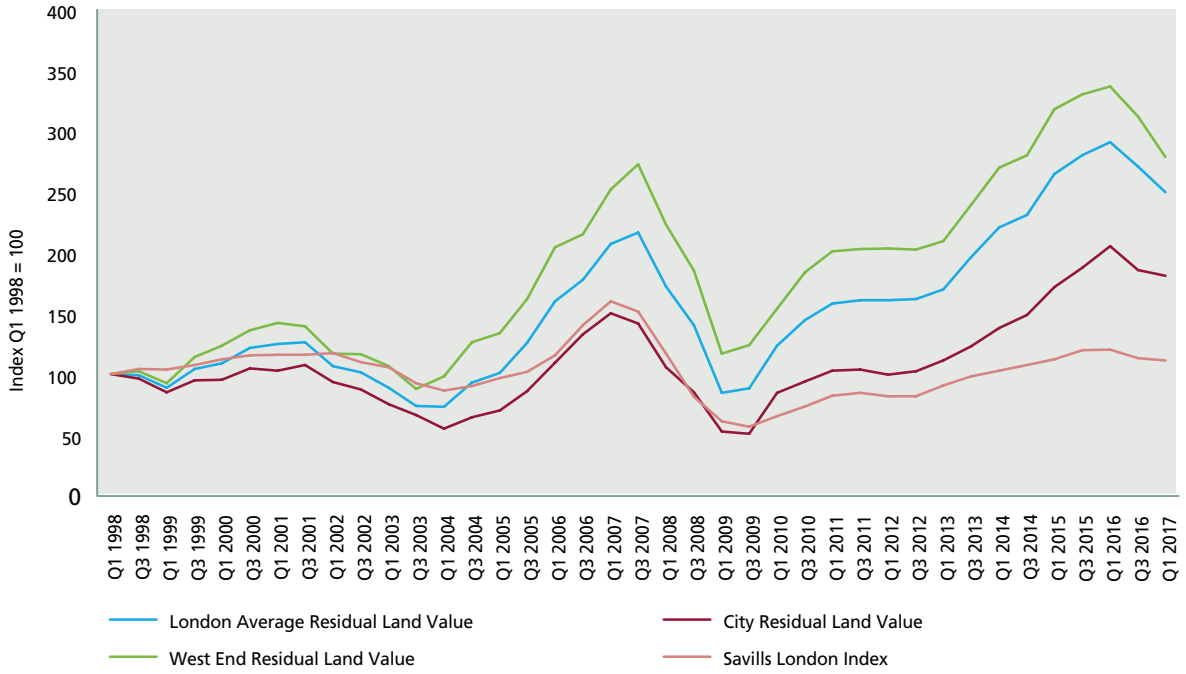


Note: BLD = Building Costs, NDV = Net Development Value, RLV = Residual Land Value

The Savills London Land Value Index, which aggregates multiple uses including office sites, can be compared to the residual land values produced for London. Figure 4.10 sets out this comparison. A similar pattern emerges to the residential analysis. The value series remain similar for the last part of the 1990s but start to diverge in the booming market of the middle 2000s. Although the Savills index remains close to the value change patterns recorded in the City by the residual valuations, the West End office land segment almost triples in value from 2004 until the middle of 2007. That segment records major losses in value until the trough in March 2009 before recovering strongly. Although all the value series record significant gains from 2009, the residual values appear to outpace the values contained within the Savills index, again significantly. This includes the City Offices series, which, up until 2009, had appeared to map onto the Savills index quite closely.

4. RESULTS

Figure 4.10: Comparison of Residual Land Values and Savills Land Value Index for Central London Offices

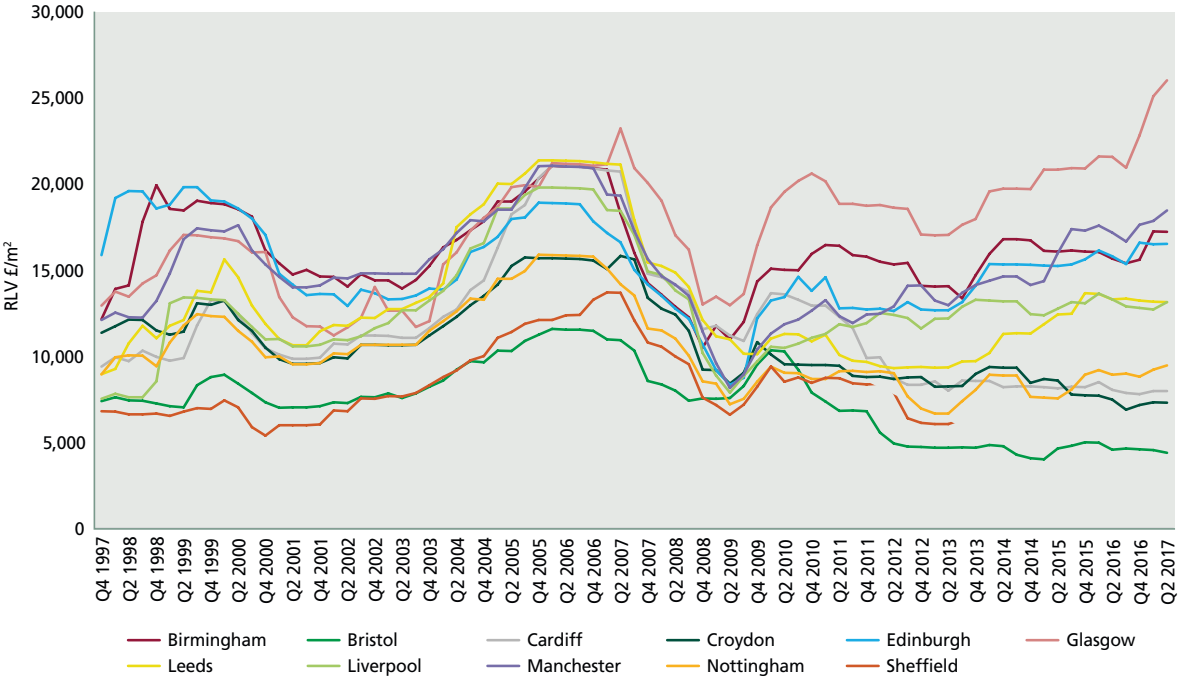


Note: Quarterly residual land value series all rebased to end Q1 1998 to match Savills six-monthly index.

4.3 High Street Retail

Figures 4.11, 4.12 and 4.13 set out the results for the high street shop residual land values.

Figure 4.11: High Street Retail Residual Land Values for Selected Locations ex. London (1997 to 2017)



4. RESULTS

Figure 4.12: Residual Land Values for High Street Retail in London (1997 to 2017)

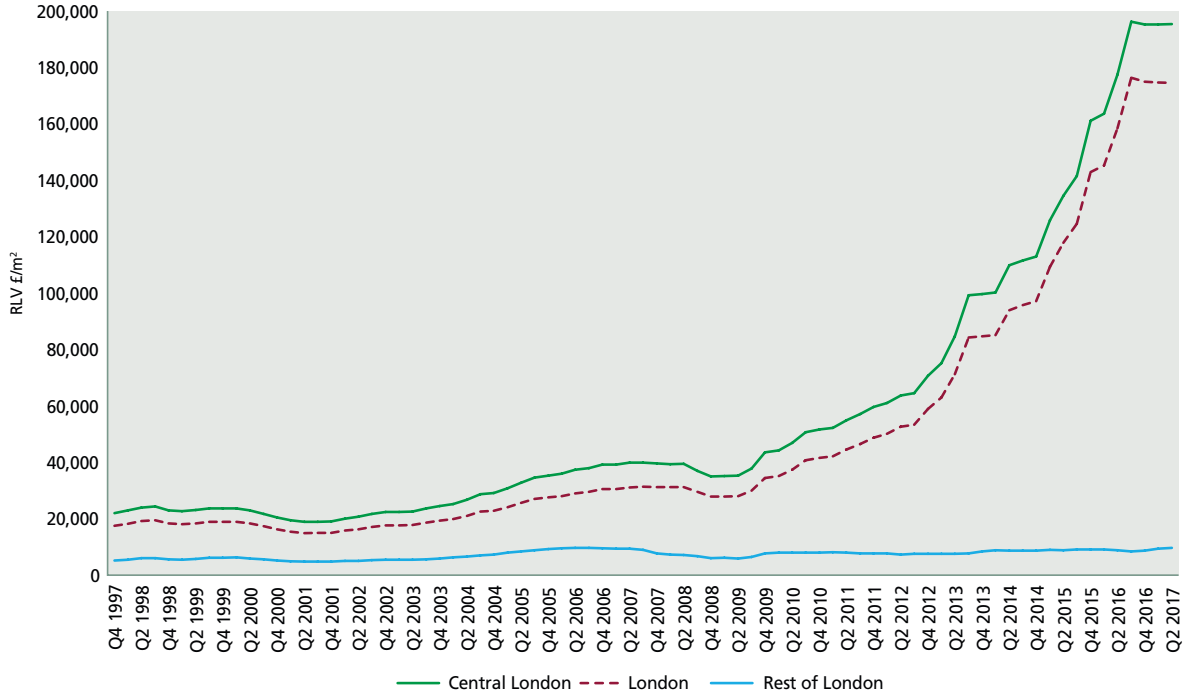
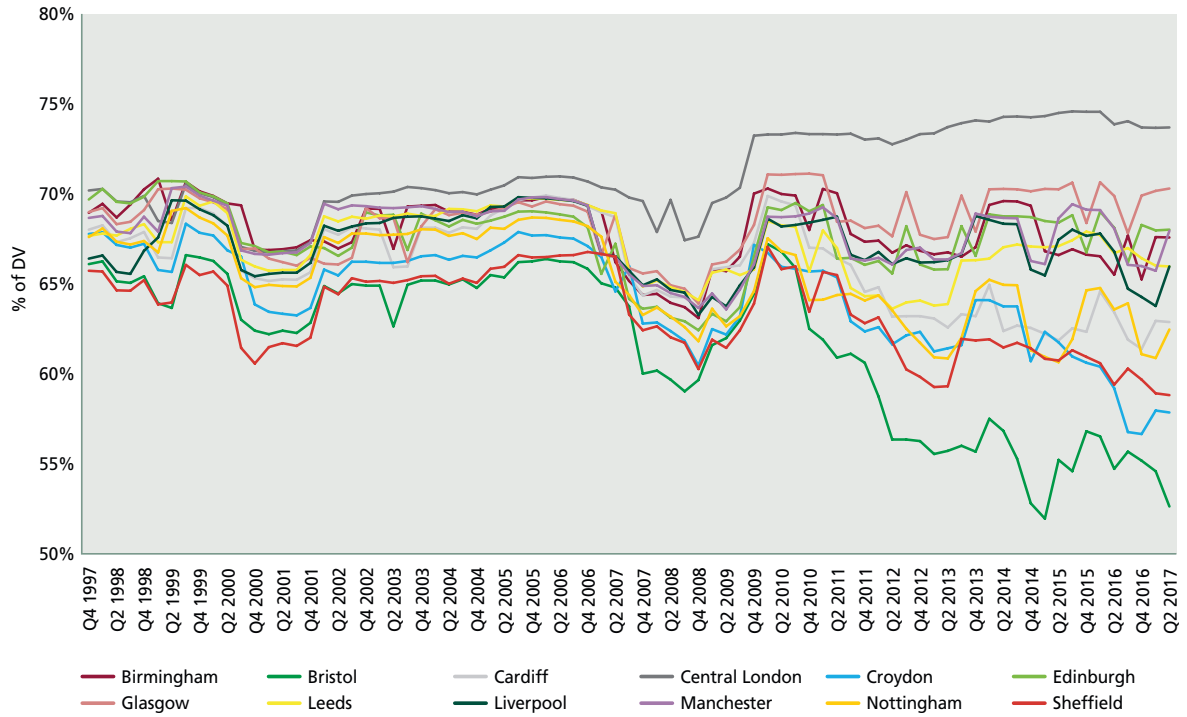


