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DISTINCTIVELY DIFFERENT: A NEW APPROACH TO VALUING ARCHITECTURAL AMENITIES

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Abstract

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JEL Classification: R52, D23, C7

Keywords: Architecture, boundary discontinuity, conservation areas, design, England, property prices

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Gabriel M. Ahlfeldt[•] & Nancy Holman[♣]

Distinctively Different: A New Approach to Valuing Architectural Amenities[*]

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1 Introduction

Architectural beauty can be considered a local public good – no one can be excluded from the utility derived from looking at an appealing building, nor does the architecture deteriorate as more people enjoy the view. These characteristics have straightforward implications for the social efficiency of private investment decisions. If there is a positive non-marketed architectural externality, investments into architectural quality will be suboptimal if left to free markets. As with most local public goods and spatial externalities it is therefore easy to rationalise planning policies that correct for a market failure. In fact, various planning policies aim at preserving or creating public spaces of particular heritage value or architectural beauty. In England conservation is regulated under the 1953 Historic Buildings and Monuments Act, which allows for the listing and preservation of individual buildings, with the 1967 Civic Amenities Act and later the 1990 Planning (Listed Buildings and Conservation Areas) Act regulating areas of architectural and historic interest. Many other nations have similar policies that afford protection to individual buildings or neighbourhoods that are deemed by society, and supported by law, of being particularly significant in their historical character or architectural appearance. In Europe these policies are broadly managed under the Convention for the Protection of the Architectural Heritage of Europe (The Granada Convention, 1985). Reflecting its federalist system, historic preservation in the United States is enabled under the National Historic Preservation Act, with individual states and municipalities affording varying degrees of protection for buildings deemed to have heritage value.

The downside of many spatial planning policies that seek to correct for market failures is an interference with private decisions that can lead to unintended economic costs. To name a few examples, planning systems around the world have been challenged on the grounds of limiting supply of housing and office space, creating affordability problems and reducing productivity (e.g. Brenner and Mühlig, 2013; Capasso et al., 2013; Cheshire and Hilber, 2008; Cheshire et al., 2015; Glaeser et al., 2005; Hilber and Vermeulen, 2014). More specifically, many have blamed planning restrictions in England with creating an economic paradox of rapidly rising house prices (which have in the last 15 years tripled in England and quadrupled in London) and historically low construction levels (Cheshire, 2014). The potential consequences of supply-restrictive policies have been argued to be "*socially explosive and economically traumatic*" (Hilber, 2015) and an issue so big that "[…] *no politician dares touch it*" (Wolf, 2015).

Against this background robust evidence on actual or potential benefits of land use planning is crucial for the economic justification of existing planning policies, but such evidence is generally scarce.[1] The policies that seek to correct for a market failure in the preservation or delivery of well-designed buildings described above are a particularly illustrative example. Similar to green belts, sometimes argued to be among the main drivers of the affordability crisis (Cheshire, 2014), such policies limit the extent to which developers can respond to demand and, thus, add to the scarcity of space. The economic rational in favour of these policies obviously rests on the assumption that an architectural externality exists. To date, however, there is limited quantitative evidence that substantiates this claim. This lack of evidence can to some extent be attributed to challenges involved in detecting effects of architectural design on the economic value of a location. For one thing, it is difficult to separate the design effect from other correlated locational factors, e.g. better infrastructure, quality of public services, or natural amenities. For another, quantifying architectural quality is difficult. Metrics that would allow differentiating the design quality of different built environments are not readily available. We aim to advance the literature by proposing a methodology that engages with both these challenges. The paper applies this methodology to the illustrative example of conservation areas in England, but we stress that the methodology can be implemented in a variety of contexts.

1 Some studies suggest that the costs of planning are large compared to the associated benefits (Albouy and Ehrlich, 2012; Cheshire and Sheppard, 2002)

To assess the economic value of an aesthetically appealing built environment we make use of a spatial variant of the difference-in-difference approach. The first difference is taken across spatial boundaries within neighbourhoods. The second difference is taken across neighbourhoods. The first differences remove features that are similar within small neighbourhoods, e.g. accessibility to the city centre, transport infrastructures, natural amenities or good schools. The second differences remove all features that differ systematically across boundaries that separate different types of areas within a neighbourhood. Examples include tax deductibility of maintenance costs, subsidies for renovation work or additional planning control that may be associated with a location in a zone of special architectural interest.

We argue that conservation areas in England are particularly amenable to the proposed methodology. Boundaries of conservation areas are purposely drawn to protect areas that have "…special architectural or historic interest, the character or appearance of which is desirable to preserve or enhance" (Civic Amenities Act, 1967 §1). English Heritage[2] describes 'special architectural' or 'historic interest' broadly to encourage more localised interpretations of heritage, but urges Local Planning Authorities (LPAs) to ensure that they are "…able to articulate the special interest and support the designation with evidence from some form of historic characterisation" (English Heritage, 2012). It is therefore reasonable to expect that the design character within such a designated area will differ significantly from the area just outside the conservation area. At the same time, areas at both sides of the boundary can be assumed to be similar in most other respects.

As an outcome measure of economic value we concentrate on observed property prices, which should reflect the value buyers attach to all property characteristics, including the architectural

[2] Also known as the Historic Buildings and Monuments Commission for England, English Heritage is an executive Non-Departmental Public Body sponsored by the Department of Culture, Media and Sport. Their role is to advise government on heritage issues in England. Recently (2015) English Heritage was broken into two separate organisations with English Heritage retaining the remit to look after historic buildings and monuments and Historic England advising on policy and grants.

value of a property itself and the area. With this approach we build on a long tradition of research on capitalisation effects of local public goods that dates back to Oates (1969) at least.[3] In taking differences in property prices within neighbourhoods we draw from the regression discontinuity design literature (e.g. Basten and Betz, 2013; Dell, 2010; 2008; Lalive, 2008) and, in particular, work that has exploited discontinuous changes at spatial boundaries (Gibbons et al., 2013). We exploit the discontinuity in design character of the built environment that arises when one crosses the boundaries of conservation areas. We similarly exploit discontinuities in the view from outside conservation areas onto buildings inside conservation areas that arise where other buildings obstruct the views. We adopt the common identifying assumption in the literature that unobserved (non-design) attributes change smoothly across these boundaries.

To obtain a measure of the spatial differences in design character across conservation area boundaries within neighbourhoods, we conduct quantitative interviews with residents living in these conservation areas. Among other questions we ask them to rank the distinctiveness of their area relative to nearby areas. The questions are asked in such a way that the responses can be aggregated to quantitative indices that can be matched to the spatially differentiated property prices. We also collect a relatively wide range of individual characteristics and use these to compute an index of relative design quality that is adjusted for interviewee characteristics.

Comparing the within-neighbourhood differences in property prices and design quality (first difference) across neighbourhoods (second difference), we find a causal design capitalisation effect of about 6.6% (about £16k in 2003 prices) associated with one standard deviation increase in our preferred index of distinctive design. Being in an area that, on average, is reported as *distinctive* as opposed to *neither distinctive nor non-distinctive* area increases property value by as much as 18.6%. In a complementary analysis we show that a one standard deviation in-

[3] The capitalisation literature covers a wide range of topics, including public transport (Gibbons and Machin, 2005), schools (Cheshire and Sheppard, 2004), or sports stadia (Ahlfeldt and Kavetsos, 2014).

crease in our preferred design score increases the relative share of population holding a university degree by 3.2 percentage points and the relative yearly median income by close to £2k, which is in line with design-based sorting. Controlling for the income, education and ethnic mix reduces the design capitalisation effect by about 18%. A collateral finding of our analysis is a negative regulatory effect of a property's location in a conservation area of about 10%, although the effect is not as robust as the design effect. Also, the positive effect of the (preserved) distinctive design exceeds the regulatory effect for the vast majority of conservation areas in our sample.

The conservation area design capitalisation effects discussed above reflect the benefits of occupying a distinctive building and a property location near to other distinctive buildings. We also provide a variety of estimates suggesting the presence of a view externality. The design effect persists if we identify from those structures that are the least likely to possess a character that is representative for a conservation area, those developed after WWII and before designation. A design effect also exists when a comparison is made between properties located outside conservation areas with and without a view onto buildings inside conservation areas. Finally, the design effect for properties close to the centres of conservation areas is larger than for properties close to the boundaries of conservation areas, which are less exposed to design externalities. Yet, we likely underestimate of the external value of design quality as we exclude potential benefits to people living further away and visiting the areas. The important implication from these findings is that planning policies capable of solving the free-market coordination problem related to the architectural externality could potentially deliver sizable economic benefits.

In general terms we contribute to a literature that has assessed the amenity value of cities (e.g. Albouy, 2009, 2012; Blomquist et al., 1988; Gabriel and Rosenthal, 2004; Gyourko and Tracy, 1991; Tabuchi and Yoshida, 2000) or neighbourhoods within cities (e.g. Brueckner et al., 1999; Carlino and Coulson, 2004; Cheshire and Sheppard, 1995; Ioannides, 2003). This literature has argued that the consumption value of cities has become increasingly important for the attraction of a highly skilled labour force and, hence, the economic success of cities (Carlino and Saiz, 2008; Glaeser et al., 2001). In using the economic value embedded in property prices as an outcome variable, we relate to a vast literature that has estimated capitalisation effects of local public goods or policies (e.g. Cellini et al., 2010; Dachis et al., 2012; Dehring et al., 2008; Eriksen and Rosenthal, 2010; Gibbons and Machin, 2005; Oates, 1969) or housing externalities (e.g. Autor et al., 2014; Rossi-Hansberg et al., 2010; Schwartz et al., 2006). Our study specifically contributes to a literature that has looked into design related capitalisation effects, e.g. internal or external capitalisation effects related to proximity to iconic architecture on residential property prices (Ahlfeldt, 2013; Ahlfeldt and Kavetsos, 2014; Ahlfeldt and Maennig, 2009) and/or the effects of building design quality on office rents (Fuerst et al., 2011; Gat, 1998; Vandell and Lane, 1989). The closest connection arguably exists to research that has analysed internal and external capitalisation effects of historic landmark buildings (Ahlfeldt and Maennig, 2010; Asabere et al., 1994; Clark and Herrin, 1997; Coulson and Lahr, 2005; Coulson and Leichenko, 2004; Lazrak et al., 2010; Leichenko et al., 2001; Listokin et al., 1998; Noonan and Krupka, 2011; Schaeffer and Millerick, 1991), and especially Koster et al. (2014) who provide compelling evidence of a premium associated with a view onto conservation areas in the Netherlands.[4] Compared to the aforementioned studies, our analysis is unique in combining a strong control for potentially correlated location effects with intuitively interpretable design metrics to which the associated economic value can be mapped explicitly.

2 Empirical Strategy

Throughout the paper we distinguish between two central effects: 1) a policy capitalisation effect, which is the effect of legal incentives (e.g. tax deductibility of maintenance cost or subsidised renovation work) and restrictions (maintenance obligations and limited rights to alter the

[4] Our analysis is also broadly connected to some recent analyses of the political economy of design related planning (Ahlfeldt et al., 2014; Cheshire and Dericks, 2014; Holman and Ahlfeldt, 2015).

external appearance of a property) that often exist in zones of special architectural interest on the market price of a property; and 2) a design capitalisation effect, which originates from the quality of the architecture of a building as well as the nearby buildings. We further distinguish three types of design capitalisation effects. First, an internal effect, which is the effect of a building's own architectural features on its price regardless of whether these are interior (e.g. wooden floors, carved ceilings) or exterior (e.g. shape of the structure or materiality of the facade) features. Second, an external view effect, which is associated with the aesthetic (dis)utility derived from a direct view onto other buildings' architecture. This effect is similar to positive effects associated with a view on mountains or the sea (Jim and Chen, 2009) or the negative effects of views that are obstructed by wind farms (Gibbons, 2015). Third, an external visiting effect, which corresponds to the capitalised benefit of living relatively close to attractive buildings so that the design amenity can be enjoyed when purposely or accidently passing through.[5]

In this section we propose an empirical strategy that can be used to estimate the causal effect of the design quality of an area on the market value of properties. We propose a spatial variant of the difference-in-difference methodology, the rudiments of which we set out in more detail in Section 1.1. In the first difference, we spatially differentiate property prices and design indices across conservation area boundaries within neighbourhoods. In the second difference, we compare the differentiated price and design indices across neighbourhoods. Our strategy is primarily designed to separate the design effect from the policy effect, but we also offer some complementary approaches to estimate the external view effect specifically. We further lay out how this strategy can be taken to data in general and how specifically we apply it to a set of conservation area neighbourhoods in the Greater London region.

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[5] Our use of the terminologies policy effect, internal effect, external effect, view effect and visiting effect is roughly consistent with Ahlfeldt & Maennig (2010), Ahlfeldt & Kavetsos (2014), and Koster et al. (2014).

2.1 Framework

The starting point of our strategy is the assumption that in spatial equilibrium all costs and benefits associated with residing in a property of a certain type and at a certain location must capitalise into property prices. With this assumption we build on a long tradition of research that dates back to Oates (1969) and Rosen (1974) at least, which has assumed that residents are fully mobile and there is perfect spatial competition. We believe that this assumption is particularly plausible in our case as we generally identify from spatial variation at a very fine spatial scale. We assume that the market price (P) of a property is fully described by vectors of non-design related structural (X) and locational (L) components, a regulatory component (r) that can make a property more or less attractive (taxes, subsidies, height restrictions, zoning, etc.), and a design component (d). For convenience we assume a semi-log relationship, which has proven to suit actual data in a vast empirical hedonic house price literature.

$$\ln(P_{z,n}) = X_{z,n}b + L_{z.n}c + \delta r_{z,n} + \beta d_{z,n} \tag{1}$$

, where b and c are vectors of implicit prices of non-design related housing and location attributes, and β and δ are the implicit prices of the design and regulatory components. We index neighbourhoods by n, and zones within neighbourhoods by z. We assume that each neighbourhood consists of two type of zones $z = (1,2)$ which are internally homogenous in design character. The difference in prices between zones $z = 1$ and $z = 2$ in each neighbourhood n is fully described by the differences in all non-design structural and locational attributes, regulatory features and the design component.

$$\begin{aligned}\ln(P_{z=1,n}) - \ln(P_{z=2,n}) = (X_{z=1,n} - X_{z=2,n})b + (L_{z=1,n} - L_{z=2,n})c + \delta(r_{z=1,n} - r_{z=2,n}) + \\ \beta(d_{z=1,n} - d_{z=2,n})\end{aligned} \tag{2}$$

We now make two assumptions that are critical for our identification and the interpretation of our estimates as causal effects. First, we assume that non-design related locational attributes such as accessibility to the city centre, transport infrastructures, natural amenities or good schools are the same within both zones in a neighbourhood, i.e. $L_{z=1,n} = L_{z=2,n}$. In practice, this will most likely be true directly at the boundary that separates two zones. Second, we allow both types of zones to be subject to differing regulatory regimes, but assume that the differences between the two type of zones are constant across neighbourhoods so that $\delta(r_{z=1,n} - r_{z=2,n}) = \alpha$. Various spatial policies such as renewal areas, enterprise zones, or conservation areas fit with this assumption as long as privileges, restrictions and enforcement are comparable within an administrative unit such as a district, city or country.

Throughout this paper we will represent spatial differences in any variable y between zones within a neighbourhood as $\Delta y_n = y_{z=1,n} - y_{z=2,n}$. Under the assumptions made, equation (2) then collapses to:

$$\Delta \ln P_n - \Delta X_n b = \alpha + \beta \Delta d_n \quad (3)$$

To estimate equation (3) and obtain a causal estimate of the design capitalisation effect we require substantial variation in within-neighbourhood design quality Δd_n across neighbourhoods n. It will be empirically helpful if within-neighbourhood variation in design quality stems from discontinuous changes in neighbourhood character at spatial boundaries so that the unobserved component can be controlled for more easily. It is also necessary that any spatial policy affecting only a specific type of zone within a neighbourhood is implemented uniformly across neighbourhoods. There are various settings that potentially comply with these requirements. As an example, spatial discontinuities in design character may arise at natural barriers such as rivers if a neighbourhood did not grow across the barrier for a sufficiently long time. Another source of discontinuous variation in architectural style could be disasters such as earthquakes, fires or bombings, if the affected areas were rebuilt in a new style. Abrupt changes in architectural design can also result from policy interventions, e.g. at the boundaries between zones that were developed at different times or to different standards as a result of master planning. Finally, buildings obstructing views onto architecturally more or less desirable parts of a neighbourhood provide a natural source of discontinuous variation in design externalities. Acknowledging this variety of potential applications, we argue that conservation areas in England are a particularly amenable to the proposed methodology.

First, the boundaries of conservation areas are purposely drawn to protect coherent areas of distinctive character, which stand out relative the rest of the neighbourhood and under best practice scenarios are supported by a conservation area appraisal that provides an evidence base to substantiate the designation. Under §69 of the 1990 Planning (Listed Building and Conservation Areas) Act, LPAs are charged with periodically reviewing their territories to determine if any new areas are worthy of designation based on special architectural or historic interest. It is, therefore, sensible to separate neighbourhoods in which conservation areas have been designated into zones that have been designated on the grounds of being distinctive and the rest of the neighbourhood, and to expect a sharp discontinuity in the appearance of the built structure at the boundary of the conservation area.

Second, conservation areas can vary greatly in architectural style. In our survey, areas ranged from neighbourhoods with a preponderance of Georgian and Regency properties to areas of Victorian and Edwardian terraces to 1930s inter-war suburban estates. It is, therefore, reasonable to expect that the difference in the design amenity of conservation areas relative to the surrounding areas Δd_n varies substantially across neighbourhoods.