Figure 4.13: Ratio of Land Value to Development Value for High Street Retail in Selected Locations (1997 to 2017)



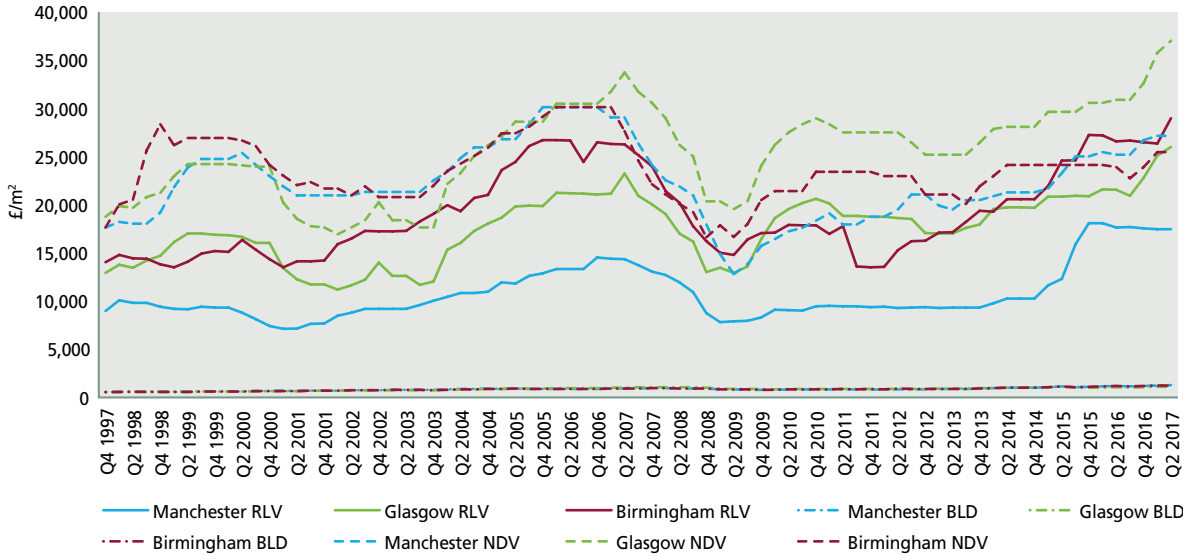
4. RESULTS

As expected the value per square metre is very high, over 10 times that of the equivalent office residual values. Given the single floor nature of high street shops (lower density) and the high value premium of the 100% location assumed in the CBRE data, that is not surprising. The percentage of residual land value to development value is consistently high and the North/South divide is not so prominent.

The residual land values follow a similar pattern as the offices. A more pronounced recovery in residual land values from the 1990 property downturn is apparent at the start of the period. At that point the lowest value cities are Sheffield, Bristol, Liverpool, Nottingham, Leeds and Cardiff. The highest value locations are Edinburgh, Glasgow, Birmingham and Manchester. They all cluster around the 65% to 70% ratio of residual land value to development value, again illustrating the high land value content in retail due to very high development values in the good locations and relatively low costs of development. However, although the general shape of the value changes mimics the property cycle over the last 20 years, there is some divergence since the financial crisis; mirroring the pattern for apartments. While some locations maintain their 65% to 70% ratio of land value to developed value, Cardiff, Nottingham, Sheffield, Croydon and Bristol have reduced ratios with percentages in the low 50s and 60s.

As with offices, the residual land values are driven by completed development values, as these are more volatile than costs. Using the same three illustrative locations as for offices, the same pattern emerges, but even more pronounced due to the relative insignificance of the building costs. On this scale, it is hard to distinguish any difference between the building costs in any of the locations (Figure 4.14).

Figure 4.14: Volatility and Variability of Residual Land Value Inputs for High Street Retail in Manchester, Birmingham & Glasgow (1997 to 2017)



Note: BLD = Building Costs, NDV = Net Development Value, RLV = Residual Land Value

The London results in Figure 4.12 exhibit a sharp increase in value in Central London compared to a relatively low increase in the Rest of London. The Rest of London is represented by local shopping centres in the Inner and Outer London Boroughs and there appears to have been very mixed fortunes over the last 20 years in each of these high streets. Some performed well, with Zone A values rising by between 150% and 300% (Camden, Islington, Clapham, Hammersmith and Stratford). But, in other locations, Zone A rents have frozen (Lewisham, Ilford, Orpington, Sutton). Croydon comes into the latter category with static rental values over

4. RESULTS

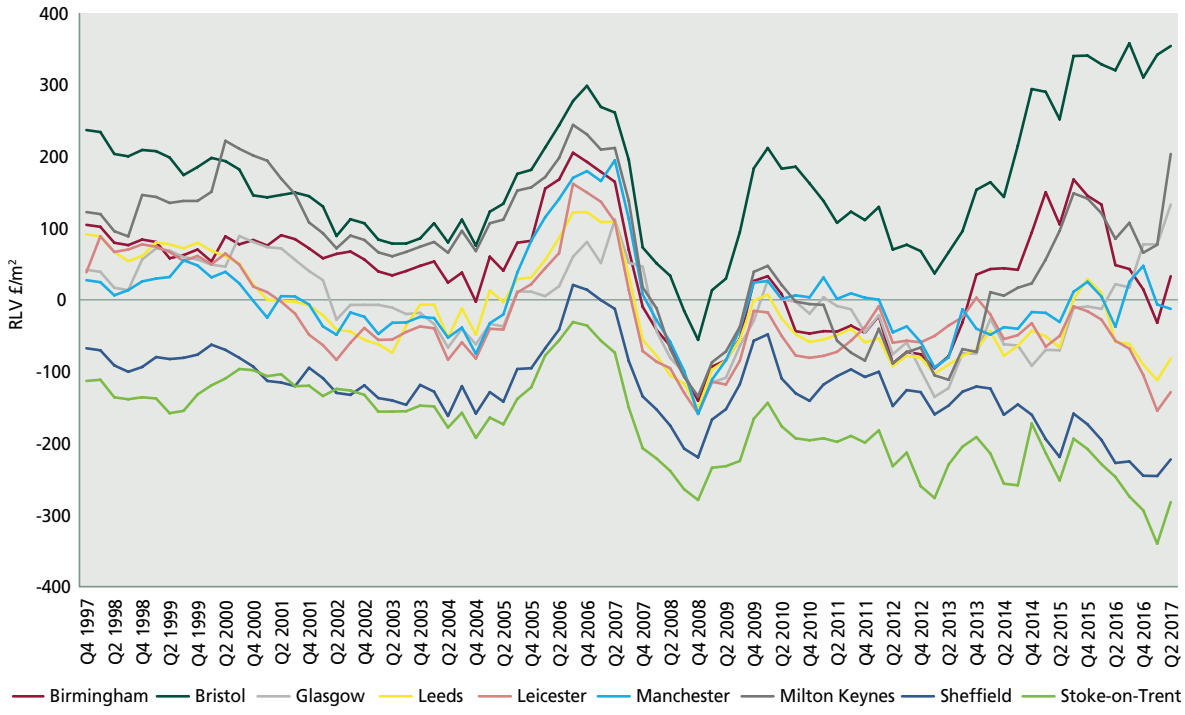
the last 20 years. On average, rents have grown by about 75% across these London boroughs but capital values have done slightly better due to a general cap rate fall across the period. However, these gains are dwarfed in Figure 4.12 by the change in Central London retail values, which have driven up residual land values by over 600%. Central London rents have done well relative to the rest of London high streets but the real change is the reduction in cap rates, which averages about 40% over the last 20 years, leading to a 500% increase in development values even though rents have only gone up by over 200%. Residual land values in Central London high street retail now stand at 75% of development value.

There are no retail high street land value benchmarks with which to compare these results. That is not surprising. The nature of the retail data, which assumes a single high street unit in a prime location, could be considered a very rare development opportunity. Few bare sites are available in the prime location, and rebuilding is highly unlikely due to the ability to reconfigure retail at a very low relative cost. Shopping centre development or redevelopment is far more likely and therefore the obstacles to developing a shopping centre land value series should be addressed.

4.4 Industrial

Figures 4.15, 4.16 and 4.17 set out the results for the industrial sector.