Third, the legal treatment of properties in conservation areas is generally similar in England. Owners face heightened levels of restrictions on what they may or may not do with their property. It is a criminal offence to totally or substantially demolish any building within a conservation area without first seeking consent from the LPA. In cases where alterations to the property require planning permission, owners are also required to apply for Conservation Area Consent and applications are determined based on the enhancement and protection of the area. Restrictions typically entail control over demolition and the cutting or removal of trees of a specific size. Unlike North America, properties inside conservation areas in England do not benefit from specific funding or tax breaks.

3 Data and Institutional Setting

3.1 Sampled Conservation Areas

As of 2011 there were some 9,800 conservation areas in England, which are identified as having “special architectural or historic interest, the character or appearance of which is desirable to preserve or to enhance” (Section 69). Our sampling strategy was to include conservation areas with varying levels of deprivation as described by 2007 ward level deprivation indices and conservation areas located in both inner and outer London boroughs. All areas selected were residential in character. We then randomly selected 24 areas with relatively high levels of deprivation and 24 with low levels, and 27 conservation areas within inner London boroughs and 21 located in outer London. The exact locations of the surveyed conservation areas are shown in Figure A1 in the online appendix. Given the very localised notion of heritage, it is no wonder that our 48 conservation areas also varied in style from the more common Victorian housing developments, to Regency, Georgian, Edwardian and Inter-war estates. Many of the areas, like St Marks (Hackney) and Bowes Park (Haringey), were the result of speculative development whilst others like Brentham Gardens (Ealing), the Cuckoo Estate (Ealing), and Clyde Circus (Haringey) were formally planned. Properties in these conservation areas range from bungalows and low-density development in places like the Mayfield (Redbridge) to more dense terraced housing (North Kilburn, Brent), to substantial villas St (Matthias, Richmond) to Regency terraces (Oakhill, Kingston). All of the areas reflect a combination of distinctive public or private buildings (e.g. churches, libraries or shopping arcades), open spaces, trees or street patterns, which set them apart from surrounding neighbourhoods.

3.2 Property Data

We use transactions data related to mortgages granted by the Nationwide Building Society (NBS) between 1995 and 2010. For our selected conservation area neighbourhoods, the data for England comprise around 7,900 observations and include the price paid for individual housing units along with detailed property characteristics.[6] These characteristics include floor space (m^2), the type of property (detached, semi-detached, flat, bungalow or terraced), the date of construction, the number of bedrooms and bathrooms, garage or parking facilities and the type of heating. There is also some information on the type of mortgage (freehold or leasehold). Importantly, the data set is geo-referenced (within the British National Grid coordinate system) so that it is possible to merge the transaction data to locational attributes in GIS (Geographic Information System). A comparison to the land registry data set, which contains the universe of transactions, but limited property characteristics, suggests that the Nationwide data set is representative for our study area (see Section 2.4 and Figure A6 in the online appendix).

3.3 Locational Data

Merging property coordinates with an electronic map of 8,167 conservation areas in England provided by English Heritage, it was possible to calculate distances to conservation area borders and to determine whether a property is located inside or outside of these borders in any of the considered neighbourhoods using a geographic information system (GIS). We further compute distances to the nearest Area of Outstanding Natural Beauty, Natural Nature Reserve, lake, river, coastline, bus stop, railway track, London Underground station as well as the average key stage 2 school test score weighted by distance from the respective schools. A detailed description of the construction and the sources of these locational and neighbourhood variables is provided in the online appendix to Ahlfeldt et al. (2014). As neighbourhood characteristics we consider the 2005 median income (from Experian) as well as the share of population holding an academic degree, shares of various ethnic groups and a Herifindahl index of ethnic segregation (all from the 2001 census). We also use a georeferenced data set of individual crimes (Anti-social behaviour, property crime, violent crime, theft) that occurred between and 2010 and

[6] For England as a whole the Nationwide data set contains 1,088,446 transactions, approximately 10% of all transactions.

2014 from the Metropolitan Police Crime Mapping to compute various density measures separately for each zone inside and outside a conservation area in each neighbourhood.

To define what we will refer to as the view area of a conservation area, we begin by drawing a 25m buffer around a conservation area in GIS. This buffer roughly corresponds to the width of half a street plus one house. While locations within this buffer in the neighbourhoods virtually always offer a view onto the conservation area as the view is just across the street, there are instances where open spaces such as parks or playing fields facilitate wider views. To account for such wider views, we overlay the conservation area and the 25m buffer with aerial photographs and manually adjust the buffer where appropriate. Figure A2 in the online appendix provides an illustration of how the view impact areas were defined.

3.4 Residential survey

In total, we surveyed 526 residents in the sampled conservation areas. Surveys were conducted face-to-face and the sample was drawn such that homeowners and both private and social renters were included. There were 53 questions in the survey covering topics ranging from demographics, level of community involvement, attitudes toward the area in terms of likes and dislikes, attitudes toward the planning system, experiences with planning applications, experiences with objecting to applications, etc. Questions were both multiple choice and discursive allowing for longer responses to gauge more fully resident's opinions about living in their neighbourhood and about planning regulation. The quantitative data from these interviews was input into statistical software and analysed.

4 Econometric Specifications

Most of our empirical work relies on the estimation of three econometric specifications. With the first specification we seek to estimate the differences in property prices across conservation area boundaries by neighbourhood, controlling as comprehensively as possible for other factors. The estimated spatial price differences correspond to the left-hand side of equation (3) and will be used in neighbourhood-level analyses, in particular in graphical illustrations. The second econometric specification shares similarities with Mincerian wage regressions and is used to correct reported relative design quality (Δd_n in equation 3) for observable interviewee characteristics. The third econometric specification is our baseline specification, which uses individual property transactions and the adjusted spatially differenced design index to obtain an estimate of β. Throughout our econometric specifications, our approach to control for unobserved locational factors is inspired by the spatial boundary discontinuity design (BDD), which is a special case of the more general RDD. In identifying design capitalisation effects, we concentrate on property transactions that fall within a 250m buffer inside and outside a conservation area boundary, an area that we refer to as neighbourhood. Identification generally stems from variation across spatial boundaries within neighbourhoods and is conditional on spatial trends that control for unobserved factors that change smoothly across the boundaries. We note that it is likely that these trends not only wash out non-design locational factors, but also external visiting effects, which presumably decay smoothly in space. Our methodology is suitable, in principle, to detect policy effects, internal design effects and external view effects.

4.1 Price Differences

To estimate the mix-adjusted difference in property prices across two sides of the boundary of a conservation area within a neighbourhood we use the following specification:

$$\ln(P_{j,n,t}) = CA_{j,n}\omega_n + DIST_{j,n}\rho_n + B_{j,n}\gamma_n + X_{j,t}b + (\mu_n \times \tau_t) + \varepsilon_{j,n,t} \quad (4)$$

, where $P_{j,n,t}$ is the transaction price of a property j selling at time t in neighbourhood n. Each neighbourhood n contains one conservation area. We control for the typical non-design related characteristics in the vector X where b is the respective vector of implicit prices. The variables considered include structural characteristics such as age, floor space, number of bathrooms and bedrooms, etc. as well as a relatively wide range of location characteristics such as distance to rivers, underground stations, average school quality, etc.

We control for arbitrary shocks that are specific to any neighbourhood in any year using interactions of year (τ_t) and neighbourhood (μ_n) fixed effects. $DIST_{j,n}$ is a vector of neighbourhood specific running variables. Each variable in the vector denotes the distance from a property *j* to the conservation area boundary within a neighbourhood *n*, taking positive values outside and negative values inside the conservation area in neighbourhood *n,* and a value of zero outside neighbourhood *n*. Similarly, $CA_{j,n}$ is a vector of neighbourhood specific indicator variables that takes the value of one if $DIST_{j,n} < 0$ and zero otherwise. It is possible that properties just outside a conservation area benefit from a view onto properties located inside a conservation area. At this stage we control for possible view effects using neighbourhood-specific buffers $B_{j,n}$, which take the value of one if $0 < DIST_{j,n} < 50$m and zero otherwise. In our baseline capitalisation equation (in 4.3) we will engage more specifically with external view effects.

We interpret the estimates of ω_n as neighbourhood-specific differences in prices between zones inside and outside conservation area right at the boundaries. These estimates control for observable property and location characteristics and correspond to $\Delta \ln P_n - \Delta X_n b$ in equation (3) under the assumption that all unobserved non-design characteristics change smoothly in space. We denote them by $\widehat{\Delta \ln P_n}$ in equations and Δ ln price (adjusted) in graphs and refer to them as relative premia or differenced prices elsewhere in the paper. Since all control variables in *X* are rescaled to have a zero mean within neighbourhoods, it is immediate to derive percentage price effects $\left(e^{\widehat{\Delta \ln P_n}} - 1\right)$ as well as absolute price effects for the average property $\left(e^{\widehat{\Delta \ln P_n}} - 1\right) \times e^{\hat{\bar{\mu}}_n}$, where $\hat{\bar{\mu}}_n$ is the mean across the year x neighbourhood fixed effects within neighbourhood *n* (Halvorsen and Palmquist, 1980).

4.2 *Design Differences*

Quantifying the design value of an area is obviously challenging, as the quality of design is inherently subjective. Moreover, suitable data, even of subjective character, is difficult to obtain. To compute an index of relative design quality (Δd_n) in the spirit of equation (3) we conduct interviews with residents living in conservation areas asking them how they would rank the distinctiveness of the area they are living in relative to nearby areas on the following scale:

Optional answers	Numeric equivalent
Not at all distinctive	-2
Non-distinctive	-1
Neither distinctive nor non-distinctive	±0
Distinctive	+1
Very distinctive	+2

As listed above, we assign numeric values to each of the optional answers so that for an individual respondent *i* living in neighbourhood *n* we obtain an index value $\widetilde{\Delta d}_{i.n} = (-2,-1,0,1,2)$. We presume that by asking residents about the "distinctiveness" of their area, we minimise the influence of normative judgements and personal tastes as respondents are not asked to reflect upon the subjective beauty of their area, but rather how different it is to other neighbourhoods. Our measure is in line with policy guidance that suggests conservation areas should reflect local distinctiveness (English Heritage, 2012). To evaluate how sensitive our results are to the wording in the design questionnaire, we also ask a similar question where we replace distinctiveness with attractiveness. In a third question we ask residents explicitly how attractive the buildings in the neighbourhood are to look at. Our presumption is that each of the resulting indices are composites of a quasi-objective design differential Δd_n and an idiosyncratic component that is driven by the respondent's tastes and attitudes. To obtain an estimate of the former we run the following Mincer type fixed effects regressions:

$$\widetilde{\Delta d}_{i.n} = F_i g + \varphi_n + \epsilon_{i,n} \tag{5}$$

, where F_i is a vector of variables capturing socio-demographic characteristics (e.g. gender, age, education, income) as well variables that are supposed to capture preferences for heritage-related attributes of the area (e.g. "aware of CA status" or "would consider moving to another CA"), and $\epsilon_{i,n}$ is an error term. We recover the neighbourhood fixed effects φ_n from the estimation of equation (5) as our estimate of the difference in design quality between the conservation area and the rest of a neighbourhood. We refer to this estimate as $\widehat{\Delta d}_n$ in equations, Δ design score (adjusted) in graphs and adjusted differenced design score elsewhere in the paper. Since all control variables have a mean of zero, this relative design score reflects how a person with average characteristics in our sample perceives the relative design quality of a conservation area.

4.3 Design Capitalisation

Our baseline design capitalisation model is a variation of equation (4), which incorporates the differenced design scores recovered form equation (5):

$$\ln(P_{j,n,t}) = \beta^{CA}\left(CA_j \times \widehat{\Delta d}_n\right) + \beta^V\left(V_j \times \widehat{\Delta d}_n\right) + \gamma^B\left(B_j \times \widehat{\Delta d}_n\right) + \alpha^{CA}CA_j + \alpha^V V_j + \alpha^B B_j + DIST_{j,n}\rho_n + X_j b + (\mu_n \times \tau_t) + \varepsilon_{j,n,t} \quad (6)$$

, where V_j is an indicator variable, which is equal to one if a property is at a location outside a conservation that offers a view onto buildings inside a conservation area (the view area introduced in Section 2.3), and zero otherwise. B_j, unlike in specification (4), is not neighbourhood-specific and takes the value of one if a property is within 50m on the outside of any conservation area. All other variables are as defined above. In particular, $DIST_{j,n}, X_j b,$ and $(\mu_n \times \tau_t)$ serve the same purpose as in specification (4).

Intuitively, this specification allows the premium associated with being located inside a conservation area to vary in the design quality of this area relative to the rest of the neighbourhood. Formally, the first derivative with respect to CA, which corresponds to crossing the boundary between the zones in a neighbourhood holding all other factors constant, illustrates that equation (6) provides a spatial differences estimate of the policy and the design capitalisation effect in the spirit of equation (3): $\frac{\partial \ln P_{i,n,t}}{\partial CA_i} = \alpha^{CA} + \beta^{CA}\widehat{\Delta d}_n$.

If the regulatory cost of being located within a conservation area is significant, we expect α^{CA} to be negative. β^{CA} in turn captures the composite of the internal design effect as well as the external view effect inside conservation areas. In perfect analogy, β^V gives a spatial differences effect of the pure external view effect outside conservation areas. This assumes that within a neighbourhood the internal design quality of buildings in the view area is the same as for other buildings outside the conservation areas. Therefore, it is only the external design effect originating from the buildings inside the conservation areas that distinguishes buildings inside the view area. The assumption seems justifiable in practice because the boundaries of conservation areas are purposely drawn to separate the distinctive buildings inside conservation from the non-distinctive buildings outside.

The interaction term $B_j \times \widehat{\Delta d}_n$ serves two purposes. First the term controls for unobserved locational factors that are correlated with the design variable $\widehat{\Delta d}_n$ within a very small area. This strengthens the identification of β^V because this setting implies that the comparison is being made between properties with and without a view onto conservation area buildings within a small buffer of no more than 50m width. Secondly, the estimate of γ^B is interesting because it can be interpreted as a placebo test. This is because under the assumptions made there should be no design capitalisation effect beyond the view area.

A notable feature of specification (6) is that it is estimated at the level of transactions, but the identifying variation in our design measures is at the level of neighbourhoods. The key advantage of using the micro-data in the estimation is that it allows analysing the design effects within conservation areas, within view areas, and the placebo buffer areas at the same time. An unintended collateral, however, is that neighbourhoods are somewhat arbitrarily weighted by the number of transactions they contain. Since our conceptual unit of observation (in equation 3) is the neighbourhood, we weight observations by the inverse of the number of transactions in a neighbourhood in our preferred specification to remove this effect. We report all key-estimates with and without weighting of observations.

Another collateral of the same feature of specification (6) is that significance levels may be inflated. We respond to this concern by clustering standard errors on neighbourhoods in our benchmark specifications. There is the additional concern that our relative design score is a "generated regressor" (Pagan, 1984), which we address in a bootstrapping procedure. We first draw bootstrap (with replacement) samples from the first stage (specification 4). Using the recovered fixed effects from the bootstrapped first-stage in the second stage (specification 6) we then also block bootstrap (clustering at the neighbourhood level) the second stage. Across a range of specifications we find very similar standard errors in the clustered and bootstrapped models. Consistently, the bootstrapped standard errors turn out to be marginally smaller than the clustered OLS estimates. Therefore, we generally report the OLS clustered standard errors as the more conservative estimates. However, we report the baseline estimates with bootstrapped standard errors here (Table 3, column 10) and a range of further central estimates with bootstrapped standard errors in the online appendix (Table A11).

We note already at this stage that above and beyond the use of alternative weighting schemes and standard errors discussed above, we subject our baseline estimates to a number of further robustness check. We use alternative approaches to detecting architectural externalities, experiment with different design measures, conduct several falsification tests, address sorting effects, further restrict the identifying variation to locations near the boundaries and allow for variation in hedonic implicit prices, heterogeneity in the effects of macroeconomic factors and planning legislation, and a non-linearity in the design capitalisation effect.

5 Results

5.1 *Estimated Differenced Prices*

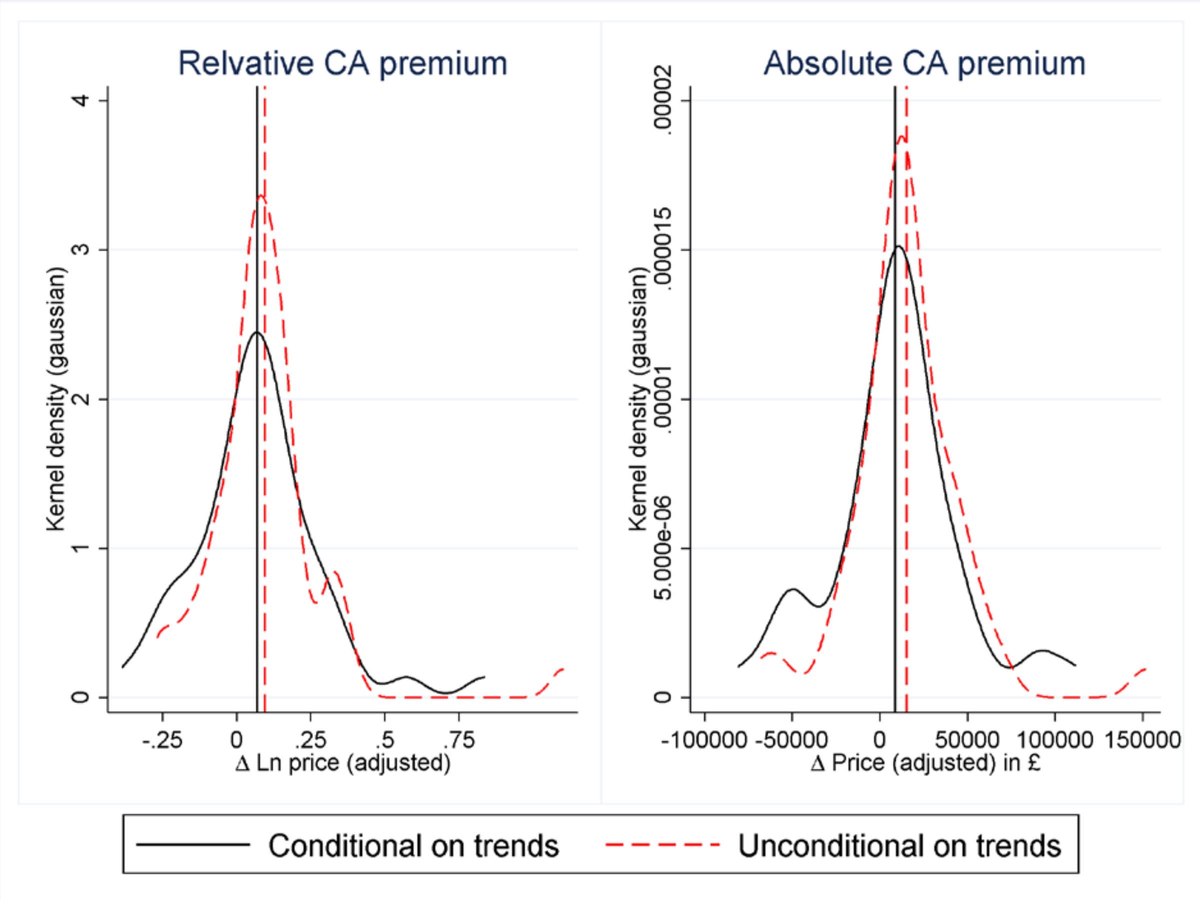
We begin by exploring the variation in adjusted differences in prices across conservation area boundaries estimated according to specification (4), the differenced prices or conservation area premia. We plot these premia in absolute (right) and relative (left) terms as well as for models, which include (solid lines) and exclude (dashed lines) boundary distance trends. In keeping with intuition, the models excluding spatial trends produce estimates that are marginally larger.

Other than this, the distributions look fairly similar. We focus on our preferred estimates that are conditional on trends in what follows.

Perhaps not surprisingly, properties just inside a conservation area boundary are, on average, about 7.3% (£8,902) more expensive than properties just outside. On average, thus, the positive design effect seems to exceed a potentially negative policy effect. More importantly for a cross-neighbourhood comparison is the degree of variation. The estimated premia vary as much as from -32.0% to +131.12% or -£80,865 to +£111,588. Standard deviations with 24.2% or £37,936 are relatively high. 15 out of 48 conservation areas achieve a negative premium. There is, thus, significant variation in differenced prices to be attributed to differenced design scores. A full list of the differenced prices by neighbourhood is provided in Table A1 in the online appendix.

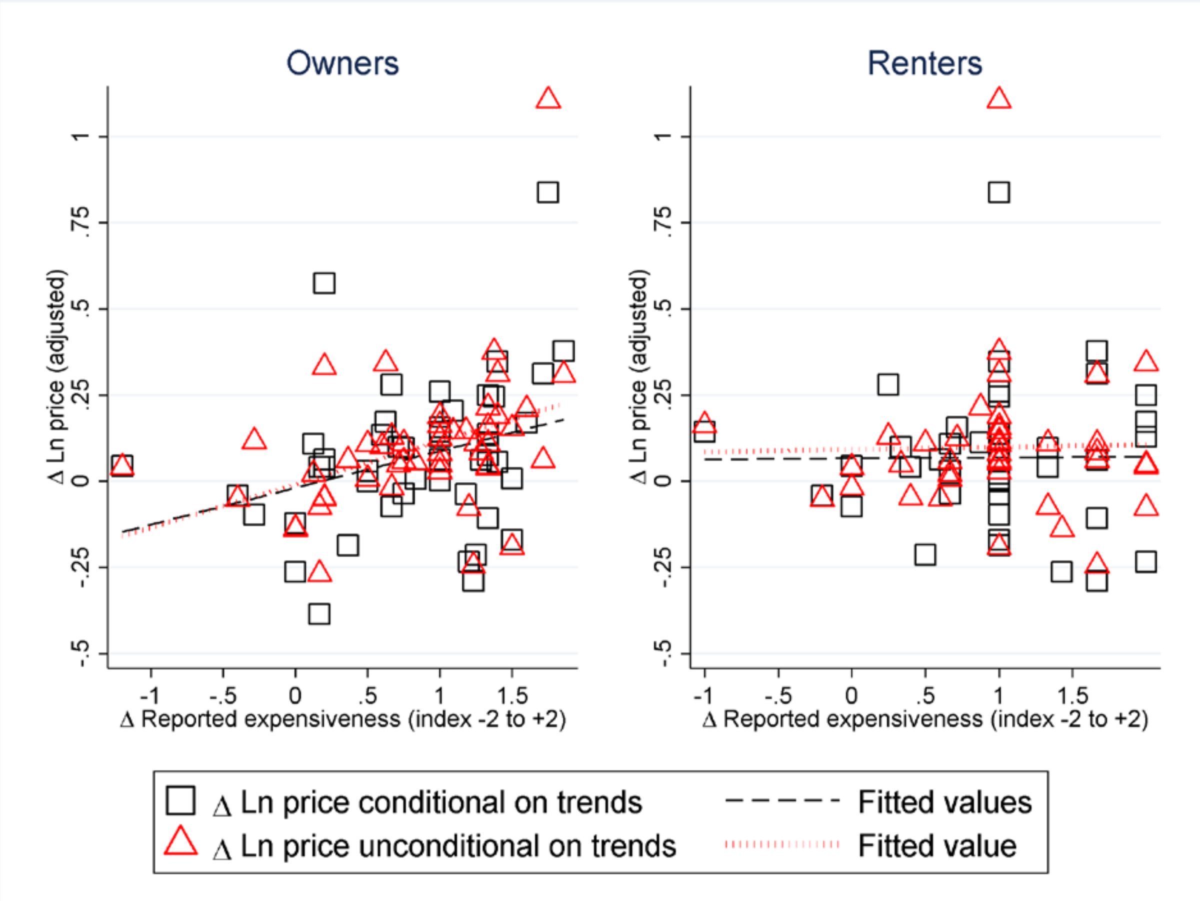
At the heart of our empirical strategy is the comparison of differenced prices derived from actual market transactions and a reported measure of differenced design quality collected in quantitative surveys. To cross-validate the econometric method and the interview-based collection process, we compute an index of relative "expensiveness" based on a question that was otherwise phrased exactly as those inquiring about the design features of primary interest. As shown in Figure 2, home owners seem to be well aware of the price premium (or discount) their area achieves. While it is not surprising that renters are less informed about purchasing prices in their area, the degree of disconnect between the perceived expensiveness and the estimated differenced prices is striking.

Fig. 1. *Distribution of Relative and Absolute Conservation Area Premia*



Notes: Unit of observation is neighbourhood. Δ Ln price (adjusted) is obtained by regressing the natural log of sales price against structural and locational controls, year x neighbourhood fixed effects, distance from CA boundary x neighbourhood effects where indicated in the legend as "conditional on trends", interaction terms between a dummy for 50m external buffer around CA boundaries and neighbourhood effects; and interaction terms between a CA dummy and neighbourhood effects (equation 4). The latter ($\widehat{\Delta \ln P_n}$) are plotted in the left panel. Δ Price plotted in the right panel is computed as $\left[\exp\left(\widehat{\Delta \ln P_n}\right) - 1\right] \times \hat{\bar{\mu}}_n$, where $\hat{\bar{\mu}}_n$ is the mean of the estimated year x neighbourhood fixed effects across years within a neighbourhood. Vertical lines are the means of the distributions.

Fig. 2. *Estimated and Reported Differenced Prices by Tenure*



Notes: Unit of observation is neighbourhood. Δ Ln price (adjusted) is obtained by regressing the natural log of sales price against structural and locational controls, year x neighbourhood fixed effects, distance from CA boundary x neighbourhood effects where indicated in the legend as "conditional on trends", interaction terms between a dummy for 50m external buffer around CA boundaries and neighbourhood effects; and interaction terms between a CA dummy and neighbourhood effects (equation 4). Reported expensiveness is the mean of individual scores ranging from -2 (not at all expensive relative to surrounding areas) to +2 (very expensive relative to surrounding areas) within a neighbourhood.

5.2 Estimated Differenced Design Scores

In Table 1 we examine how the reported differenced design scores correlate with individual characteristics of the respondents and some observable design related characteristics of the areas they live in. Relative to the Victorian character, which is the most frequent style and forms our base category, Georgian and Interwar styles are more likely to be reported as attractive. Also, planned estates carry a premium in the reported attractiveness scores (1). This pattern is also apparent when we ask an alternative question explicitly about the attractiveness of the buildings (5) in the area. Georgian style areas are also more likely to be reported as distinctive

(3). It is important to note, however, that most non-Victorian styles apply to no more than a couple of conservation areas, so some care is warranted with the interpretation.

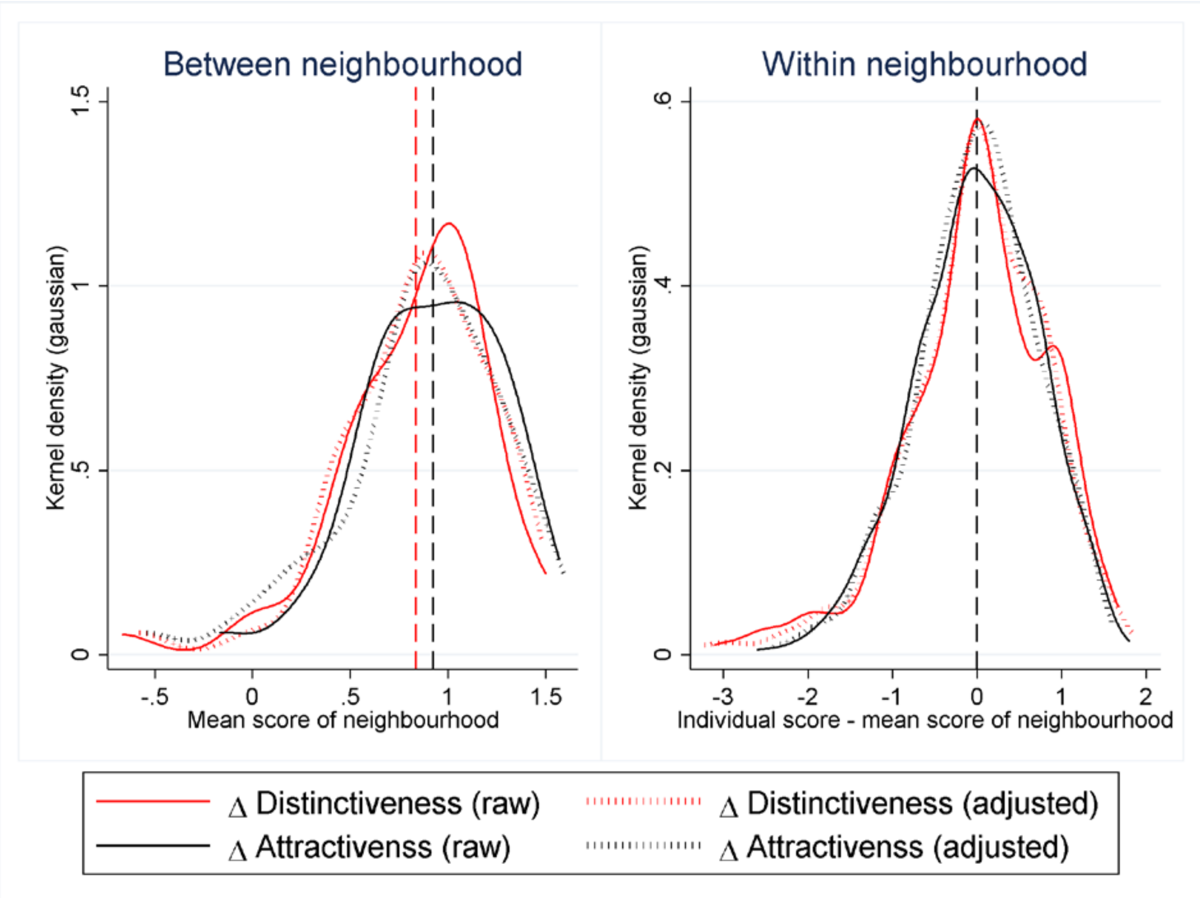
Tab. 1. *Design Score Regressions*

	(1)	(2)	(3)	(4)	(5)	(6)
	Attractiveness relative to surrounding areas		Distinctiveness relative to surrounding areas		Attractiveness of buildings	
Female (dummy)	-0.124**	-0.171**	-0.006	0.021	-0.034	-0.029
	(0.059)	(0.066)	(0.067)	(0.075)	(0.080)	(0.080)
Age (years)	-0.002	-0.002	0.006**	0.004	0.003	0.002
	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)
British (dummy)	0.041	0.003	0.143	0.126	0.074	0.026
	(0.106)	(0.108)	(0.104)	(0.113)	(0.109)	(0.091)
White (dummy)	0.083	-0.028	-0.031	-0.140	0.033	-0.114
	(0.110)	(0.109)	(0.098)	(0.113)	(0.102)	(0.098)
In full-time em-	-0.195**	-0.101	-0.284***	-0.186*	-0.103	-0.045
ployment (dummy)	(0.089)	(0.096)	(0.104)	(0.101)	(0.079)	(0.070)
Income (£/year)	0.000	-0.001	-0.001*	-0.002***	0.000	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
University degree	-0.170*	-0.178*	-0.049	-0.059	0.010	-0.028
(dummy)	(0.098)	(0.104)	(0.135)	(0.133)	(0.125)	(0.104)
Homeowner (dum-	0.045	0.076	0.008	0.115	0.033	0.106
my)	(0.135)	(0.143)	(0.124)	(0.135)	(0.130)	(0.115)
Years stayed at	-0.015*	-0.013	-0.007	-0.003	-0.013*	-0.012
property	(0.009)	(0.009)	(0.009)	(0.010)	(0.007)	(0.007)
Aware of CA status	0.183*	0.029	0.346***	0.237*	0.225**	0.115
(dummy)	(0.096)	(0.096)	(0.124)	(0.139)	(0.104)	(0.094)
Would consider	0.210***	0.195**	0.164**	0.134	0.115*	0.111
moving to a CA	(0.071)	(0.080)	(0.076)	(0.086)	(0.068)	(0.072)
Georgian	0.239**		0.496***		0.367***	
	(0.110)		(0.091)		(0.115)	
Regency	0.006		0.113		0.111	
	(0.157)		(0.156)		(0.215)	
Edwardian	0.028		0.020		-0.124	
	(0.116)		(0.132)		(0.110)	
Interwar	0.381***		-0.019		0.325**	
	(0.100)		(0.149)		(0.129)	
Planned	0.262**		0.133		0.242*	
	(0.098)		(0.105)		(0.133)	
Constant	0.761***	0.874***	0.758***	0.870***	1.009***	1.114***
	(0.091)	(0.042)	(0.090)	(0.039)	(0.122)	(0.039)
Neighb. fixed effects	NO	YES	NO	YES	NO	YES
Observations	524	524	524	524	521	521
R^2	0.087	0.231	0.097	0.212	0.084	0.319

Notes: Baseline architectural style category is Victorian. All individual variables have a mean of zero. Standard errors in parentheses are clustered on neighbourhoods. A hand full of missing values in age, income and degree have been set to zero and denoted by 0,1 indicator variables. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In columns (2), (4) and (6) we replace the conservation area characteristics with neighbourhood fixed effects. These models provide a strong control for unobserved conservation area characteristics and, thus, more credible estimates of the effects of individual characteristics. Only few individual characteristics turn out to exhibit significant partial correlations with reported differenced design scores. Women and degree holders tend to rank their area somewhat lower in terms of attractiveness. Individuals with higher incomes or those who are in full-time employment tend to rank their areas somewhat lower in terms of distinctiveness. Individuals who reported to be likely to move to another conservation area were more likely to rank their area as attractive while individuals who were aware of the conservation area status of their areas were more likely to report it as distinctive.