Figure 4.15: Residual Land Values for Industrials in Selected Locations ex. London (1997 to 2017)



4. RESULTS

Figure 4.16: Residual Land Values for Industrials in London (1997 to 2017)

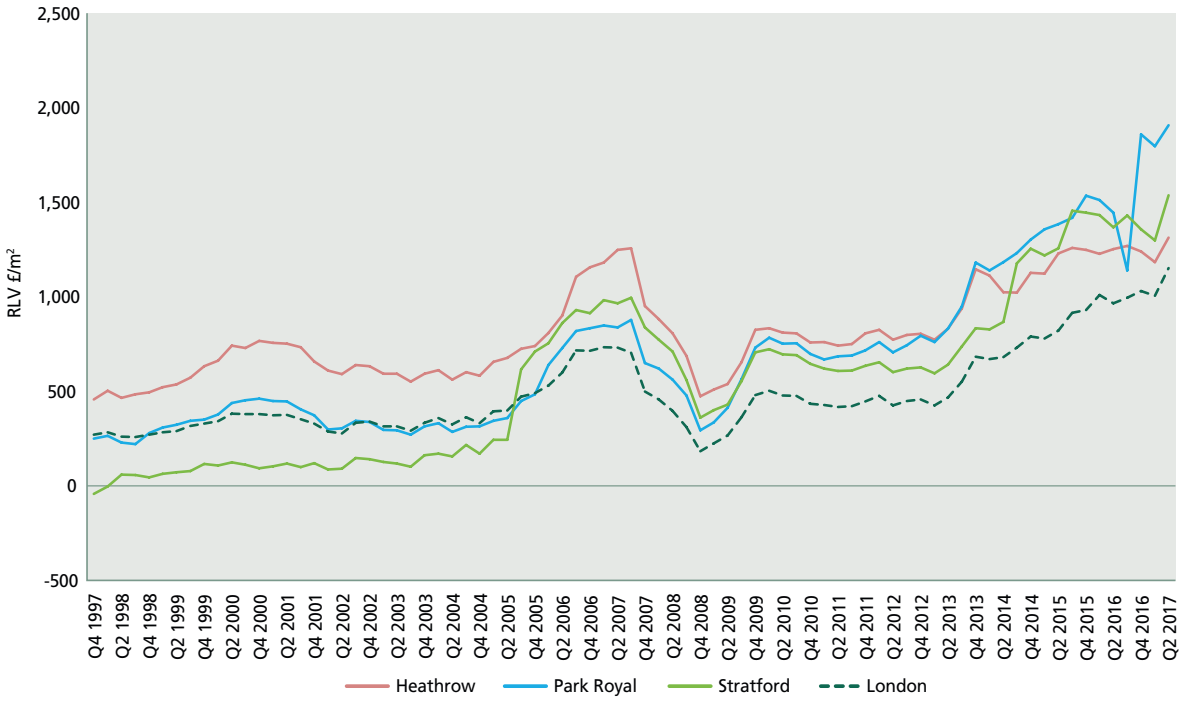
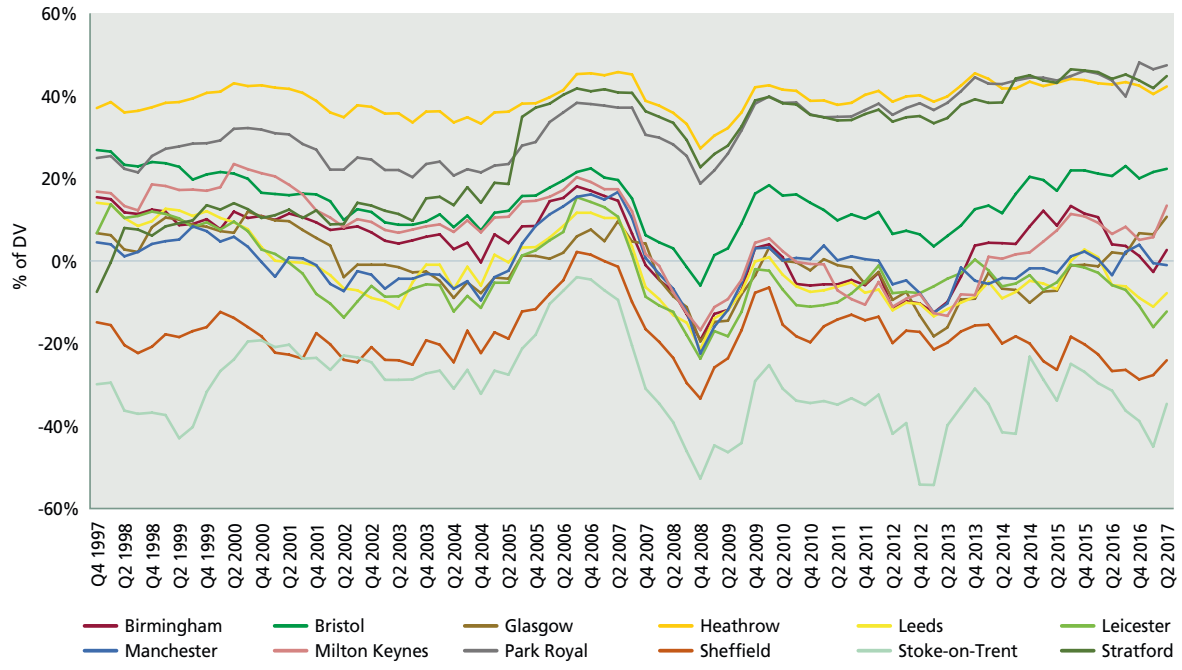


Figure 4.17: Ratio of Residual Land Value to Development Value for Industrials in Selected Locations (1997 to 2017)



4. RESULTS

The first observation is that certain parts of the country have had no viable industrial land market throughout the whole of the analysis period. Stoke-on-Trent and Sheffield have two positive residual land values between them in the whole of the 20-year study period covering 158 observations (Figure 4.15). Within the database as a whole the same can be said for locations throughout the Midlands and the North.

While the South does exhibit positive land values for industrial development throughout most of the period, not one location outside of London and its immediate sphere of influence (which, for example, includes Reading, Woking, Guildford, Watford and St. Albans) has a positive land value in every one of the 79 quarters measured between 1997 and 2017. Even locations like Bristol had two quarters in the second half of 2008 where a negative residual land value was recorded. The regional data set out in Appendix 3 suggests that the negative land value issue is most acute in the North East, North West, Scotland and Yorkshire/Humberside. Here, there are only 15 positive residual land values over the whole period, the equivalent of one year in 20 for each of them. To complete the geographically stark divide, the next three least viable regions are Wales (11 positive residual land values across 79 quarters), West Midlands (13) and the East Midlands (21).

The data exhibit the same increased variability across locations during the post financial crisis period, which was also apparent for apartments and high street retail. This seems to be a function of geography, with Bristol and Milton Keynes increasing in value from the middle of 2014 to the present, while residual industrial land values have declined throughout much of the North and Midlands since the beginning of 2009.

As with other property sectors, industrials around London have higher residual values, with land values stabilising at around 40% of development value from around the middle of the 2000s (Figure 4.17). During the financial crisis these residual land values dropped to around 30% but by the end of 2009 had recovered back to 40%. Of the sample cities, Bristol currently has residual land values at about 20% of development value and Milton Keynes at 10%, but all the others struggle to register any positive residual value at all.

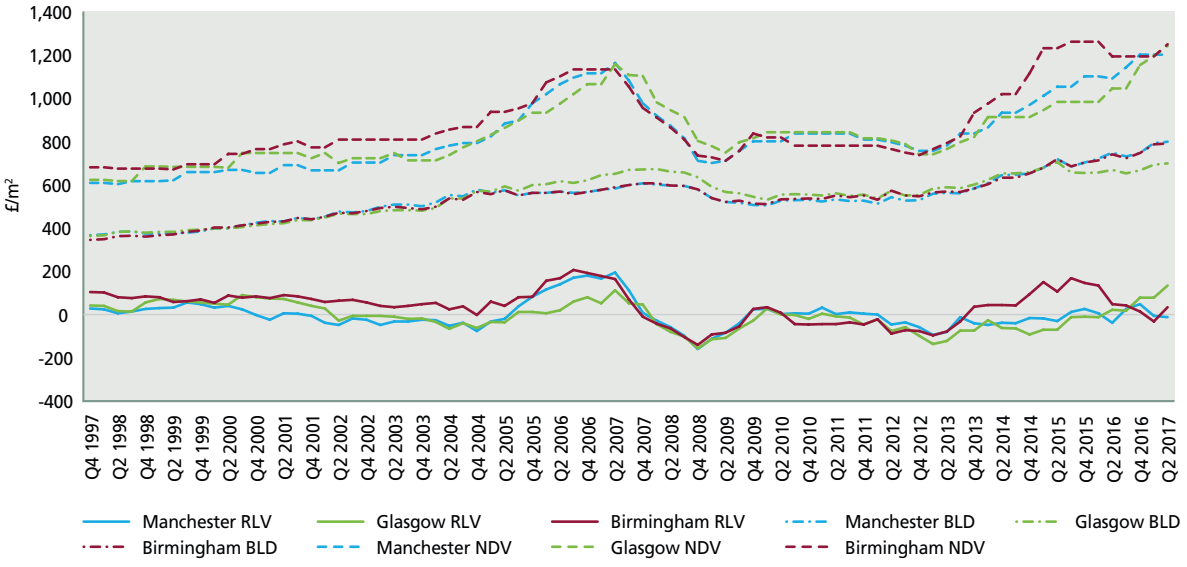
There are no contemporary indices for the value of industrial development land, but, as noted in Section 2, the Department for Communities and Local Government did publish estimates as at March 2015 for the English regions (CLG, 2015b). These estimates, set out in Appendix 4, are all positive and this contrasts with the residual land value estimates produced for this research, which, at the same time period, are all negative except for London, the South East and the East Midlands (Figure 4.18). However, with the exception of East of England, the relative values across the regions appear to be broadly consistent.

The main driver of the industrial land residual is, as with the other land uses, the development value. The lack of relative volatility in the construction tender price series for the cities of Birmingham, Manchester and Glasgow is illustrated in Figure 4.19.

4. RESULTS

Figure 4.18: Industrial Residual Land Values versus CLG/VOA Estimates for English Regions (March 2015)

Figure 4.19: Volatility of Residual Model Inputs for Manchester, Birmingham & Glasgow Industrials (1997 to 2017)



Note: BLD = Building Costs, NDV = Net Development Value, RLV = Residual Land Value

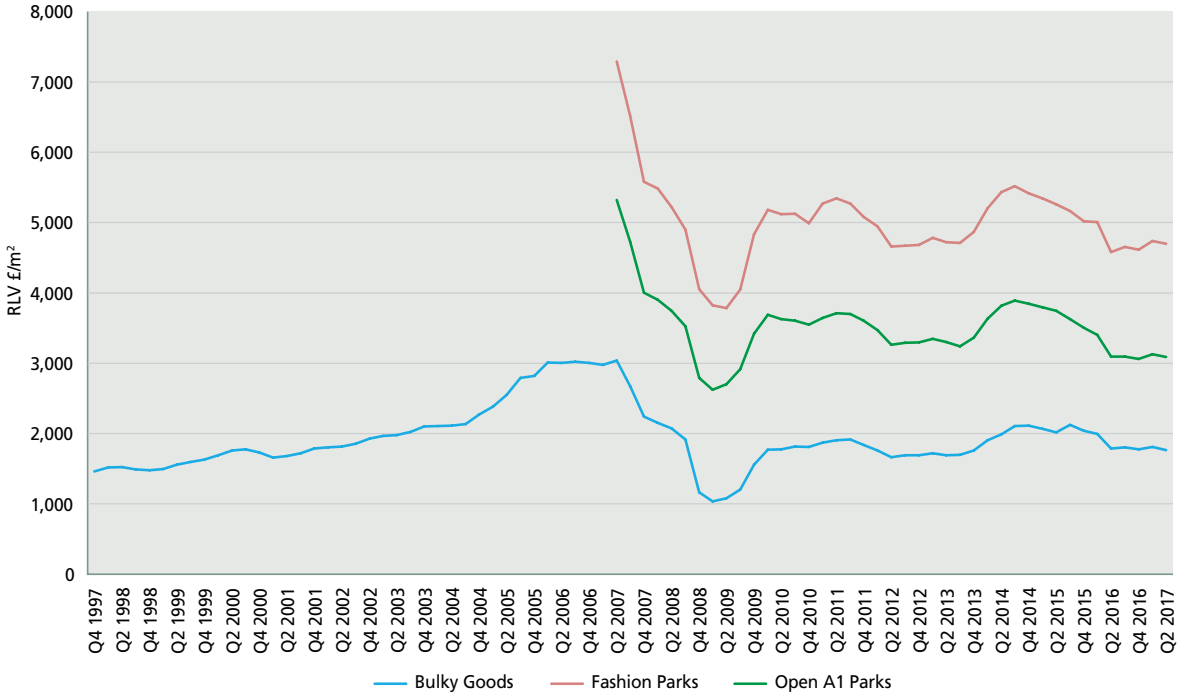
4. RESULTS

4.5 Retail warehouses

Results for Retail Warehouses are set out in Figures 4.20 and 4.21. As discussed earlier, the results are illustrated for each type of retail warehouse rather than for locations. The dataset prior to Q2 2007 was linked to the data from Q2 2007 for bulky goods parks in order to produce a continuous series from 1997 to 2017, while residual land values for the two other categories of retail warehouse parks could be measured from 2007 onwards. This break point occurs at an interesting point in time, since it represents the peak of the market prior to the major downturn in commercial property values.