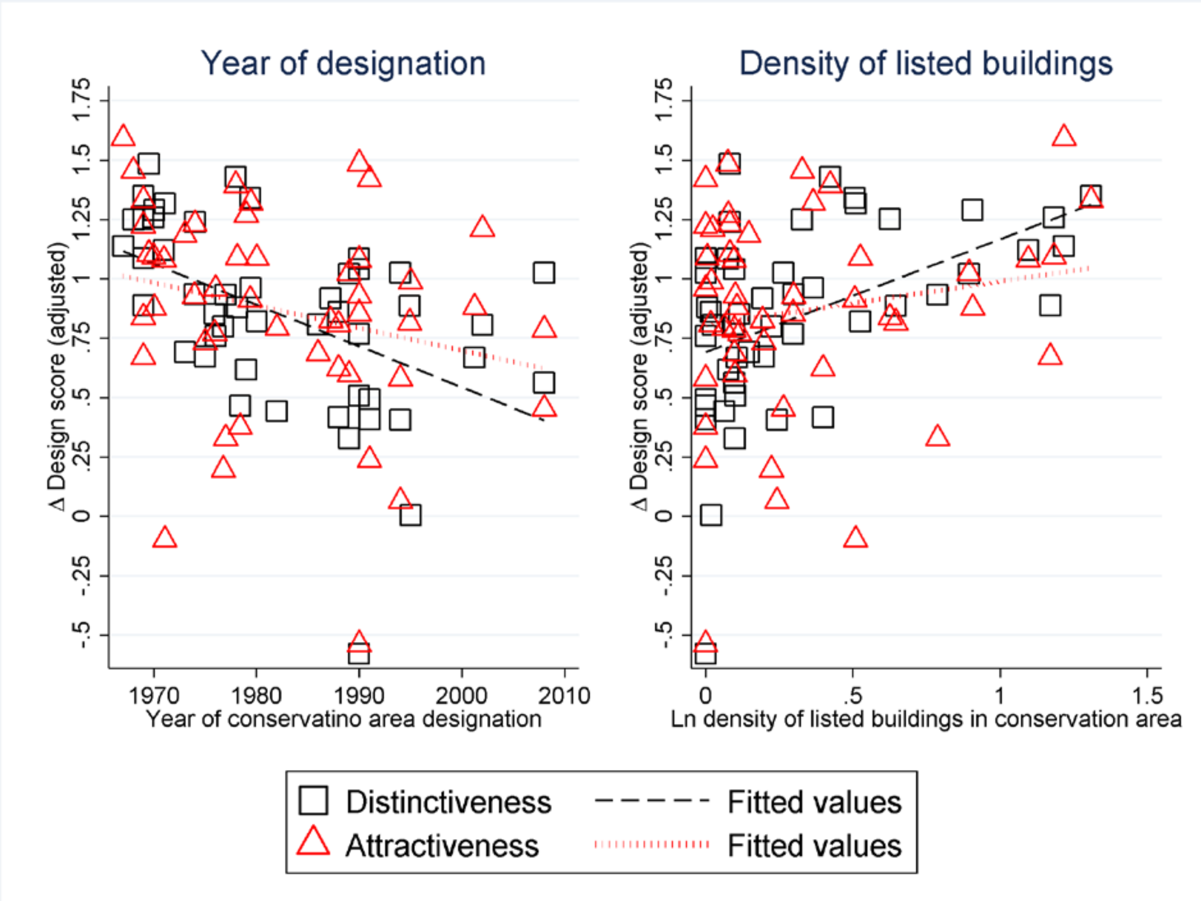
Fig. 3. *Between and Within Neighbourhood Distribution of Differenced Design Scores*



Notes: Unit of observation is neighbourhood in the left panel and interviewee in the right panel. Left panel compares design scores across neighbourhoods. Raw values are means of the reported scores ranging from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas) within a neighbourhood. Adjusted scores are the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Right panel compares differences in the reported individual scores to the respective neighbourhood mean. Raw values use unadjusted reported data. Adjusted design scores are the residuals recovered from the estimation of equation (5).

Figure 3 plots the distribution of the reported differenced design scores across neighbourhoods (left) as well as the distribution of individual deviations from the neighbourhood means (right). The adjusted differenced design scores (left) are the estimated fixed effects from Table 1 (column 4). The adjusted individual deviations (right) are the residuals from the same models. The between distributions of differenced design scores peak close to one, which implies that on average the sampled conservation areas were considered as distinctive and attractive compared to nearby areas. Only one conservation area received a negative differenced distinctiveness score, implying that the area was perceived as not distinctive. There are quite a few areas that are at the margin of being *distinctive* or *attractive* or at the margin of being *very distinctive* or *very attractive*. The standard deviation in the adjusted differenced distinctiveness score across neighbourhoods is 0.39. Within conservation areas the distribution of individual scores is concentrated around the mean score of the area. Close to 50% of the adjusted individual scores are within a ±0.5 range of the adjusted mean conservation area score. Only about 19% of the individual scores are outside a ±1 windows. There seems to be some consensus on the relative design quality of an area.

Fig. 4. *Design Scores vs. Year of Designation and Density of Listed Buildings*



Notes: Unit of observation is neighbourhood. Δ design score (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ design scores can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Ln density of listed buildings is the natural log of the number of listed buildings in a CA normalised by the geographic size of the CA. Year of designation and an electronic map of listed buildings were provided by English Heritage.

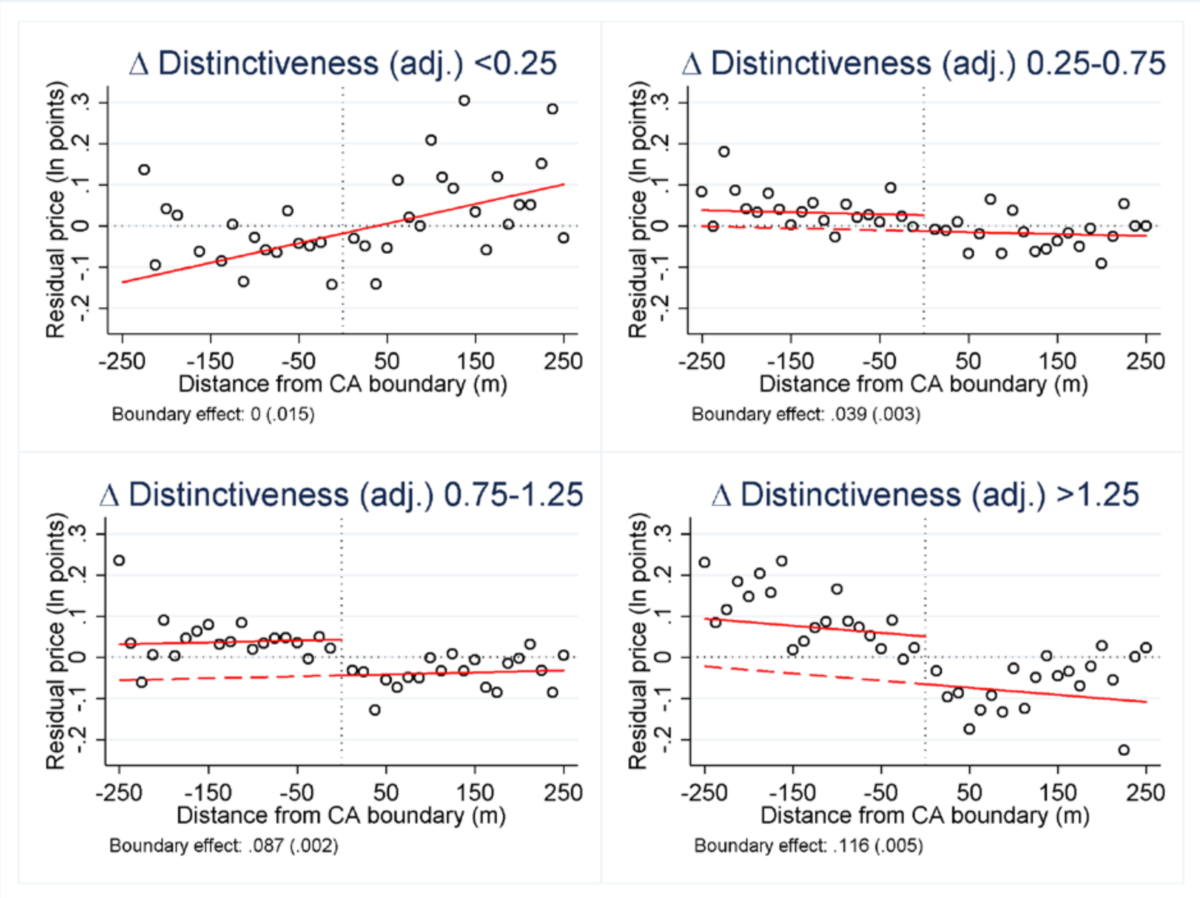
In Figure 4 we make an attempt to externally validate our design scores. In line with the model of the political economy of conservation area designation by Ahlfeldt et al. (2014), conservation areas characterised by higher (relative) design quality were designated earlier. We also find that areas with a higher density of listed buildings tend to be perceived as more distinctive. Together, these findings suggest the perceptions of distinctive design by residents and the planners who designate conservation areas and listed buildings are reasonably well aligned. From a more technical perspective, Figure 4 suggests that designation date and listed building density may serve as predictors of the differenced design scores.

5.3 Design Valuation: Graphical Illustration

We argue that by exploiting discontinuous variation in property prices at the boundaries of conservation areas, where the design character of the neighbourhood changes abruptly, we are able to control for many unobserved locational characteristics and achieve a strong identification of the design effect. Figure 5 illustrates the nature of the variation in prices that we exploit in identifying the design effect. In each of the four panels we plot residual prices, which control for observable structural and locational characteristics, against our running variable, distance from the conservation area boundary. We also illustrate how a linear trend with an intercept at the conservation area boundary approximates the distribution of mix-adjusted transaction prices. Finally, we report an estimate of the price change at the boundary, the boundary effect (standard errors in parenthesis).

The four panels distinguish between neighbourhoods with different differenced design scores. The key-insight that emerges from Figure 5 is that the existence of a price discontinuity at the boundary critically depends on the magnitude of the differenced design score. The estimated boundary effect is essentially zero within neighbourhoods where the reported differenced distinctiveness scores are near to or below zero (Δ distinctiveness < 0.25). An about 4% boundary effect exists for the group of neighbourhoods where the conservation area has a moderate design advantage over the rest of the neighbourhood (0.25 < Δ distinctiveness < 0.75). The boundary effect further increases to about 9% and 12% for the groups of neighbourhoods where the conservation areas were reported as being *distinctive* relative to surrounding areas 0.75 < Δ distinctiveness < 1.25 and those which lean towards being *very distinctive* (Δ distinctiveness > 1.25).

Fig. 5. *Discontinuities in Prices at Conservation Area Boundaries by Distinctiveness*



Notes: Residual prices are from regressions of the natural log of sales price against structural and locational controls, year fixed effects and neighbourhood fixed effects. Circles denote means of residual prices within 12.5 meter distance bins within categories of neighbourhoods defined based on their adjusted Δ distinctiveness score (the recovered fixed effects from equation (5). Raw Δ distinctiveness ranges from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Solid red lines illustrate the results of separate regressions (for each of the Δ distinctiveness categories) of residual prices against distance from the CA boundary and a dummy variable equalling one for negative distance values. The unit of observation in these regressions is the bins (observations are weighted by the number of transactions within a bin). Boundary effects are the coefficients on the dummy variables from these regressions (standard errors in parentheses) and correspond to the gaps between the solid and the dashed lines.

In the online appendix, we show that a similar pattern in residual prices exists when we concentrate on properties whose structures were developed after 1945, but before the conservation area in a given neighbourhood was designated (Figure A5). We argue that these properties are the least likely to possess the characteristics that led to designation, thus any conservation area effect is less likely to originate from an internal design effect and more likely to originate from an external view effect.[7] This interpretation is in line with a positive discontinuity at the boundary of the view area, which is larger in neighbourhoods with more distinctive conservation areas as shown in the same figure. We also note that we find a similar pattern to Figure 5 when using Land Registry data, which contains the universe of transactions, but only limited property characteristics (online appendix Figure A6).

Figure 5 suggests that there is a positive relationship between differences in prices across conservation areas and the respective differences in design quality. In Figure 6 we explicitly plot this relationship, which directly corresponds to equation (3), using estimates of differenced prices from specification (4) and estimates of differenced design scores from specification (5). Despite the two labelled outliers Ladbroke and Minet Estate the correlation is reasonably well defined. While we stress that our preferred parametric estimates are based on specification (6), which we discuss next, there are some noteworthy insights that emerge from the simple and transparent estimates reported below the scatter plots.

There is a significantly negative intercept as expected (α in equation 3). The implication is that the regulatory constraint in conservation areas, if not compensated by high design quality, depreciates the value of a property by about 10% or £15.7k. A one-step increase on our five-step scale, e.g. from being *neither distinctive nor non-distinctive* to being *distinctive*, all else equal increases prices by about 22%. In standard deviation terms, a one unit increase in our differenced distinctiveness score increases differenced prices by about 7.8%. At a differenced distinctiveness score of 0.5 (just in the middle between being reported as being *neither distinctive nor non-distinctive* and being *distinctive* relative to surrounding areas) the regulatory effect and the design effect cancel out each other. In an average neighbourhood with a differenced distinctive-

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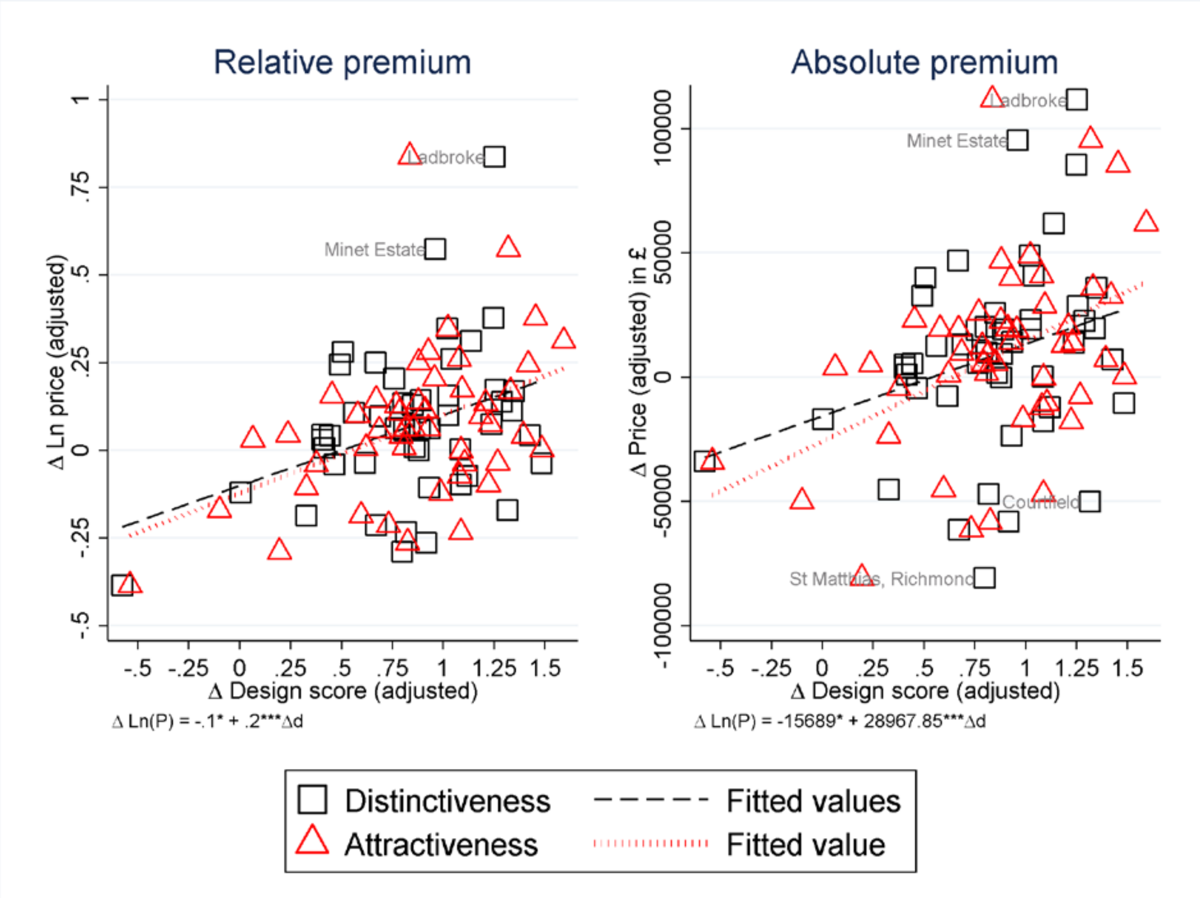
[7] Since the Edwardian, Georgian, Interwar, Regency, and Victorian styles that characterise the conservation areas in our sample predate the cut-off date it is unlikely that these properties possess the characteristics that led to designation. In fact, the reason for protecting conservation areas is to prevent unsympathetic (re)development, which is not in keeping with the area's character.

ness score of 0.85 the predicted positive net capitalisation effect is close to the means of the distributions in relative and absolute premia depicted in Figure 1 (≈7% or £8.9k).

Fig. 6. *Differenced Prices vs. Differenced Design Score*



Notes: Unit of observation is neighbourhood. Δ Ln price (adjusted) is obtained by regressing the log of sales price against structural and locational controls, year x neighbourhood fixed effects, distance from CA boundary x neighbourhood effects, interaction terms between a dummy for 50m external buffer around CA boundaries and neighbourhood effects; and interaction terms between a CA dummy and neighbourhood effects (specification 4). The latter are the neighbourhood specific relative premia ($\widehat{\Delta \ln P_n}$) plotted in the left panel. Δ Price plotted in the right panel is computed as $\left(e^{\widehat{\Delta \ln P_n}} - 1\right) \times e^{\hat{\bar{\mu}}_n}$, where $\hat{\bar{\mu}}_n$ is the mean of the estimated year x neighbourhood fixed effects across years within a Neighbourhood. Δ Design score (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ design scores can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Outliers are labelled if internally studentised residual (from distinctiveness models) is larger than two. Parametric fit from Δ distinctiveness model. * *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01 (robust standard errors).

5.4 Design Valuation: Baseline Econometric Analysis

In Table 2 we report estimates of specification (6), our preferred design capitalisation model. We use all available transaction throughout columns (1-4). In doing so, we exclude neighbourhood specific boundary distance effects in models (1) and (2) and weight observations according to the inverse of the number of transactions in a neighbourhood in (2) and (4). This is to give equal weights to neighbourhoods, which provide the variation from which we identify the design capitalisation effect. Our preferred baseline model is in column (4).

In line with the results discussed above, the estimates reported in columns (1-4) consistently point to a positive and significant capitalisation effect of distinctive design when the comparison is made across conservation area boundaries and neighbourhoods (*CA x Δ distinctiveness*). The magnitude of the estimated conservation area distinctiveness effect tends to be larger in models in which we apply our weighting scheme and in models that feature boundary distance effects. The premium for being located in a conservation area increases by 18.3% for each one-step increase in our differenced distinctiveness score, e.g. a conservation area that is *distinctive* relative to surrounding areas as opposed to a conservation area that is *neither distinctive nor non-distinctive*. In terms of standard deviations, a one unit increase in our differenced distinctiveness score increases differenced prices by 6.6%. This design effect is close to the one found in Figure 6 (7.8%).

Consistently, we find no positive and no statistically significant design effect if a similar difference-in-difference comparison is made taking first differences across the outer boundaries of the buffer zone instead of conservation area boundaries (*Buffer x Δ distinctiveness*). We interpret this result as a successful placebo test. Instead, we find a positive design effect when the same comparison is made taking first differences across the boundaries of the view areas (*View x Δ distinctiveness*) within the buffer zones, although the effect is only statistically significant at conventional levels in our baseline model (4). In terms of magnitude the effect is about half the size of conservation area distinctiveness effect. We cannot conclude, however, that the difference in magnitudes reflects the internal design effect because the external view effect is likely larger within conservation areas.

In model (5) we replicate (3) restricting the sample to structures constructed after 1945, but before the conservation area in a given neighbourhood was designated. In this model we find a large, positive, and statistically significant conservation area distinctiveness effect (*CA x Δ distinctiveness*). We, once again, argue that this comparison is more likely to capture an external view effect than in the baseline model because the buildings included in the sample are the least likely to possess the particular design features that constitute the character of a conservation area. When we include boundary distance effects in column (6) the conservation area distinctiveness effect (*CA x Δ distinctiveness*) increases as before. But the standard errors increase even more, likely the result of the combination of a limited number of observations and a relatively demanding specification. Still, we argue that the results from this alternative approach to detecting spillovers substantiate the impression that an external view effect exists.

Tab. 2. *Design Capitalisation Effects*

	(1)	(2)	(3)	(4)	(5)	(6)
	All transactions				Non-historic pre-designation buildings	
	Ln price	Ln price	Ln price	Ln price	Ln price	Ln price
CA x Δ distinctiveness	0.137***	0.160***	0.134**	0.168**	0.230**	0.302
(adjusted)	(0.049)	(0.049)	(0.055)	(0.064)	(0.110)	(0.354)
View x Δ distinctiveness	0.056	0.074+	0.061	0.081*	0.112	0.139
(adjusted)	(0.047)	(0.050)	(0.049)	(0.048)	(0.202)	(0.210)
Buffer x Δ distinctiveness	-0.031	-0.020	-0.042	-0.028	-0.054	0.106
(adjusted)	(0.049)	(0.053)	(0.048)	(0.059)	(0.157)	(0.199)
Conservation area (CA)	Yes	Yes	Yes	Yes	Yes	Yes
View (dummy)	Yes	Yes	Yes	Yes	Yes	Yes
Buffer (dummy)	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes
CA distance x neigh. effects	-	-	Yes	Yes	-	Yes
Weighted	-	Yes	-	Yes	Yes	Yes
N	7,871	7,871	7,871	7,871	1,127	1,127
r2	0.913	0.915	0.917	0.919	0.959	0.965

Notes: Unit of observation is transactions. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ design scores can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside conservation areas. View is a dummy variable identifying transactions outside conservation areas with a view on buildings inside conservation areas. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside conservation areas. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to conservation area boundary trends (0 at boundary). Observations in (2) and (4-6) are weighted by the inverse of the number of transaction in a neighbourhood. Non-historic pre-designation buildings are developed after 1945, but before designation of the conservation area in a neighbourhood. Standard errors (in parentheses) are clustered on neighbourhoods. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

We note that we report a much broader range of parameter estimates for the key-models in Table 2 in the online appendix (Table A2). The estimates of the implicit prices of structural and locational characteristics, where significant, offer little surprise. The perhaps most interesting parameter estimate not reported here is the one on the conservation area dummy (*CA*). While, in line with the estimates reported in Figure 6, the parameter estimate is consistently negative, is not statistically significant. It is still noteworthy, though, that the effects of *CA* and *CA* x *Δ distinctiveness* jointly imply that the negative regulatory effect and the positive design effect cancel out at a differenced distinctiveness score of about 0.4, which is very close to the 0.5 we find based on the estimates reported in Figure 6.[8]

5.5 Design Valuation: Robustness and Complementary Evidence

As announced in the empirical strategy section, we subject our baseline estimates to a number of robustness checks, which we briefly summarise here. For most robustness checks reported in Table 3 there is a complementary section providing additional estimates and explanation in the online appendix (Section 4).

In column (2) we replicate our baseline model using non-adjusted differenced distinctiveness scores reported by the interviewees. The estimated design effects slightly increase, revealing that our results are not driven by the adjustments made to account for individual interviewee characteristics (using specification 5). In column (3) we use the differenced attractiveness score instead of distinctiveness score as a design measure. The results are qualitatively similar, but the view area design effect becomes insignificant. We find a similar pattern when we use the variable coded based on how attractive buildings are to look at (see Table A6 in the online appendix). These results reveal sensitivity to the wording in the design questionnaire and the importance of seeking formulations that abstract from personal tastes and preferences.

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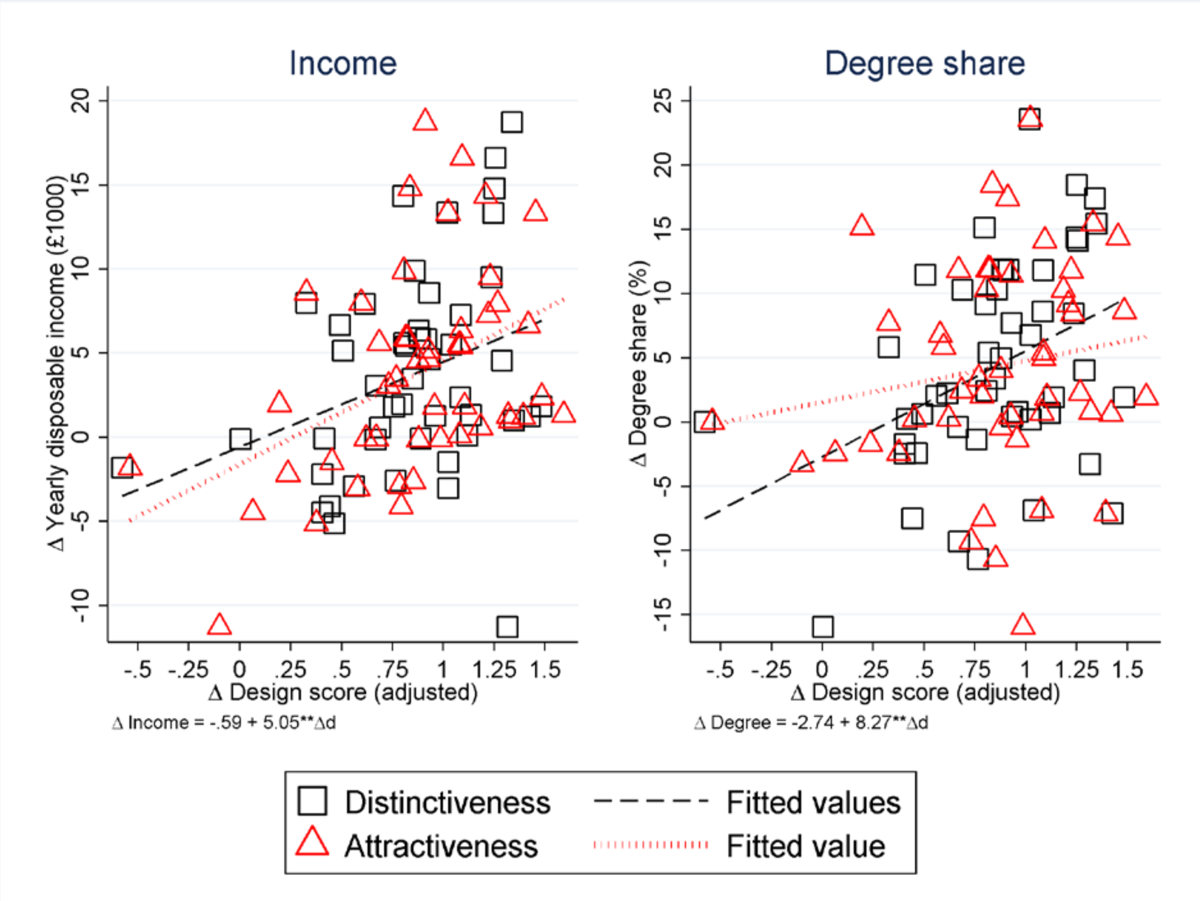
[8] A Wald-test comfortably rejects that both parameters are jointly equal to zero.

In column (4) we allow the implicit prices of all structural and locational characteristics to vary across conservation area boundaries and in the differenced distinctiveness score. This specification allows for a complementarity in the valuation of design and observable non-design features. It is demanding robustness check that significantly reduces the degrees of freedom. While the view area distinctiveness effect remains within the same range, it becomes statistically insignificant. The conservation area distinctiveness effect is reduced, but remains significant.

In column (5) we add socio-economic controls capturing the neighbourhood composition in terms of income, education and ethnicity to control for sorting. We also add various crime density measures (varying across the conservation area border) to accommodate the possibility that criminal activity or anti-social behaviour could be concentrated in areas with specific design characteristics. The conservation area distinctiveness effect is reduced by about 18%. Otherwise the results remain qualitatively and quantitatively similar. As shown in the online appendix, the results remain relatively robust even if we allow the design effect to vary in socio-economic characteristics (Table A7). In complementary estimates reported in the online appendix (Table A8) we show that differences in crime densities across conservation area boundaries are not significantly correlated with the differenced distinctiveness score. In contrast, a one standard deviation increase in the differenced distinctiveness score increases the differenced share of population holding a university degree by 3.2 percentage points and the differenced yearly median income by close to £2k (see Figure 7). Together, these results suggest that there is amenity-based sorting as predicted by e.g. Brueckner et al. (1999) but that the quantitative effect on the design capitalisation effect is limited.

Fig. 7. *Income and Education vs. Design Quality*



Notes: Unit of observation is neighbourhood. Δ Income and Δ degree shares are expressed as differences between the means across transactions within inside 250m buffers around a conservation areas boundary and outside 250m buffers around a conservation areas boundary. Raw income data merged to transactions are Experian estimates of the median household income in a census ward. Degree shares merged to transactions are from the 2001 census and available at the output area level. Δ design score is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ design scores can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas).

In column (6) we control for whether an "*Article 4*" direction is in place for a conservation area, which gives special planning control to authorities. Moreover, we allow the regulatory cost (α in equation 3) to arbitrarily vary across local authorities (boroughs) by adding *CA x Local Planning Authority* fixed effects. In column (7) we similarly allow arbitrary macroeconomic shocks to impact heterogeneously on areas inside and outside conservation areas by adding *CA x year* effects. Although especially model (6) is very demanding since the number of local authorities with 21 is large relative to the number of neighbourhoods from which we identify (48), the results tend to be reasonably robust.

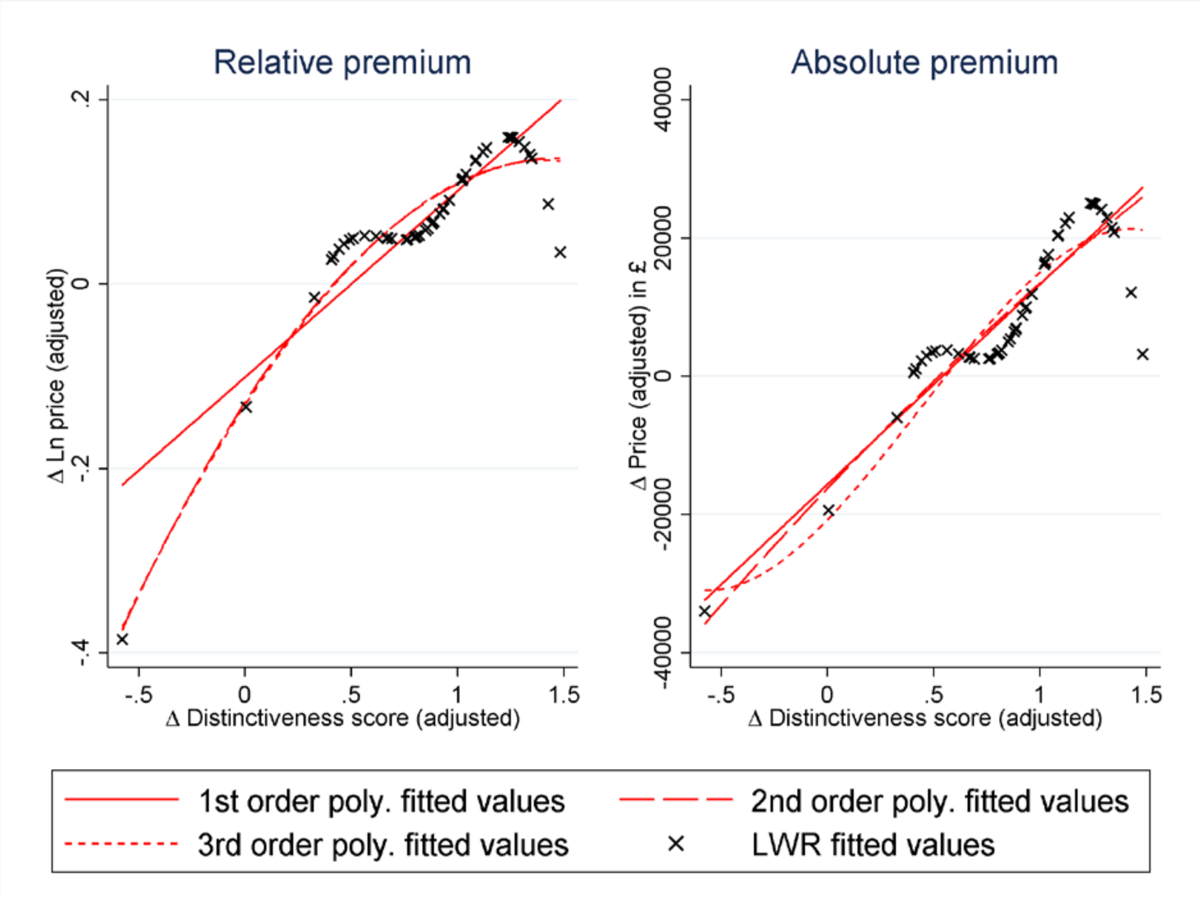
In column (8) we address the concern that it is potentially the same households who reported design scores and bought properties inside conservation areas. Unobserved preference shocks could therefore introduce an endogeneity problem. Building on the evidence provided in Figure 4 we use the year of designation of a conservation area and the density of listed buildings inside a conservation area, both interacted with the conservation area dummy, as instruments for the interaction of the CA dummy and the relative distinctiveness score (*CA x Δ distinctiveness score*). In the reported estimates from a model excluding boundary distance effects the conservation area design effect remains large and significant. We report a wider range of instrumental variable estimates in the online appendix (Table A9). Models including boundary distance effects generally show coefficient estimates within the same range of the baseline model. But the estimates are not significant, likely because of a weak instrument problem (Kleinbergen Paap F-statistic < 6.5).

In column (9) we employ an alternative approach to ensure that identification of conservation area distinctiveness effect originates from changes in prices at conservation area boundaries. Instead of controlling for boundary distance effects, we weight observations according to their proximity to the boundary. We use a standard Gaussian kernel with a bandwidth selected according to Silverman (1986).[9] The conservation area distinctiveness effect remains close to the benchmark estimate, showing little sensitivity to the choice of bandwidth (see Table A10 in the online appendix). In column (10), finally, we report the baseline model with standard errors computed according to the bootstrap procedure discussed towards the end of Section 3.3. As previewed in that section, the standard errors are marginally smaller than in the baseline model. Table A11 in the online appendix compares a broader range of approaches to computing standard errors, revealing that the ones reported here are the most conservative.

[9] Formally, the distance kernel weight is defined as $w_{jn} = \frac{1}{\lambda\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{DIST_{jn}}{\lambda}\right)^2\right)$, where $DIST_{jn}$ is the distance from conservation area boundary n, and the bandwidth is set as $\lambda = 1.06 \times \sigma N^{-\frac{1}{5}}$.

So far, because of the limited number of neighbourhoods providing within-neighbourhood variation in design quality, we have remained restrictive with respect to the functional form of the price-design relationship. In Figure 8 we present a transparent attempt to explore a potential non-linearity. We compare the linear fit from Figure 6 (the solid line) to higher-order polynomial fits and a non-parametric locally weighted regression (LWR) approximation. The higher-order polynomial fits seem to point to a concave relationship in semi-logarithmic scale (left), which is in line with diminishing marginal utilities from design. However, the non-parametric LWR estimates suggest that this concavity is driven by a small number of outliers in sparsely populated areas, which polynomials tend to chase after. Moreover, the concavity disappears altogether when differenced prices are expressed in absolute terms (right). In the online appendix, we present estimates of a semi-non-parametric version of the baseline capitalisation specification (6). We find that the mean and median of the distribution of marginal conservation area distinctiveness effects is slightly above the baseline estimate while the distribution of marginal view area distinctiveness effects is centred on a value slightly below the baseline estimate. The marginal effects are generally within a narrow range for the vast majority of observations. Thus, we conclude that there is little evidence in support of a non-linearity in the design capitalisation effect, although we caution against over-interpreting this result given the limited number of neighbourhoods from which we identify.