Figure 4.20 illustrates that the residual land values for the bulky goods sector have been largely static over the 20-year period. Development costs for bulky goods parks have increased more than the values of completed developments, and the net result is a stagnation of land values over the period. These observations are subject to the caveat that the linking of the two series might have distorted the picture. For example, while the rent, yield and cost series may well have been dominated by bulky goods retailers on parks in the late 1990s, the more valuable retail warehouse park users might have been reflected in the datasets at an increasing rate in the early 2000s. This would have driven up development values and, despite higher costs, residual land values in that period before the data was formally split into the three categories. The peak at around £3,000 per square metre in 2007, and subsequent fall to around £1,000 per square metre, might have included some removal of these higher value users from the series, as well as genuine value falls due to the property market downturn that followed the financial crisis.

Figure 4.20: Residual Land Values for Retail Warehouses (1997 to 2017)



4. RESULTS

Figure 4.21: Ratio of Residual Land Value to Development Value for Retail Warehouses (1997 to 2017)

Figure 4.21 illustrates that in the first half of the time series between 1997 and 2007, the ratio of land value to development value was fairly static at just under 60%, with a slight rising trend perhaps as a result of the changes identified above. The fall in all three series from Q2 2007 is apparent, driven by the fall in development value rather than a substantial increase in construction and other development costs. Development Values fell by around 45% in the Fashion Parks and A1 segments but Bulky Goods Parks fared worse at around 55% from Q2 2007 until the end of Q1 2009. In contrast, development costs based on BCIS tender prices fell by less than 10% in the same period. Residual land values also fell by around 50% in the two most valuable segments and by 65% in the bulky goods segment, a function of greater falls in development value and a lower ratio of residual value to development value.

In the recovery, it was the bulky goods section that fared the best with around 50% growth in development values between 2009 and 2017, compared to less than 20% in the other two segments. Despite a 40% increase in tender prices, the growth in residual land prices, the gearing effect resulted in a net gain for the bulky goods residual land values of around 70% growth compared to around 20% in the other two segments. Most of that recovery was in the first two years and thereafter the residual land values have witnessed no sustained growth through to 2017.

4. RESULTS

4.6 Cross-sector comparison

Figures 4.22 and 4.23 summarise all of the results across the cities and regions, respectively, as at the end of 2016. The results indicate the hierarchy of residual land values based on the ratio of land value to developed value. This hierarchy has two elements; property type and region/city/town.

The high value uses per square metre associated with retail land use flow through into residual land values. City/town level discrepancies are not so apparent in retail, with the majority of the ratios at city centre level ranging between 55% and 66%. The exceptions are Edinburgh (68%), Glasgow (70%) and Central London (74%). Retail warehouses have the lowest ratio at around 50%. Apart from Scotland and Central London, the regional standard high street retail variations are even less, ranging from Wales at 54% to the North East at 60%. This indicates that there is no regional north/south divide in retail. This is reinforced within the retail warehouse sector, with ratios being highest in Wales and Scotland and lowest in the East Midlands, the East and the South East.

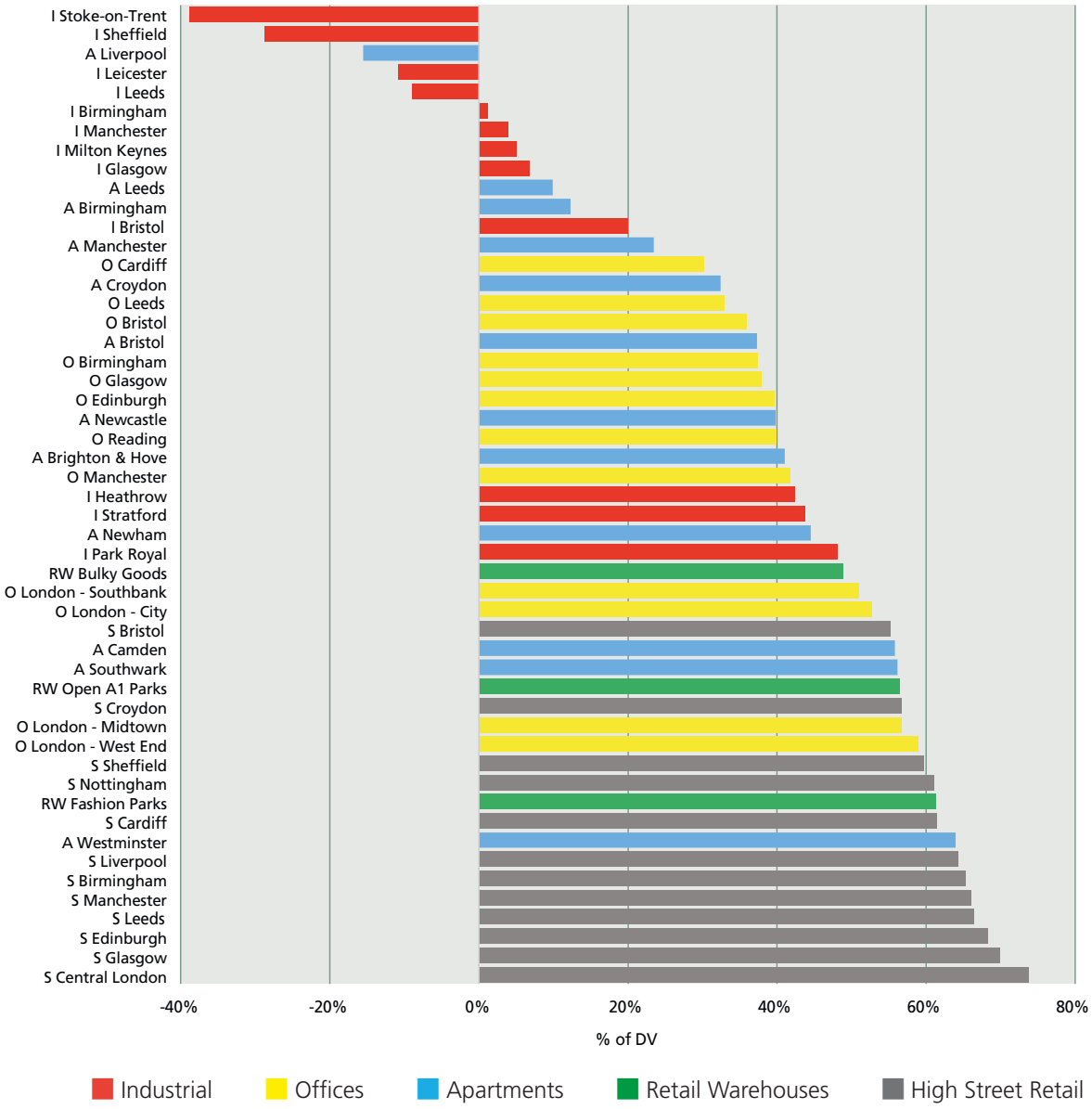
Regarding the lack of regional variation, retail is the exception. Office ratios exhibit a much greater range. At city/town level this ranges from Cardiff at 30% to the West End of London at nearly 60%. Outside of London, the ratios hover around 40% with Manchester at 42% and Birmingham 38%. Leeds is at 33%. At the regional level the ratios are significantly lower across the board ranging from Wales at 15% to the North West at 32%, with London the outlier at 55%. These results indicate the influence of large regional centres such as Manchester, Birmingham, Glasgow and Edinburgh on the regional results, but also that smaller towns within the regions have much lower land values as a percentage of total development values.

The north/south divide is most apparent in the industrial results. Here the ratios, even assuming prime locations, are negative for all towns north of Birmingham apart from Manchester and Glasgow. The regional results are even more illustrative with only London, the South East, the East and the South West showing positive ratios and the whole of the Midlands, North, Scotland and wales exhibiting negative ratios.

Apartment values also indicate a north/south divide; London stands out with a regional ratio of over 50%, while the South East, South West and the East cluster around 33%, and the rest range between 10% and 15%. The city/town level results are less consistent with a number northern cities having high ratios such as Newcastle and Manchester; these particular inconsistencies have been addressed elsewhere.

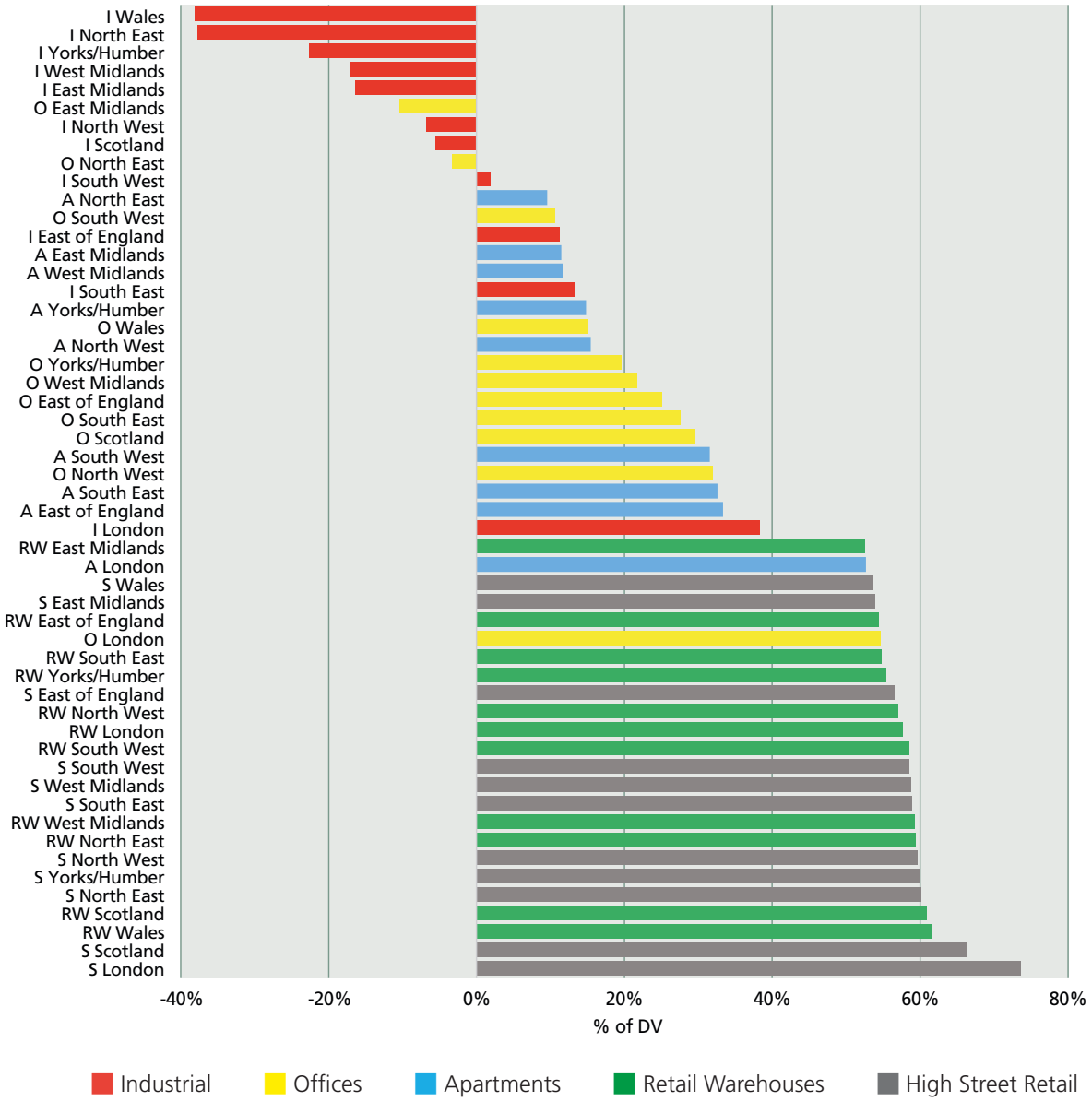
4. RESULTS

Figure 4.22: Ratio of Residual Land Value to development Value for Selected Locations, Q4 2016



4. RESULTS

Figure 4.23: Ratio of Residual Land Value to Development Value for Regions, Q4 2016



5. DISCUSSION AND CONCLUSIONS

The research into land value measurement has uncovered just how few systematic land price measures exist in the UK. Where they do exist, they are concentrated upon agricultural and residential land uses. In commercial land markets, there is virtually nothing.

This is in contrast with the built environment, where the collection and analysis of data sets has a long history stretching back into the 1960s. In commercial real estate markets, CBRE rent and yield data is a case in point, with continuous measurement across the UK from 1972. MSCI and others have been measuring benchmark returns for investment property since the 1980s, with the IPD long term index extending back to 1971 and the main UK index starting from 1981.

The production of price indexes in residential and commercial real estate markets is a well-researched area, and the difficulties of producing transaction-based indexes that can give granular disaggregation within markets is well documented. This is why both CBRE and MSCI commercial real estate indexes are valuation-based rather than transaction-based indexes. Valuation-based indices are grounded in direct comparison valuation techniques using rental value and yields to generate market values. Land valuation is more complex and these direct valuation approaches have proved incapable of valuing all but the most basic of sites, and only where transaction evidence exists. In the absence of homogeneous sites and a depth of transaction evidence, development valuation relies on the residual method, as endorsed by professional guidance.

For the purposes of developing a commercial land value series, we have adopted the residual method in its conventional form. This has been verified within the industry steering group as being in frequent use within practice and confirms earlier research by the authors on valuation methods in practice (Coleman et al., 2012). Having selected the valuation method, the next stage involved selecting appropriate data inputs for the revenue and cost estimates. The agreement with CBRE to use their individual rent and yield points enabled the research to estimate development values for commercial land uses in different locations using a simple rent/yield model. Residential apartment prices were sourced from data published by Office for National Statistics but are limited to England only. Construction costs are based on the Building Cost Information Service.

The cost (and indeed value impact) of planning obligations is not included in the residual model. For residential in particular, this is a highly politicised area and, at the time of writing, changes to the English planning regime concerning planning obligations are imminent. The model, therefore, estimates hypothetical land values excluding the impact of planning obligations. Also, the model does not reflect any option value that the land may have. Given both the simplicity of the model and its limitations, including the possibility that some revenue and cost items are not accounted for, the resulting residual land values are not claimed to mimic prices accurately. We have compared the residual land values against available benchmarks to identify these issues and to stimulate discussion as to how the model could be improved.

The main objective for this research was to produce a series of regional and location-specific land values, examine the results and identify the major drivers. The results are set out in Section 4 and Appendix 3. The results were disaggregated into five primary land uses; apartments, offices, high street retail, industrials and retail warehouses. Retail warehouse rent and yield data were subject to a structural break in 2007 and so could not be assessed with the same degree of confidence as the other land uses.

5. DISCUSSION AND CONCLUSIONS

There are some common features within the results. First, they are mainly driven by development values. One reason for this is the lack of volatility in construction costs. The BCIS cost series is remarkably stable over time compared to development values. This raises questions concerning the determination of the construction cost series, and the academic and professional literature is light in this area. There are few critiques of the data collection, collation or index construction issues within either BCIS or any other source of building cost information. It is also one area where the small survey of practice carried out to verify our approach did not provide much support. Most respondents use cost consultants rather than indices and cost information services. This is an area for further research.

Second, there is a major North/South divide and, in some parts of the country for some uses, development is not viable without intervention. Industrial in the Midlands and North is a prime example, but negative values occur in some locations for apartments at the beginning and end of the analysis period. Even where there are positive residual values, the other property types exhibit significantly lower values in the Northern regions. Only in London and its very near environs did every location exhibit positive residual land values in industrial. This finding contrasts with the Government's estimates, which are all positive regardless of region (CLG, 2015a; 2015b).

Third, and not surprisingly given the impact of development value on residual land value, the property market downturn in 2007 and 2008 caused a major correction in residual land values. This downturn was matched in offices by the Savills benchmark, but this series suggested that the recovery was slower than that recorded by the residual values. At other points in the property market cycle, the ratio of land value to development value was relatively stable. Exceptions include high street retail where the variability between locations appears to widen significantly towards the end of the period. As indicated earlier, this variability was most obvious in industrials but lasted throughout the analysis period. Apartments were quite similar between locations in the middle of the period but diverged at both the beginning and the end. The benchmarking exercise that compared the Savills Central London Residential Land Value Index with the apartment residual land values for Inner London raise some questions for both series. There were quite significant discrepancies and, even if some of them could relate to the base year, there is no doubt that the different value series behave differently at different stages in the value cycle. This was especially apparent during the financial crisis period but also in the last few years. It has been acknowledged that the residual land value series does not take account of planning obligations and optionality but there issues with comparative valuation-based indices discussed above that may impact on the timing and extent of value change within the Savills index, which might also explain some of these discrepancies.

The final objective of this research was to identify the scope for regular publication of land value data on a periodic basis. The data has been produced in quarters and so any publication could use that as the period. The real question is whether these outputs represent figures that are useful, given the limitation of valuation-based value series in general, and the valuation of development land in particular. Valuation-based indices are well established but there are acknowledged problems with valuations of development land that are not replicated in the valuation of real estate standing investments.

5. DISCUSSION AND CONCLUSIONS

The research makes it clear that the residual land values are not market prices but they do give an indication of value before planning obligations and option value. They also give some indication of value change through time and across space. The residual land values should enable users to identify which land uses have commanded most value at particular points, which will have shaped decisions about what and when to build, and what to pay. Such information can increase the transparency of land markets and of policy making surrounding land value capture. As such, the results should be of interest to real estate developers, investors that engage in or fund development, development consultants and policy makers in local or national government who are interested in viability and its determinants.

The next step is for the industry to use this report as the framework for a debate into whether land value residuals would be a useful addition to existing property market data sources. Would it, despite the limitations, improve transparency in a market that appears to have very little information at present? If so, the next stage is to refine the model, if that is deemed necessary, identify any additional or alternative data sources, and determine the nature and format of any periodic publication.

APPENDIX 1: AVERAGE LAND PRICES PER ACRE BASED ON COSTAR DATA

The following table is compiled by the authors using data supplied by CoStar. The number of transactions that support each land price figure is shown in brackets. While this report produces land value estimates for both regions and cities, there were too few deals in the CoStar dataset to enable comparable city-level estimates to be attempted. To create each average land price per acre that is shown below, the authors have removed extreme outliers, but significant variations remain both across regions and from period-to-period within different regions.

	2011	2012	2013	2014	2015	2016
East of England	512,484 (16)	338,924 (11)	996,576 (15)	1,344,316 (23)	2,370,140 (21)	1,304,741 (21)
East Midlands	462,517 (26)	267,217 (18)	559,774 (23)	246,329 (24)	430,963 (33)	431,059 (36)
London	7,335,144 (8)	8,402,361 (13)	9,830,028 (17)	15,851,921 (14)	6,884,927 (27)	9,935,378 (13)
North East	522,488 (16)	598,726 (8)	382,782 (9)	744,117 (11)	651,098 (17)	756,511 (14)
North West	912,223 (39)	638,533 (24)	297,931 (61)	309,888 (57)	433,752 (58)	1,261,392 (44)
South East	470,231 (20)	4,087,100 (21)	767,500 (18)	1,363,595 (32)	1,665,329 (23)	2,013,769 (37)
South West	857,560 (20)	339,096 (13)	1,351,236 (14)	401,011 (26)	773,020 (21)	928,726 (19)
West Midlands	616,446 (18)	752,383 (33)	305,659 (42)	573,254 (43)	502,940 (45)	2,228,160 (50)
Yorkshire & Humber	522,934 (15)	561,509 (17)	631,789 (21)	464,531 (26)	301,091 (30)	685,296 (21)
Scotland	494,357 (76)	644,004 (69)	432,039 (120)	324,368 (99)	385,824 (141)	448,152 (81)
Wales	202,740 (4)	271,504 (8)	420,846 (6)	302,822 (11)	202,364 (9)	160,163 (10)

APPENDIX 2: DETAILED ASSUMPTIONS FOR RESIDUAL VALUATION MODEL BY LAND USE TYPE

See Sections 3.1 and 3.2 for illustration of the residual valuation model and further discussion of the data sources and inputs

	Apartment	Industrial	Office	Retail Warehouse	Shop
Rents	n/a	CBRE	CBRE	CBRE	CBRE
Yields	n/a	CBRE	CBRE	CBRE	CBRE
Stamp duty rates	n/a	Rises from 2%-5%	Rises from 2%-5%	Rises from 2%-5%	Rises from 2%-5%
Other purchase costs	n/a	1.75%	1.75%	1.75%	1.75%
Purchase costs	n/a	Rises from 3.75%-6.75%	Rises from 3.75%-6.75%	Rises from 3.75%-6.75%	Rises from 3.75%-6.75%
Sale costs	2.0%	2.0%	2.0%	2.0%	2.0%
Building costs	BCIS	BCIS	BCIS	BCIS	BCIS
Site etc. costs	15%	10%	10%	10%	10%
Professional fees	12.5%	12.5%	12.5%	12.5%	12.5%
Finance - base	3 month IBLR	3 month IBLR	3 month IBLR	3 month IBLR	3 month IBLR
Finance - margin	De Montfort Residential	De Montfort Pre-let	De Montfort Pre-let	De Montfort Pre-let	De Montfort Pre-let
Build period	2.0 years	1.0 years	1.5 years	1.0 years	1.0 years
Efficiency ratio		100%	90%	100%	80%
Developer profit	17.5%-20% DV	15%-17.5% DV	15%-17.5% DV	15%-17.5% DV	15%-17.5% DV
Land purchase costs*	From 2.5% to 5.75%	Rises from 3.75%-6.75%	Rises from 3.75%-6.75%	Rises from 3.75%-6.75%	Rises from 3.75%-6.75%
Other	Flat size of 60m2	n/a	n/a	n/a	25ft frontage, 80ft depth

*

Not incorporated where values are negative.