Fig. 8. *Distinctiveness Effect: Non-Linear Approximations*



Notes: Unit of observation is neighbourhood. Δ Ln price is obtained by regressing the log of sales price against structural and locational controls, year x neighbourhood fixed effects, distance from CA boundary x neighbourhood effects, interaction terms between a dummy for 50m external buffer around CA boundaries and neighbourhood effects; and interaction terms between a CA dummy and neighbourhood effects. The latter are the neighbourhood specific relative premia ($\widehat{\Delta \ln P_n}$) plotted in the left panel. Δ Price plotted in the right panel is computed as $\left(e^{\widehat{\Delta \ln P_n}} - 1\right) \times e^{\hat{\bar{\mu}}_n}$, where $\hat{\bar{\mu}}_n$ is the mean of the estimated year x neighbourhood fixed effects across years within a neighbourhood. Δ distinctiveness score is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ design scores can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Crosses are predicted values from locally weighted linear regressions (LWR) of Δ ln price against Δ distinctiveness. We run one LWR for each neighbourhood $\tilde{n}$ weighting all other neighbourhhods using the Gaussian kernel $w_{n\tilde{n}} = \frac{1}{\lambda\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{\widehat{\Delta d}_n - \widehat{\Delta d}_{\tilde{n}}}{\lambda}\right)^2\right)$, where the bandwidth is set as $\lambda = 1.06 \times \sigma N^{-\frac{1}{5}}$.

Having discussed a range of empirical exercises supporting our main finding that there is a positive and sizable valuation of architectural design; we turn to some limitations of the work. Arguably, the main concern is that it is impossible to control for all non-design related structural attributes of properties. In our particular setting this concern is somewhat mitigated since omitted variables would have to be correlated with design value in first spatial differences to challenge our main findings.[10] Such a relationship could exist if in households' utility function there was a complementarity between (unobserved) non-design characteristics and design characteristics. If owners or landlords responded to a higher design value by adding (unobserved) positive non-design features, our design effect would be overestimated. The imperfect defence we can bring up is that NBS data set we use is much richer in terms of property characteristics than many other data sets, including the Land Registry data, which reduces the risk of such a bias. A related concern is that non-design locational variables could change discontinuously at conservation area boundaries in a way that is correlated with design differences across these boundaries. This concern is mitigated by the fact that conservation area boundaries generally do not coincide with administrative boundaries such as school catchment areas. Also, we show that there is little correlation between differenced design and differenced densities of criminal activity and anti-social behaviour, which could theoretically be concentrated in areas with specific design characteristics. On a more conceptual level, our method cannot distinguish whether the identified valuation of distinctive design originates from a consumption value, i.e. households genuinely enjoy distinctive design, or a social value that results from the reputational effect of owning a scarce good. These limitations are primarily relevant for the general conclusions of the paper as the scarcity value would decline the more a planning system succeeded in creating areas of high design quality.

[10] Systematic differences across conservation area boundaries would affect the estimated regulatory cost, but not the estimated design value.

Tab. 3. *Design Capitalisation Effects: Robustness*

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price	(5) Ln price	(6) Ln price	(7) Ln price	(8) Ln price	(9) Ln price	(10) Ln price
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	OLS	OLS
CA x Δ design score	0.238**	0.177***	0.196***	0.104*	0.137**	0.122*	0.171**	0.221***	0.186***	0.168***
	(0.092)	(0.056)	(0.059)	(0.059)	(0.054)	(0.064)	(0.065)	(0.082)	(0.038)	(0.063)
View x Δ design score	0.086*	0.088**	0.044	0.058	0.087*	0.081+	0.086*	0.082*		0.081*
	(0.050)	(0.044)	(0.047)	(0.052)	(0.045)	(0.048)	(0.048)	(0.048)		(0.046)
Buffer x Δ design score	-0.007	-0.026	0.018	-0.019	-0.031	-0.028	-0.027	0.002		-0.028
	(0.059)	(0.055)	(0.039)	(0.043)	(0.059)	(0.058)	(0.059)	(0.050)		(0.049)
Design score	Distinc-tiveness (adjusted)	Distinc-tiveness (raw)	Attractive-ness (ad-justed)	Distinc-tiveness (adjusted)	Distinc-tiveness (adjusted)	Distinc-tiveness (adjusted)	Distinc-tiveness (adjusted)	Distinc-tiveness (adjusted)	Distinc-tiveness (adjusted)	Distinc-tiveness (adjusted)
CA / View / Buffer	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic controls	-	-	-	-	Yes	-	-	-	-	-
Crime controls	-	-	-	-	Yes	-	-	-	-	-
CA x controls	-	-	-	Yes	-	-	-	-	-	-
Δ Distinct. x controls	-	-	-	Yes	-	-	-	-	-	-
Year x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CA dist. x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	Yes
Internal buffer x neigh. effects	Yes	-	-	-	-	-	-	-	-	-
CA x LPA effects & Article 4	-	-	-	-	-	Yes	-	-	-	-
CA x year effects	-	-	-	-	-	-	Yes	-	-	-
View spillover area excluded	-	-	-	-	-	-	-	-	Yes	-
Weighted	Inverse neigh.	Inverse neigh.	Inverse neigh.	Inverse neigh.	Inverse neigh.	Inverse neigh.	Inverse neigh.	Inverse neigh.	Inv. neigh. & CA dist.	Inverse neigh.
Standard errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Bootstr.
Kleinbergen Paap F-statistic	-	-	-	-	-	-	-	9.873	-	-
Hansen J-statistic (p-value)	-	-	-	-	-	-	-	0.956	-	-
N	7871	7871	7871	7871	7871	7871	7871	7871	7057	7871
r2	0.920	0.919	0.919	0.923	0.923	0.920	0.919	-	0.942	0.919

Notes: Unit of observation is transactions. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5).Raw values are neighbourhood means across the scores reported by individuals. Reported Δ design scores can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Attractiveness is defined accordingly. CA / View / Buffer are dummy variables identifying transactions inside conservation areas (CA) / the view spillover zone / and a 0-50 m buffer outside CA boundaries. Controls are defined in Table 2 notes. Socio-economic controls include output area income, academic degree share, shares of mixed, Asian, black, and Chinese population and a Herfindahl-Index of ethnic neighbourhood composition. Crime controls include density of the following crimes: Anti-social behaviour, property crime, violent crime, theft. CA distance x neighbourhood effects are neighbourhood specific distance to CA boundary trends (0 at boundary). Internal buffer x neighbourhood effects are neighbourhood effects interacted with a -50-0 meter internal buffer on the inner side of the CA boundaries. CA x LPA effects are local planning authority fixed effects interacted with the CA dummy. Article 4 is a dummy indicating that an Article 4 direction is in place. Instruments for CA x Δ distinctiveness in (7) are year of CA designation and natural log of listed building density within the respective CA. Observations are weighted inversely to the number of observations in a neighbourhood in all models except in (8) where the same is multiplied by a kernel function that decreases in distance from the CA boundary on either side (Gaussian kernel, bandwidth set according to Silverman). Clustered standard errors (in parentheses) are clustered on neighbourhoods. Bootstrapped standard errors are generated by bootstrapping samples of survey respondents (with replacement), placing the recovered design fixed effects in block (clustered on neighbourhoods) bootstrapped (with replacement) second-stage price regressions in 1000 replications. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6 Conclusion

We have presented a novel method to estimate the economic value of architectural design. Our method separates the design effect from correlated location effects by differentiating property prices and design character across spatial boundaries within neighbourhoods and comparing the differences in property prices and design across neighbourhoods. The applicability of the method is not limited to certain empirical settings or architectural styles. The key-requirement is that discontinuous variation in design exists along clearly defined boundaries in a number of neighbourhoods. Such discontinuities can arise for a variety of reasons. A non-exclusive list includes natural barriers that interrupted urban growth, disasters such as fires, earthquakes or bombings, which led to localised reconstruction, master planning, which can produce estates developed to particular design standards differentiating them from surrounding areas, or simply major buildings, which obstruct views on architecturally more or less desirable parts of a neighbourhood.

In our implementation of this method we use conservation area boundaries as a source of discrete variation in design character. We obtain our indices of capitalised value and design scores using a combination of econometric techniques and qualitative methods. The estimated design value is large. Our baseline estimate suggests a capitalisation effect of about 6.6% of property value (£16k in 2003 prices) associated with a one standard deviation increase in our preferred index of distinctive design. Being in an area that is reported as *distinctive* as opposed to being in a *neither distinctive nor non-distinctive* area increases property value by as much as 18.6%. The effect seems at least partially attributable to an architectural externality. Our results, thus, provide some rationale for planning policies that seek to preserve and enhance the architectural quality of the built environment to internalise architectural externalities. Examples naturally include policies like those discussed here but also could entail encouraging new build projects through master planning of larger sites where developers are actively encouraged to internalise externalities through design guides.

The evidence we provide is particularly relevant in light of an ongoing debate in which panning systems have come under pressure for creating costs in form of lower productivity or limited supply of office and housing space. We provide some evidence that there may be benefits of land use planning that need to be carefully weighed against such costs. Our analysis directly speaks to this trade-off in that we demonstrate that the net-effect of regulatory cost and design value is positive of the average conservation area, but the net effect can be negative for selected areas that are not particularly distinctive.

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Appendix to:
Distinctively different: A new approach to valuing architectural amenities

1 Introduction

This technical appendix provides complementary material not reported in the main paper for brevity. The material presented comprises additional detail on data and maps that illustrate the spatial setting of our study (Section 2), complementary results that are not essential for the message of the main paper but may be of interest to some readers (Section 3), and various robustness checks that substantiate the interpretations and conclusions presented in the main paper (Section 4). The appendix is not designed to stand alone or replace the reading of the main paper.

2 Data

2.1 Conservation area locations

Our sampling strategy was to include conservation areas with varying levels of deprivation as described by 2007 ward level deprivation indices and conservation areas located in both inner and outer London boroughs. We randomly selected 24 areas with relatively high levels of deprivation and 24 with low levels and 27 conservation areas within inner London boroughs and 21 in located in outer London. Figure A1 maps the resulting sample of conservation areas included in our study.

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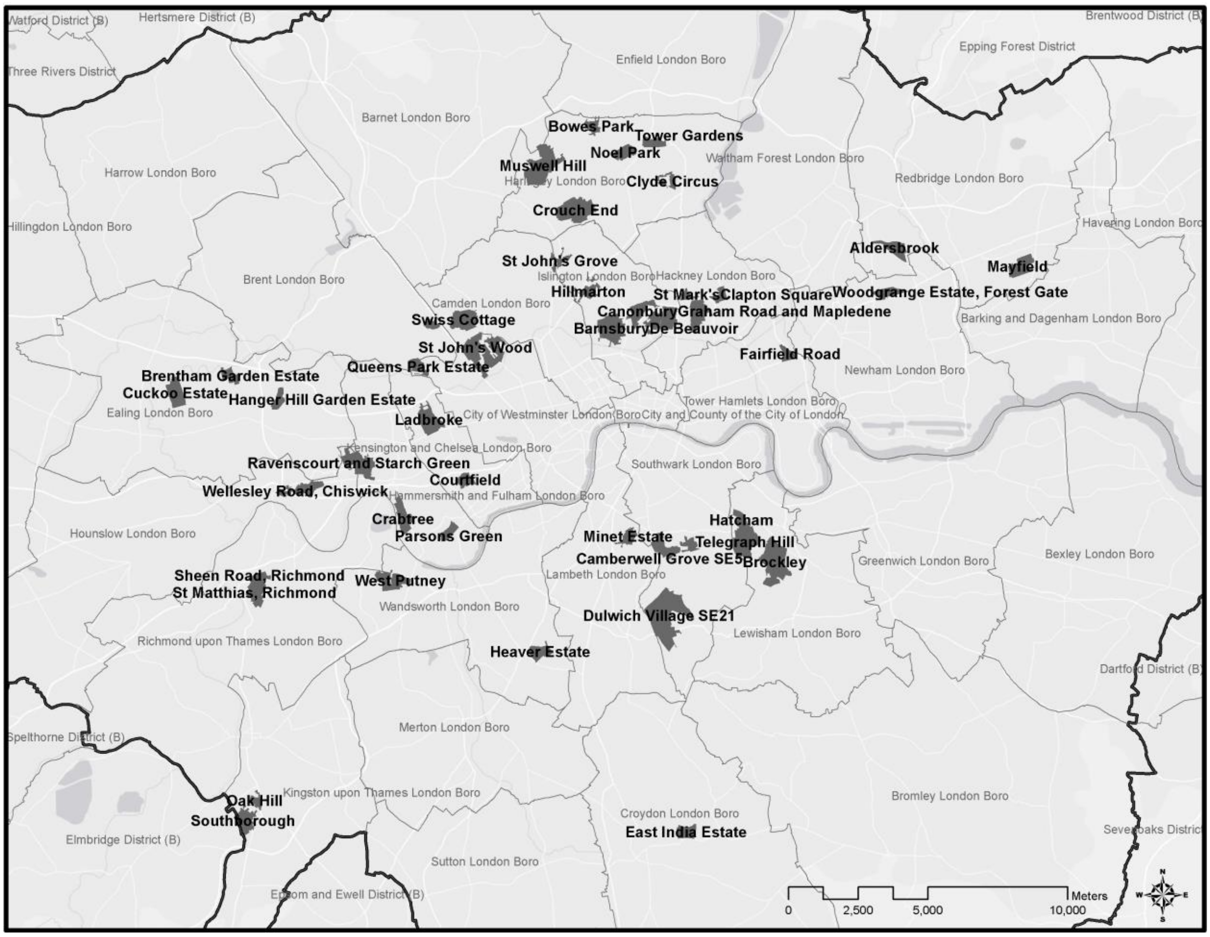
Fig A1. Conservation area locations



Notes: Dark shaded areas are the sampled conserveration areas. ESRI topographic map in the background. Borough boundaries based on a shapefile from Office for National Statistics.

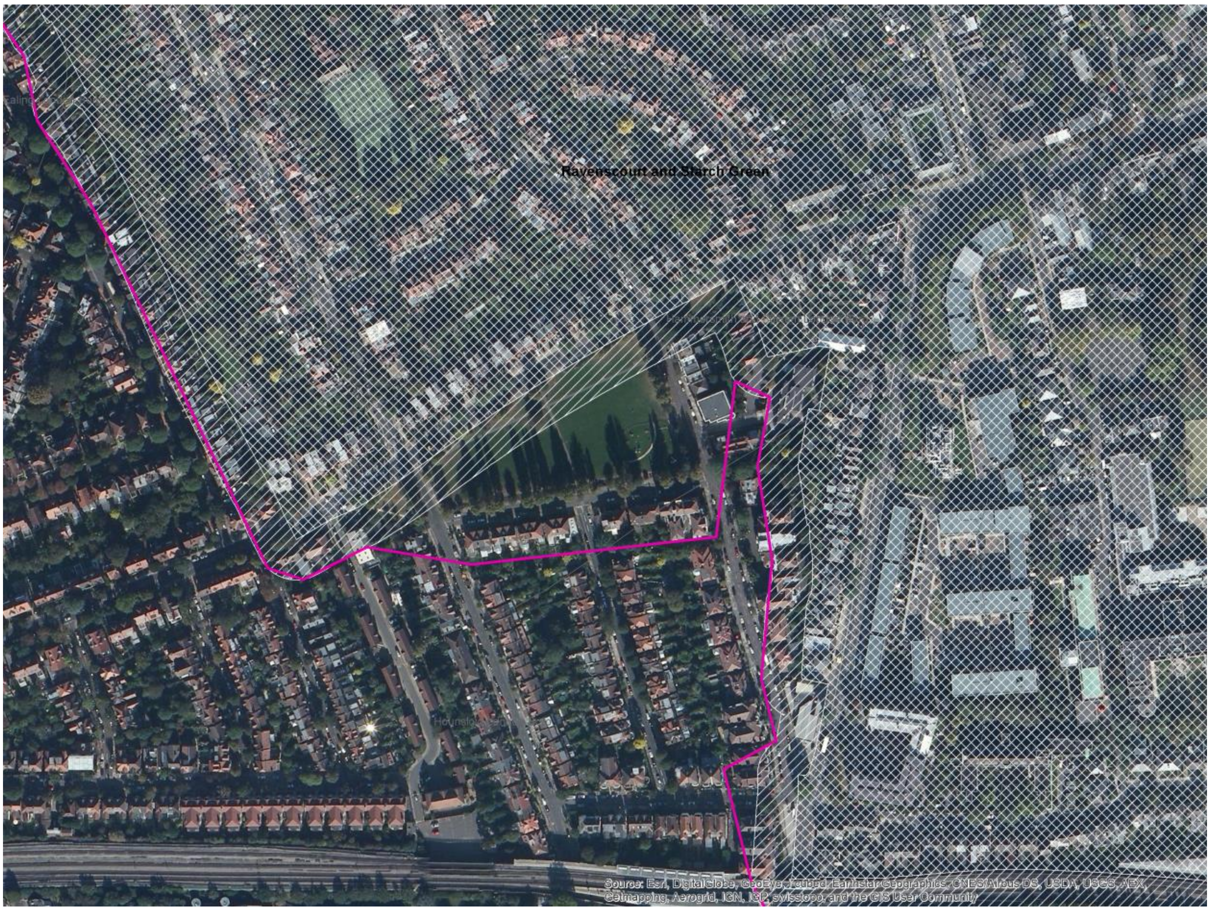
2.2 Definition of view areas

We refer to the area outside a conservation area from which the buildings inside the conservation area are visible as the view area. To approximate the view area of a conservation area we begin by drawing an outside 25m buffer area around the conservation area, which is about the width of half a street plus one house in a typical neighbourhood. As illustrated in Figure A2a this buffer area provides a reasonable approximation of the view area in many circumstances where there is a view across the street. In some cases, however, wider views are facilitated by open spaces such as parks or playing fields. In such instances we manually adjust the shape of the view area using the 25m buffer area as a starting point. For ease of adjustment, we slightly simplify the geometry of the 25m buffer (reduce the number of edges) before we adjust the boundaries. Figure A2b illustrates an example where a manual adjustment was made to provide a better approximation of the view area.

Fig A2a. View area

Notes: Cross-hatched area is the conserveration area. Hatched area is the 25m buffer. Thick solid line show the view impact area. ESRI topographic map in the background.