APPENDIX 3: REGIONAL RESULTS

Figure A3.1: Residual Land Values for Apartments – Regions ex. London

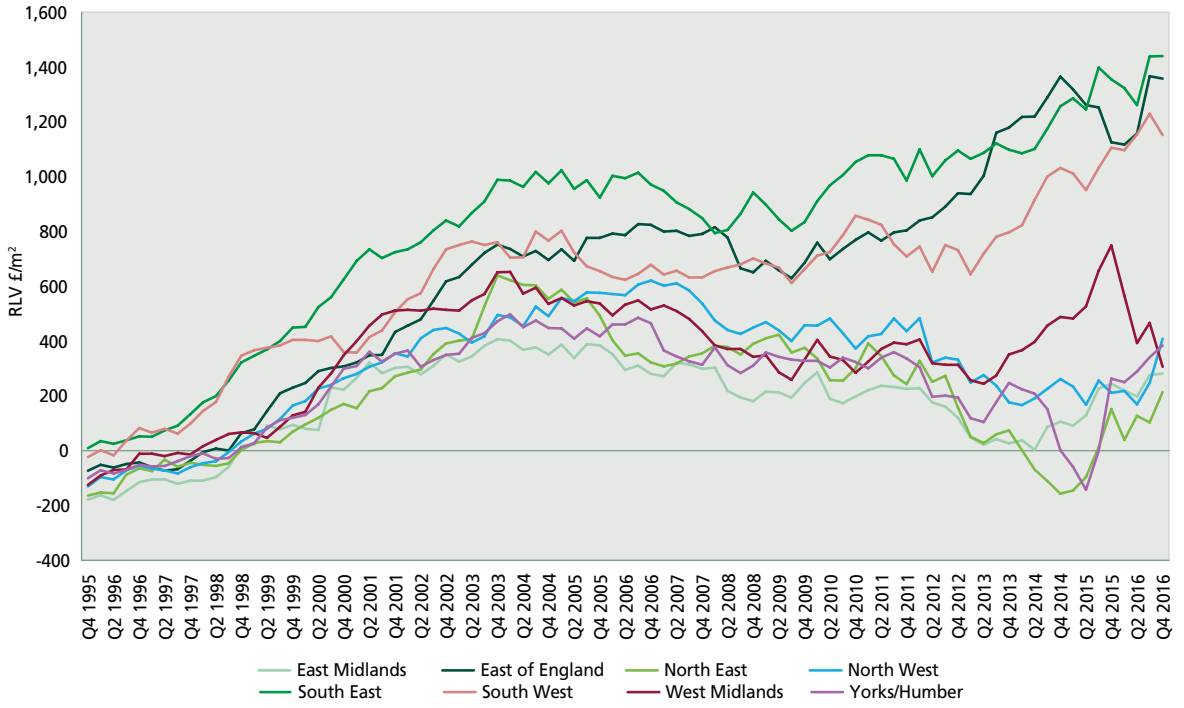
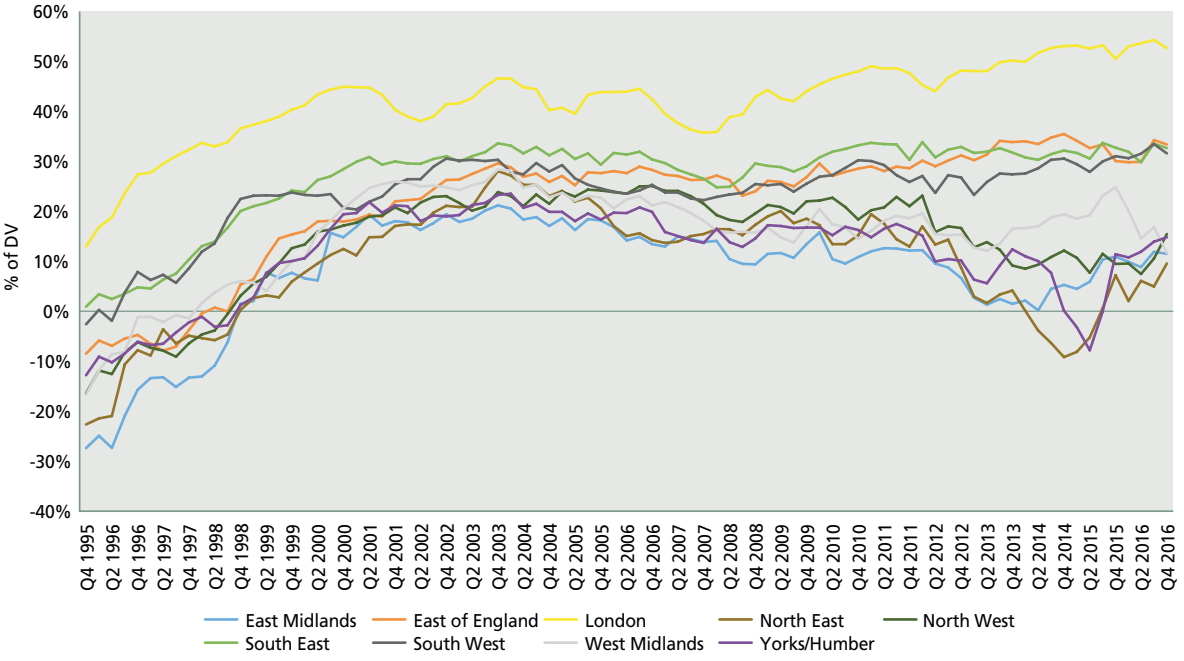


Figure A3.2: Ratio of Residual Land Value to Development Value for Apartments – Regions



APPENDIX 3: REGIONAL RESULTS

Figure A3.3: Residual Land Value for Offices – Regions ex. London

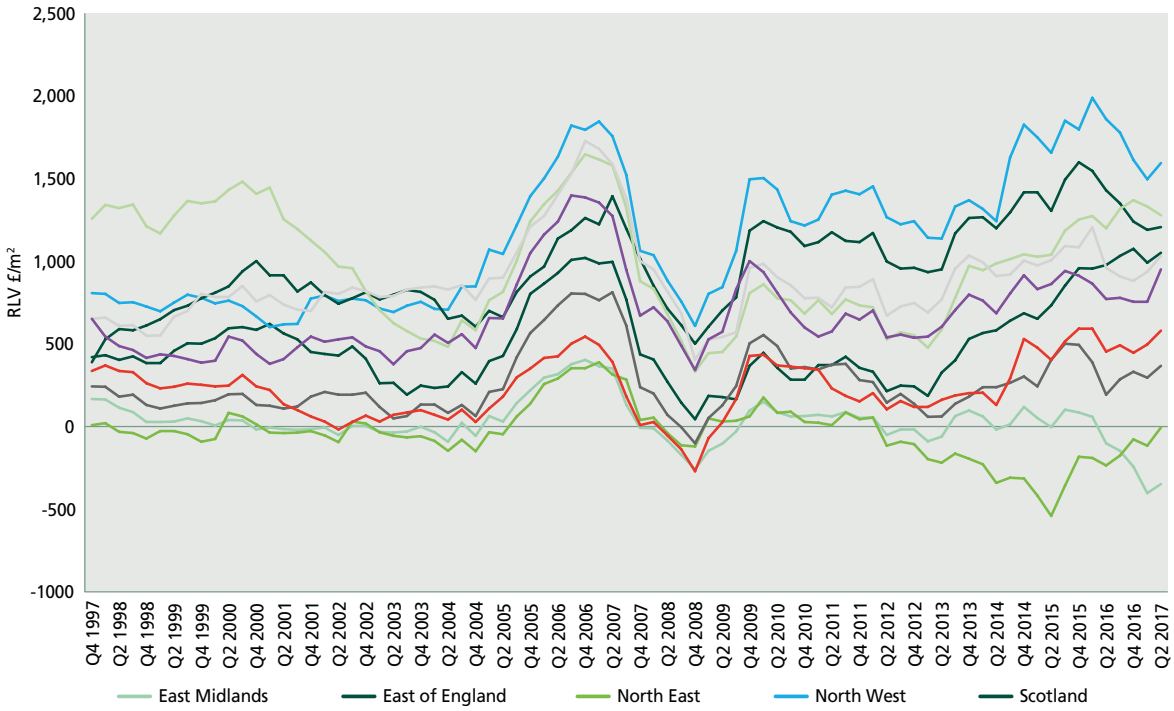
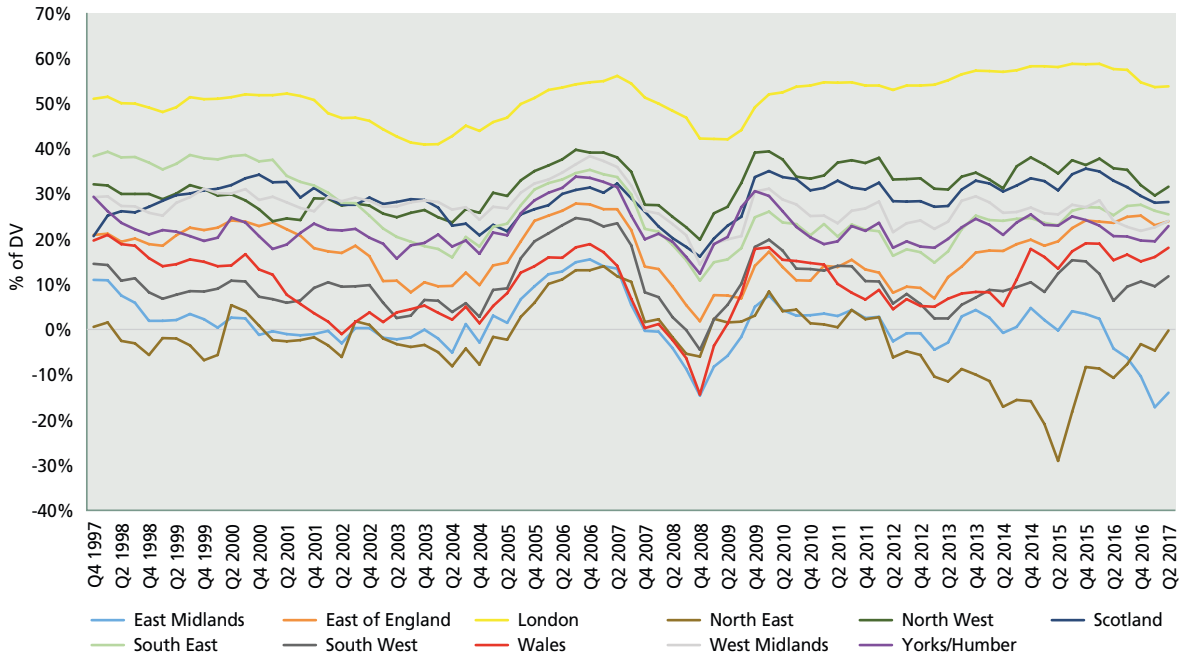


Figure A3.4: Ratio of Residual Land Value to Development Value for Offices – Regions



APPENDIX 3: REGIONAL RESULTS

Figure A3.5: Residual Land Value for High Street Retail – Regions ex. London

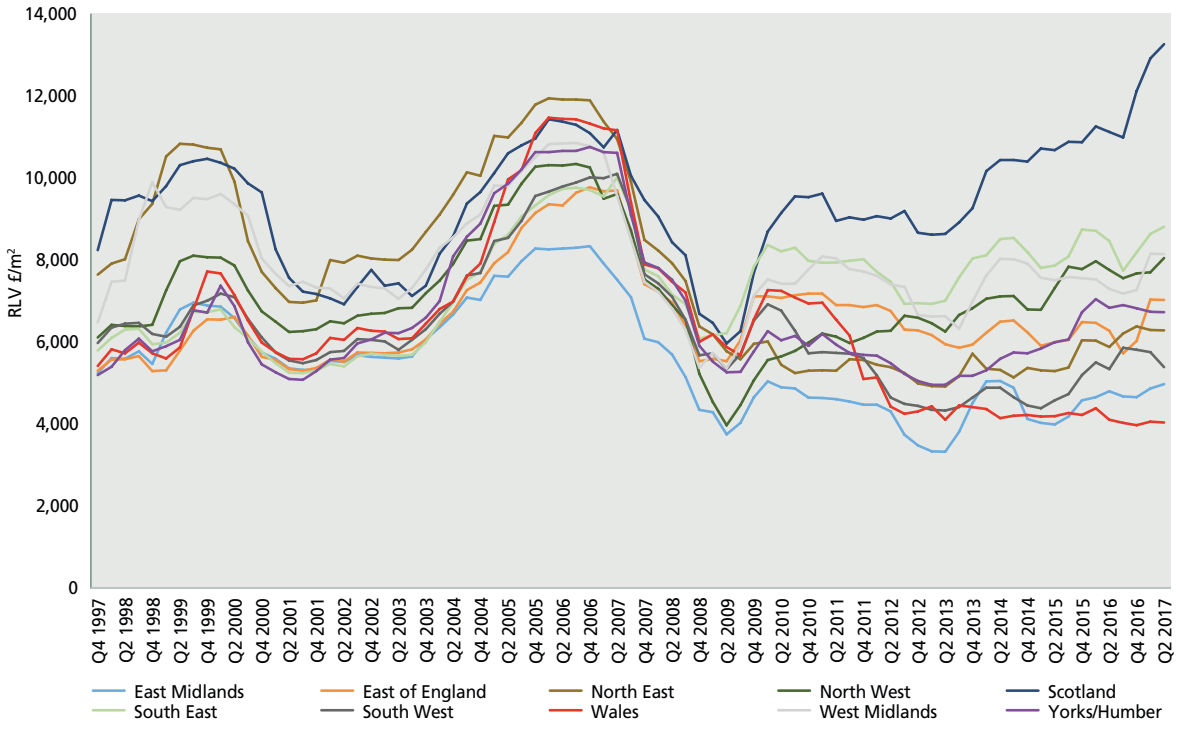
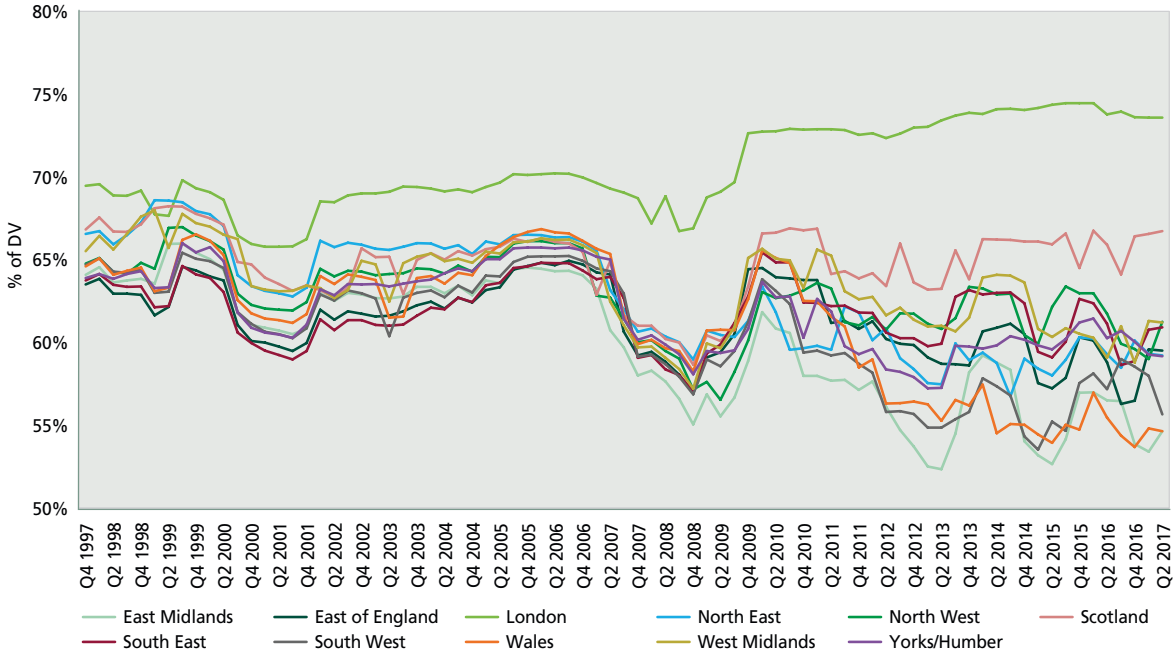


Figure A3.6: Ratio of Residual Land Value to Development Value for High Street Retail – Regions



APPENDIX 3: REGIONAL RESULTS

Figure A3.7: Residual Land Value for Industrials – Regions ex. London

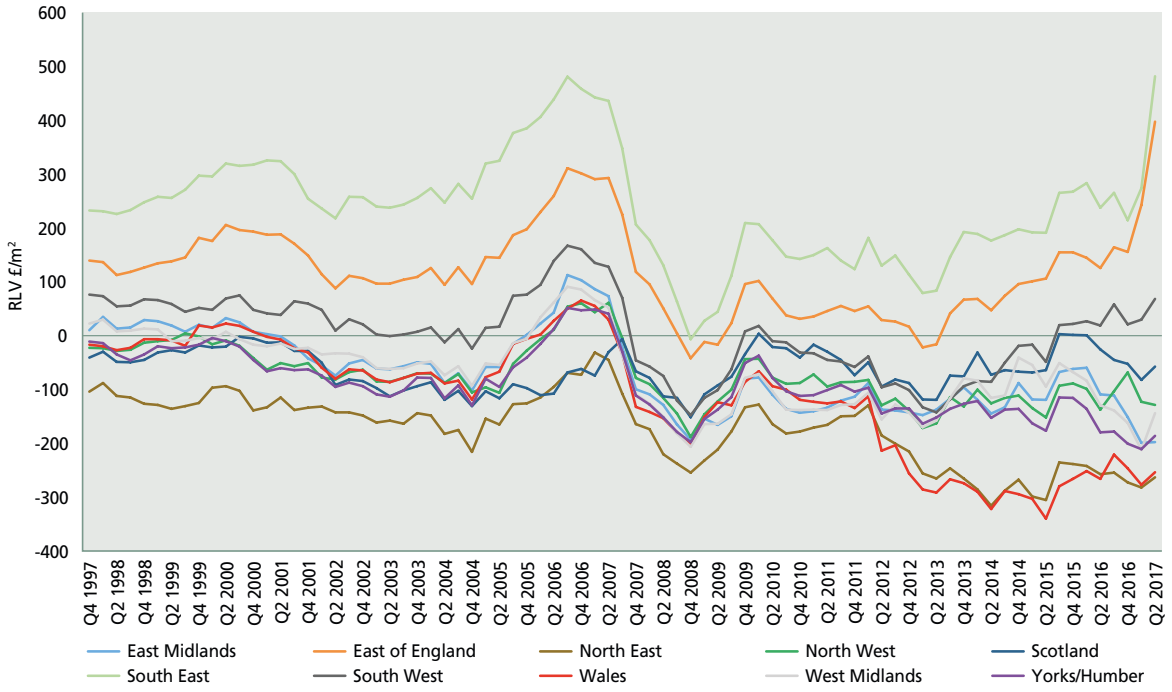
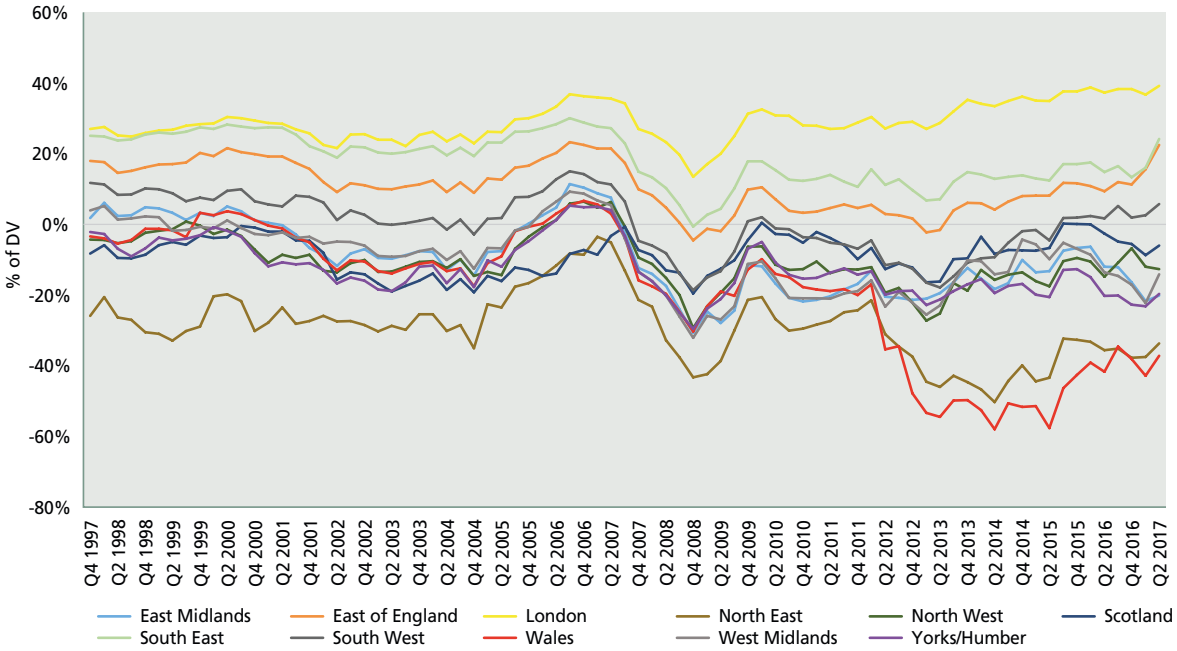