Fig A2b. View area

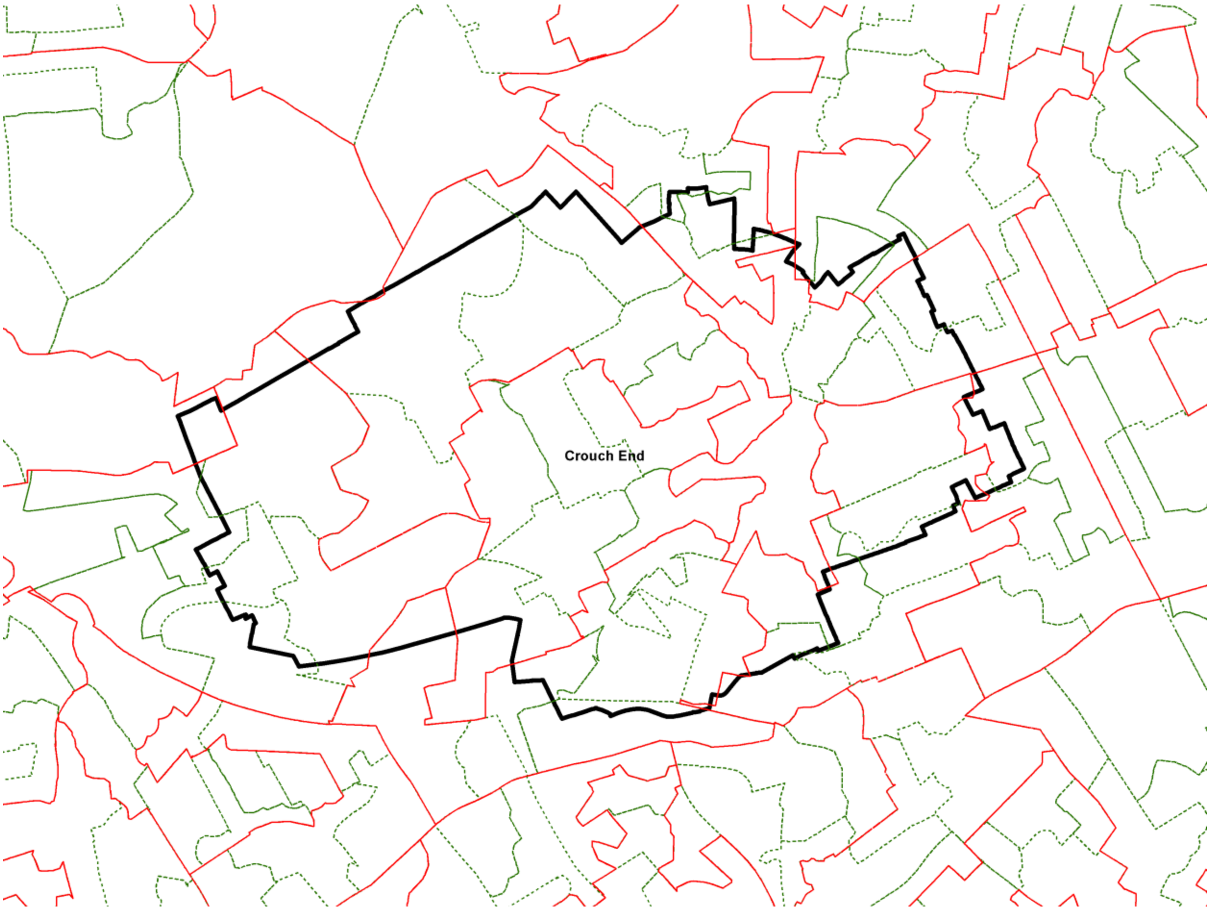


Notes: Cross-hatched area is the conserveration area. Hatched area is the 25m buffer. Thick solid line show the view impact area. ESRI topographic map in the background.

2.3 Conservation areas and census unit boundaries

To assess whether building design quality attracts certain types of households more than others and to control to some extent of the effects associated with such sorting we match neighbourhood characteristics to our data. Such data refer to spatial statistical units whose boundaries are typically not congruent with conservation area boundaries. We use disposable household income estimates by Experian available at the level of lower level super output areas as well as the share of population holding an academic degree and various measures of ethnic composition available at output area level. For an exemplary conservation area we overlay the different boundaries in Figure A3. As expected, the conservation area boundaries differ significantly from those of the (super) output areas. However, it is also evident that (super) output areas are sufficiently small to ensure that for each conservation area there are at least a couple of (super) output areas with the majority of their surface area within the conservation area. It is therefore expected that a comparison of the aggregate of (super) output areas within and outside the boundary of a conservation area will be informative with respect to the actual differences across the boundary. In merging the neighbourhood data to our data base we proceed as follows. We merge the neighbourhood variables to transactions based on the (super) output areas a transaction falls in. To aggregate neighbourhood statistics inside and outside the conservation area boundary we make use of the allocation of transactions to (super) output areas as an intermediate input. Essentially, we compute the means over transactions inside and outside the conservation area and within the 250m buffers. This approach is asymptotically equivalent to a spatial interpolation weighted by population as long as turnover is proportionate to population.

Fig A3. Conservation areas and census unit boundaries

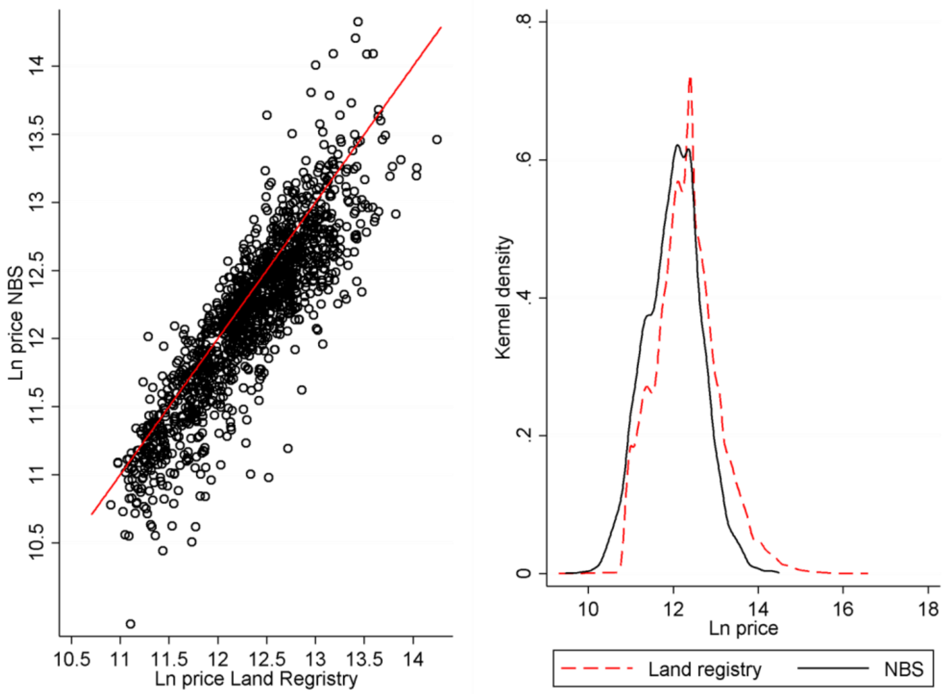


Notes: Black thick line is the conserveration area boundary. Thin solid lines are boundaries of lower level super output areas. Thin dotted lines are boundaries of output areas.

2.4 Comparison between Nationwide and Land Registry data

Our primary property data relates to mortgages for properties granted by the Nationwide Building Society (NBS) between 1995 and 2010. Compared to data set compiled and made publicly available by the Land Registry, the great advantage of the Nationwide data set is that it includes a broader range of property characteristics such as floor space (m^2), the type of property (detached, semidetached, flat, bungalow or terraced), the date of construction, the number of bedrooms and bathrooms, garage or parking facilities and the type of heating. There is also some buyer information including the type of mortgage (freehold or leasehold). Unlike the Land Registry data, the Nationwide data set, however, does not include the universe of residential transactions. In Figure A4 we analyse how the transaction prices recorded in both data sets compare within our study neighbourhoods. In the left panel we aggregate property prices to zones, where a zone is either the area outside or inside a conservation area within a neighbourhood. In the right panel we compare the distribution of individual transaction prices. The comparison suggests that the Nationwide sample is representative for the overall distribution of prices in the market.

Fig. A4. Comparison of Nationwide Building Society (NBS) data to Land Registry data



Notes: Dots in the left panel are natural logs of mean property prices within “conservation area x neighbourhood x year cells”. Unit of observation is transactions in the right panel. Kernels are Gaussian.

3 Complementary evidence

3.1 Conservation area details

In Table A1 we tabulate the differenced prices estimated according to specification (4) along with the design indices and some additional information by conservation area.

Tab. A1. Conservation area details

Conservation area		Transactions		Δ Price (adjusted)		Survey obs. and Δ design score (adjusted)				Architectural style /	Planned
N	Name	In	Out	Ln points	Absolute (£)	Obs.	Distinct.	Attract.	Buildings	period	estate
1	Aldersbrook	66	59	0.134***	20123	10	0.8	1.21	1.04	Edwardian	Yes
2	Barnsbury	172	72	0.173***	28704	10	1.26	1.09	1.56	Georgian, Victorian	No
3	Bowes Park	50	161	0.030**	3870	15	0.41	0.06	-0.03	Victorian	No
4	Brentham Garden Estate	41	35	-0.037*	-10476	14	1.48	1.1	1.38	Edwardian	Yes
5	Brockley	181	287	0.097**	13001	15	0.69	1.19	1.36	Victorian	Yes
6	Camberwell Grove	69	117	0.138***	22639	10	1.29	0.88	1.26	Victorian, Edwardian	Yes
7	Canonbury	72	91	0.169***	35956	10	1.35	1.33	1.62	Victorian	Yes
8	Clapton Square	68	73	0.143***	19106	10	0.89	0.67	0.4	Victorian	No
9	Clyde Circus	33	135	0.044**	5089	10	0.41	0.24	0.58	Victorian	No
10	Courtfield	67	5	-0.170***	-50079	6	1.32	-0.1	1.04	Victorian	Yes
11	Crabtree	130	68	-0.186***	-45312	20	0.33	0.6	0.84	Victorian, Edwardian	Yes
12	Crouch End	232	169	0.074***	13634	10	1.24	1.23	1.63	Victorian	No
13	Cuckoo Estate	90	105	-0.121***	-17079	1	0.01	0.99	1	Interwar	Yes
14	De Beauvoir	91	13	0.113***	19557	14	1.34	0.91	1.33	Victorian	Yes
15	Dulwich Village	42	210	0.377***	85482	10	1.25	1.45	1.15	Victorian, Edwardian	Yes
16	East Canonbury	96	25	-0.263***	-58256	10	0.92	0.83	1.24	Victorian	Yes
17	East India Estate	122	158	0.108***	12393	11	0.56	0.79	0.93	Victorian, Edwardian	No
18	Fairfield Road	83	27	0.347***	48806	10	1.02	1.02	1.18	Victorian, Edwardian	No
19	Graham Road and Mapledene	164	25	0.061**	9186	10	0.89	0.82	1.24	Victorian	Yes
20	Hanger Hill Garden Estate	25	20	-0.097***	-17887	14	1.09	1.22	1.64	Interwar	Yes
21	Hatcham	38	87	0.063+	5673	15	0.77	0.85	1.19	Victorian	Yes
22	Heaver Estate	142	183	-0.001	-199	5	0.88	1.09	1.88	Victorian	Yes
23	Hillmarton	80	109	0.281***	39855	10	0.51	0.93	0.7	Victorian	Yes
24	Holly Grove	52	98	-0.074***	-12078	10	1.12	1.08	1.41	Georgian, Victorian	No
25	Ladbroke	60	6	0.838***	111588	16	1.25	0.84	1.44	Regency	Yes
26	Mayfield	31	109	0.245***	32753	10	0.49	1.42	1.49	Interwar	Yes
27	Minet Estate	39	28	0.574***	95300	10	0.96	1.32	1.49	Victorian	Yes
28	Muswell Hill	254	108	0.129***	25888	20	0.85	0.77	1.15	Victorian	No
29	Noel Park	80	94	0.042**	5322	10	0.44	0.79	0.26	Victorian	Yes
30	North Kilburn	40	60	0.100***	19348	10	1.03	0.58	1.02	Victorian	Yes
31	Oak Hill	43	85	0.006	910	8	0.42	0.62	0.76	Regency, Victorian	No
32	Overcliffe, Gravesend	5	45	-0.386***	-34061	6	-0.58	-0.54	-0.54	Victorian	No
33	Parsons Green	19	29	-0.213***	-61451	6	0.67	0.73	1.31	Victorian	Yes
34	Queens Park Estate	36	77	0.042***	6972	10	1.43	1.39	1.89	Victorian	No

Tab. A1. Conservation area details

Conservation area		Transactions		Δ Price (adjusted)		Survey obs. and Δ design score (adjusted)				Architectural style /	Planned
N	Name	In	Out	Ln points	Absolute (£)	Obs.	Distinct.	Attract.	Buildings	period	estate
35	Ravenscourt and Starch Green	60	209	0.062**	14018	10	0.94	0.93	1.15	Victorian, Edwardian	No
36	Sheen Road, Richmond	38	25	-0.107***	-23624	9	0.93	0.33	0.88	Victorian	No
37	Southborough	27	134	-0.037	-7670	15	0.62	1.27	1.45	Victorian	No
38	St John's Grove	36	118	0.260***	40703	10	1.04	1.08	1.27	Victorian	No
39	St John's Wood	74	81	0.312***	61703	10	1.14	1.59	1.45	Vict., Edw., Interwar	Yes
40	St Mark's	57	71	0.156***	22928	13	1.03	0.45	0.73	Victorian	Yes
41	St Matthias, Richmond	97	13	-0.289***	-80865	16	0.8	0.2	1.06	Victorian	No
42	Swiss Cottage	146	87	0.008	1645	10	0.86	0.81	0.81	Victorian	No
43	Telegraph Hill	139	121	0.002	259	15	1.09	1.49	1.69	Victorian	Yes
44	Tower Gardens	34	30	-0.041**	-4503	10	0.47	0.38	0.39	Edwardian	Yes
45	Turnham Green	46	40	-0.234***	-47101	13	0.82	1.09	1.22	Victorian	No
46	Wellesley Road, Chiswick	72	68	0.250***	46840	10	0.67	0.88	0.85	Victorian	Yes
47	West Putney	64	107	0.057***	9771	5	0.81	0.69	1.18	Victorian, Edwardian	No
48	Woodgrange Est., Forest Gate	31	60	0.204***	18953	11	0.76	0.96	1.09	Victorian	Yes

Notes: Transactions give the number of property transactions within an *In*side and *Out*side 250m buffer area from the conservation area boundary. Δ Price (adjusted) is the price difference between the buffer area inside vs. outside the conservation area, controlling for observable property and location characteristics, neighbourhood specific distance from conservation area boundary trends, and year x neighbourhood effects (equation 4). Survey N is the number of survey observations by conservation area. Distinc./Attract./Building stand for distinctiveness/ attractiveness/ buildings are attractive to look at. Δ design index (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ design index ranges from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

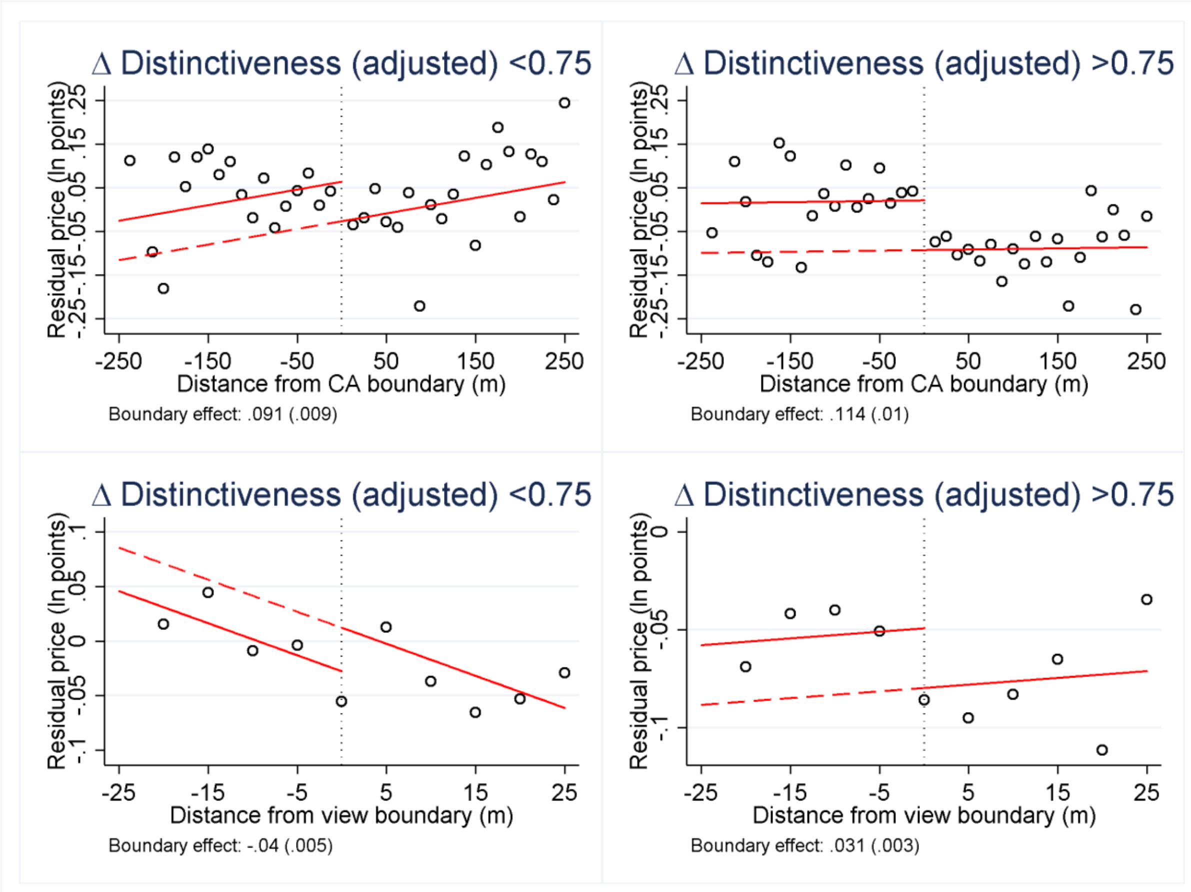
3.2 Boundary discontinuities: complementary evidence

The upper panels in Figure A5 compliment Figure 5 in the main paper by showing analogous estimates restricting the sample to properties whose structures were developed after 1945, but before the conservation area in a given neighbourhood was designated. Because of the lower number of available transactions we limit the comparison to two categories, which are otherwise similarly defined as in Figure 5 in the main paper. The key stylized facts are in line with the figure reported in the main paper. There is a notable discontinuity at the conservation area boundary, which is larger in neighbourhoods where the design differences are larger (right panel). We argue that these properties are the least likely to possess the characteristics that led to designation, thus any conservation area effect is less likely to originate an internal design effect and more likely to originate from an external view effect.