Figure A3.8: Ratio of Land Value to Development Value for Industrials – Regions



APPENDIX 3: REGIONAL RESULTS

Figure A3.9: Residual Land Value for Retail Warehouses – Regions ex. London

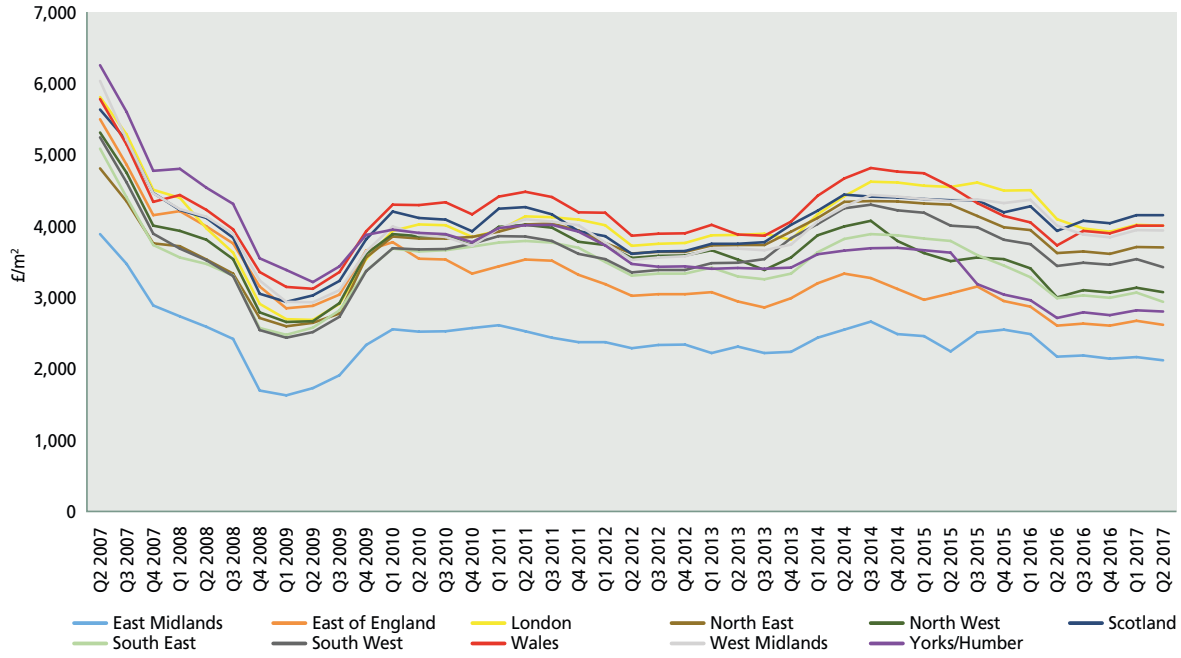
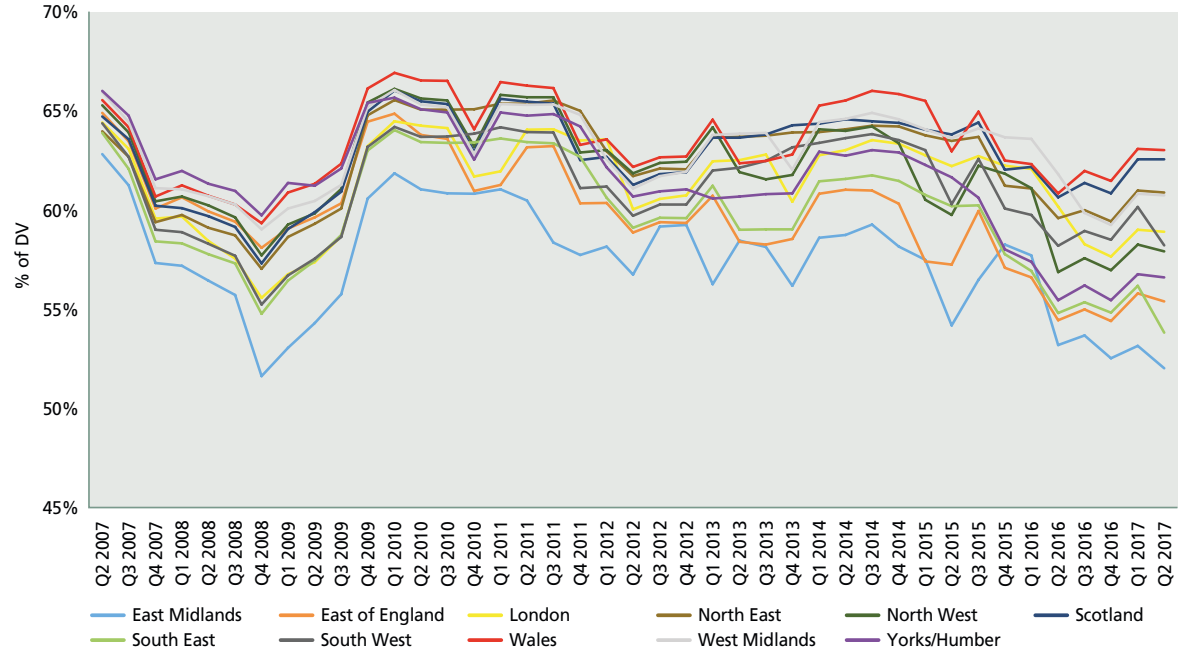


Figure A3.10: Ratio of Residual Land Value to Development Value for Retail Warehouses – Regions



APPENDIX 4: CLG REGIONAL INDUSTRIAL LAND VALUE ESTIMATES

Region	VOA Estimates per hectare	Price PSM assuming 45% cover	Author Residual Land Values
East of England	675,000	150	-118
East Midlands	450,000	100	101
London	£2,733,000	607	780
North East	180,000	40	-298
North West	400,000	89	-134
South East	1,100,000	244	192
South West	430,000	96	-17
West Midlands	500,000	111	-55
Yorkshire and the Humber	375,000	83	-163

Source of VOA estimates: CLG (2015b)

REFERENCES

CBRE (various) **Rent and Yield Monitor. CBRE: London.**

CBRE (2014), **Rent Index and Average Yields: A Guide to the CBRE Rent and Yield Monitor.** London: CBRE.

CB Richard Ellis (2007), **Rent Index and Average Yields: A Guide to the CB Richard Ellis Rent and Yield Monitor.** London: CB Richard Ellis.

CB Hillier Parker (2000), **Rent Index and Average Yields: A Guide to the CB Hillier Parker Rent and Yield Monitor.** London: CB Hillier Parker.

CLG (2015) **English Housing Survey 2014/2015.** Communities and Local Government: London. Annex Table 3.4 https://www.gov.uk/government/statistics/english-housing-survey-2014-to-2015-housing-stock-report

CLG (2015a) **Land Value Estimates for Policy Appraisal.** Communities and Local Government: London, February 2015

CLG (2015b) **Land Value Estimates for Policy Appraisal.** Communities and Local Government: London, December 2015

Coleman, C., Crosby, N., McAllister, P. and Wyatt, P. (2012) Development appraisal in practice: some evidence from the planning system. **Journal of Property Research**, 30 (2): 144-165. https://doi.org/10.1080/09599916.2012.750620

Davis, M. A. and Heathcote, J. (2007). "The price and quantity of residential land in the United States". **Journal of Monetary Economics,** 54: 2595-2620.

Davis, M. A. and Palumbo, M. G. (2008). "The price of residential land in large US cities". **Journal of Urban Economics**, 63: 352-384.

Demographia (2017) **World Urban Areas.** 13th edition. Demographia: Belleville, USA.

Javedicius, A., Huston, S., Baum, A. and Butler, A. (2017) Two centuries of farmland prices in England, **Journal of Property Research**, https://doi.org/10.1080/09599916.2017.1393450

Knight Frank (various) **Residential Development Land Index**. Knight Frank Residential Research: London.

Lux, N. (various) **The UK Commercial Property Lending Report**. De Montfort University: Leicester.

Maxted and Porter (various) **The UK Commercial Property Lending Report**. De Montfort University: Leicester

Nichols, J. B., Oliner, S. D. and Mulhall, M. R. (2013). "Swings in commercial and residential land prices in the United States". **Journal of Urban Economics**, 73: 57-76.

ONS (2011) 2011 **UK Census – Built-up Areas.** Office for National Statistics: London

RICS (2008) **The Valuation of Development Land**, Valuation Information Paper 12 RICS: London

RICS/RAU (various) **Rural Land Market Survey.** RICS/Royal Agricultural University. https://www.rics.org/Global/RICS_RAU_Rural_Land_Market_Survey_H1_2017_Summary.pdf

Savills (2015) **Development Land Statistical Supplement Q3 2015**. Savills Research: London

Savills (2017a) D**evelopment Land Statistical Supplement Extract Q1 2017**. Savills Research: London

Savills (2017b) **UK Residential Development Land Market In Minutes – October 2017**. Savills Research: London

Savills (various) **Market Survey UK Agricultural Land**. Savills: London

IPF Research Programme

Investment Property Forum
New Broad Street House
35 New Broad Street
London EC2M 1NH

Telephone: 020 7194 7920
Fax: 020 7194 7921
Email: ipfoffice@ipf.org.uk
Web: www.ipf.org.uk

Printed on recycled paper