The lower panels of Figure A5 provide a similar comparison of (all) residual prices across the boundaries of our view areas. Because we concentrate on a much smaller area transactions are again relatively scarce so that we use the same two categories of within-neighbourhood variation in design as in the upper panels. Again, we find a positive discontinuity in residual prices in neighbourhoods where the conservation area has a large design advantage. Perhaps somewhat surprisingly, the discontinuity is negative in neighbourhoods where the differenced distinctiveness score is smaller (but typically still positive). This result is somewhat driven by the trend in residual prices and needs to be interpreted with some care given the limited number of transactions. The key-stylized fact that the (positive) discontinuity in prices is larger where differences in design are larger prevails.

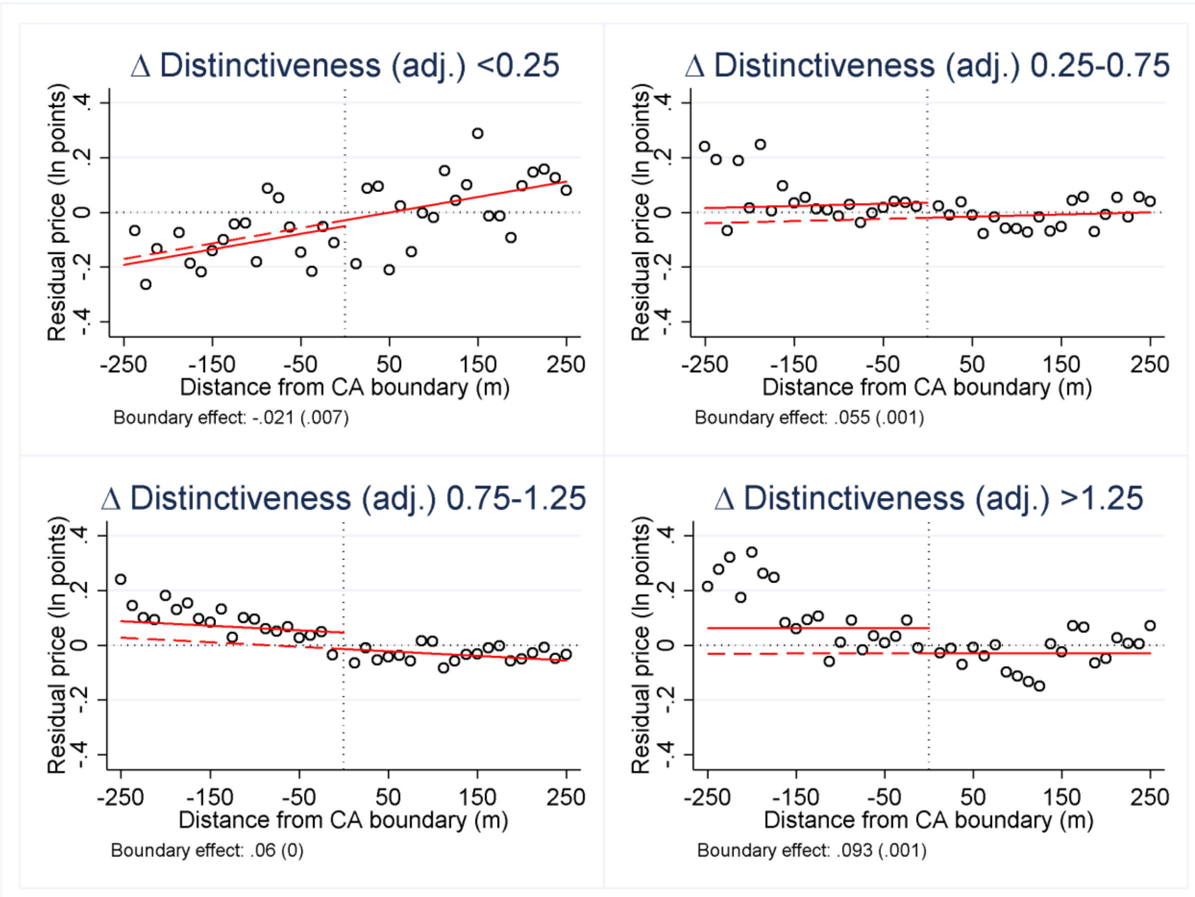
Figure A6 is an exact replication of Figure 5 in the main paper using the Land Registry data set instead of our preferred Nationwide data. The general patterns are remarkably similar to Figure 5 in the main paper. The boundary discontinuities are clearly visible and increase in the differenced design scores. Figure A6 is, once more, reassuring in the sense that it suggests that the results are not driven by sample selection in the Nationwide data set.

Fig. A5. Discontinuities in prices at conservation area boundaries by distinctiveness: Externality models



Notes: Residual prices are from regressions of the natural log of sales price against structural and locational controls, year fixed effects and neighbourhood fixed effects. Circles denote means of residual prices within 12.5 (upper panels) or 5 (bottom panel) meter distance bins within categories of neighbourhoods defined based on their adjusted Δ distinctiveness score (the recovered fixed effects from equation (5). Raw Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). The solid red lines illustrate the results of separate (for each of the Δ distinctiveness categories) regressions of residual prices against distance from the conservation area (CA) or view area boundary and a dummy variable taking the value of one for negative distance values. The unit of observation in these regressions is the bins (observations are weighted by the number of transactions within a bin). Boundary effects are the coefficients on the dummy variables from these regressions (standard errors in parentheses) and correspond to the gaps between the solid and the dashed lines.

Fig. A6. Discontinuities in prices at conservation area boundaries by distinctiveness: Land registry data



Notes: Residual prices are from regressions of the natural log of sales price against dummy variables capturing property type (detached, semi-detached, terraced vs. flat), whether a property is new, whether a property sells as leasehold, year fixed effects and neighbourhood fixed effects. Circles denote means of residual prices within 12.5 meter distance bins within categories of neighbourhoods defined based on their adjusted Δ distinctiveness score (the recovered fixed effects from equation (5). Raw Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Solid red lines illustrate the results of separate (for each of the Δ distinctiveness categories) regressions of residual prices against distance from the CA boundary and a dummy variable taking a value of one for values for negative distance values. The unit of observation in these regressions is the bins (observations are weighted by the number of transactions within a bin). Boundary effects are the coefficients on the dummy variables from these regressions (standard errors in parentheses) and correspond to the gaps between the solid and the dashed lines.

3.3 Hedonic estimates

In Table A2 we present a broader range of parameter estimates from models (3-5) in Table 2 in the main paper. In particular, we show the various estimates of the implicit prices of structural and hedonic attributes, which were not reported in the main paper to save space.

Tab. A2. Hedonic implicit prices

	(1)		(2)		(3)	
	All transactions				Non-historic pre-designation	
	Ln price		Ln price		Ln price	
Transaction within conservation area (CA)	-0.036	(0.054)	-0.071	(0.058)	-0.065	(0.104)
CA x Δ distinctiveness (adjusted)	0.134**	(0.055)	0.168**	(0.064)	0.230**	(0.110)
View impact area	-0.048	(0.035)	-0.064*	(0.035)	-0.108	(0.144)
View x distinctiveness (adjusted)	0.061	(0.049)	0.081*	(0.048)	0.112	(0.202)
0-50 m distance to CA buffer	0.019	(0.043)	-0.002	(0.048)	0.073	(0.124)
Buffer x distinctiveness (adjusted)	-0.042	(0.048)	-0.028	(0.059)	-0.054	(0.157)
Building age (years)	0.001***	(0.000)	0.001***	(0.000)	-0.002	(0.002)
Floor size (m^2)	0.005***	(0.000)	0.006***	(0.000)	0.006***	(0.001)
New property (dummy)	0.143***	(0.043)	0.158***	(0.040)	0.247	(0.202)
Leasehold (dummy)	-0.102***	(0.022)	-0.112***	(0.026)	-0.182***	(0.066)
Garage (dummy)	-0.017***	(0.005)	-0.020***	(0.006)	-0.025*	(0.013)
Central heating (dummy)	-0.000	(0.003)	-0.000	(0.004)	-0.003	(0.008)
No. of bathrooms	0.033***	(0.010)	0.032***	(0.012)	0.061	(0.053)
No. of bedrooms	0.082***	(0.007)	0.075***	(0.008)	0.064**	(0.026)
Detached house (dummy)	0.098***	(0.031)	0.079**	(0.035)	0.009	(0.092)
Semi-detached house (dummy)	0.053***	(0.017)	0.055**	(0.021)	0.004	(0.091)
Terraced house (dummy)	0.040**	(0.019)	0.033+	(0.022)	0.026	(0.077)
Distance to nearest Natural Park	-0.001	(0.024)	-0.013	(0.026)	0.103	(0.071)
Distance to nearest AONB[a]	-0.034+	(0.022)	-0.036	(0.025)	0.069	(0.069)
Distance to nearest NNR[b]	0.005	(0.025)	-0.009	(0.024)	0.051	(0.068)
Distance to nearest lake	-0.024	(0.024)	-0.039	(0.029)	-0.009	(0.066)
Distance to nearest river	0.006	(0.022)	0.009	(0.022)	-0.028	(0.066)
Distance to nearest coastline	-0.018	(0.022)	-0.021	(0.025)	0.014	(0.071)
distance to nearest bus stop	0.220***	(0.060)	0.153*	(0.078)	-0.137	(0.177)
Distance to nearest railway tracks	0.003	(0.025)	0.024	(0.028)	0.032	(0.080)
Dist. to nearest London Underground stations	-0.013	(0.027)	-0.008	(0.027)	0.021	(0.066)
IDW of Key stage 2 score per MSOA	0.057*	(0.033)	0.050+	(0.030)	0.070	(0.063)
Year x neighbourhood effects	Yes		Yes		Yes	
CA distance x neighbourhood effects	Yes		Yes		-	
Weighted	-		Yes		Yes	
N	7,871		7,871		1,127	
r2	0.917		0.919		0.959	

Notes: Expanded presentation of models reported in Table 2, columns (3-5) in the main paper. Unit of observation is transaction. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). CA distance x neighbourhood effects are neighbourhood specific distance to conservation area boundary trends (0 at boundary). Observations in (2-3) are weighted by the inverse of the number of transaction in a neighbourhood. Standard errors (in parentheses) are clustered on neighbourhoods. + $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. [a] Area of Oustanding Natural Beauty. [b] National Nature Reserve.

The results are generally very consistent across specifications and in line with economic intuition. Larger properties in terms of floor space, number of bedrooms and bathrooms are more expensive as are detached, semi-detached and terraced houses (as opposed to flats). New properties sell at a premium, but among other properties older properties achieve a premium in some possibly reflecting a premium for historical style and character. Leasehold (as opposed to freehold) is associated with a significant discount as expected. The only surprising parameter estimate among the structural characteristics is the negative coefficient of a garage, which indicates that properties with a garage are likely to have some unobserved negative features (e.g. unfavourable architectural style). Because we identify from variation within very small neighbourhoods where many locational attributes should be similar there is generally not sufficient within-neighbourhood variation to identify significant effects of locational features. An exception is the average key-stage 2 test scores in local school, which increases property prices as expected. The other and perhaps more surprising exception is the negative effect of proximity to a bus stop. One interpretation is that this effect is capturing the negative effects associated with a location at a major road (e.g. noise, pollution) where busses typically pass through.

4 Robustness

4.1 Boundary effects and placebos

In column (1) of Table 3 in the main paper we control for effects within 50m buffer zones inside conservation area boundaries defined for each neighbourhood (*Internal buffer x neighbourhood effects*). The rationale is that if a view externality exists, we expect the conservation area distinctiveness effect to increase in this model because properties located closer to the center of a conservation area should be exposed more intensely to design externalities. In the first three columns of Table A3 we gradually increase the size of the internal buffer from 25 to 75m. The conservation area distinctiveness effect increases continuously as expected.

In the last three columns of Table A3 we add similarly increasing external buffers. Because these *neighbourhood x external buffer effects* obviously interfere with *view x Δ distinctiveness effects* and *buffer x Δ distinctiveness effects* we drop those from these models. The decrease in the conservation area distinctiveness effect from column (4) to (5) comes as a surprise, but otherwise the results are in line with expectations (larger than the baseline estimate and increasing in buffer size).

Because the exact view area is difficult to approximate we experiment with different view area definitions Table A4. We consider an external buffer around the conservation area of varying width, not adjusted buildings and spaces that obstruct or facilitate views (unlike in our baseline). Otherwise the reported models are identical to our baseline model (4) in Table 2 in the main paper. The view area distinctiveness effects tend to be relatively robust and are largest when we define the view area as a 25m buffer area outside conservation areas. This result supports the starting point of the construction of our variable. The fact that the view area distinctiveness effect based on the 25m larger than in our baseline model reveals that our results are not driven by the manual adjustments made to the view area boundaries.

Starting from column (4) in Table A4 we conduct four falsification tests using artificial boundaries in Table A5. Model (3) is the same as model (4) in Table A4 and just included for comparison. In columns (1) and (2) we shift the conservation area boundaries towards the center of the conservation areas. In column (4) and (5) we shift the boundaries into the area outside conservation areas. As we shift the conservation area boundaries we parallel shift the boundaries of the view areas and the buffer areas. The placebo tests generally do not yield positive and significant design capitalization effects. The conservation area distinctiveness effect in (5) is an exception, possibly because the artificial conservation area boundaries are close to the actual view area boundaries.

Tab. A3. Varying internal and external neighbourhood x buffer effects

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price	(5) Ln price	(6) Ln price
CA x Δ distinctiveness (adjusted)	0.217***	0.238**	0.260**	0.203***	0.172***	0.179*
	(0.080)	(0.092)	(0.099)	(0.040)	(0.058)	(0.091)
View x Δ distinctiveness (adjusted)	0.083^{+}	0.086*	0.080^{+}			
	(0.050)	(0.050)	(0.049)			
Buffer x Δ distinctiveness (adjusted)	-0.013	-0.007	-0.004			
	(0.059)	(0.059)	(0.060)			
CA dummy	Yes	Yes	Yes	Yes	Yes	Yes
View dummy	Yes	Yes	Yes	-	-	-
Buffer dummy	Yes	Yes	Yes	-	-	-
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes
CA distance x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes
Neighbourhood x internal buffer effects	Yes	Yes	Yes	-	-	-
Neighbourhood x external buffer effects	-	-	-	Yes	Yes	Yes
Internal / external buffer size (meters)	25	50	75	25	50	75
Weighted	Yes	Yes	Yes	Yes	Yes	Yes
N	7,871	7,871	7,871	7,871	7,871	7,871
r2	0.920	0.920	0.920	0.920	0.920	0.920

Notes: Baseline model is model (4) in Table 2 in the main paper. Unit of observation is transaction. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside CA. View is a dummy variable identifying transactions outside CA with a view on buildings inside CA. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside CA. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to CA boundary trends (0 at boundary). Internal (external) buffer x neighbourhood effects are neighbourhood effects interacted with an internal (external) buffer on the inner (outer) side of the CA boundaries. Observations are weighted by the inverse of the number of transaction in a neighbourhood. Standard errors (in parentheses) are clustered on neighbourhoods. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Tab. A4. Distinctiveness effects: Varying view area definitions

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price	(5) Ln price	(6) Ln price
CA x Δ distinctiveness	0.166***	0.163**	0.165***	0.173**	0.161***	0.161**
(adjusted)	(0.060)	(0.061)	(0.059)	(0.065)	(0.059)	(0.060)
View x Δ distinctiveness	0.091	0.074	0.075+	0.116**	0.071+	0.098*
(adjusted)	(0.101)	(0.074)	(0.050)	(0.044)	(0.046)	(0.049)
Buffer x Δ distinctiveness	0.009	0.005	-0.005	-0.040	-0.030	-0.060
(adjusted)	(0.057)	(0.059)	(0.066)	(0.056)	(0.071)	(0.065)
CA dummy	Yes	Yes	Yes	Yes	Yes	Yes
View dummy	Yes	Yes	Yes	Yes	Yes	Yes
Buffer dummy	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes
CA distance x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes
Weighted	Yes	Yes	Yes	Yes	Yes	Yes
View area (meter)	10	15	20	25	30	35
N	7,871	7,871	7,871	7,871	7,871	7,871
r2	0.919	0.919	0.919	0.919	0.919	0.919

Notes: Baseline model is model (4) in Table 2 in the main paper. Unit of observation is transactions. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside conservation areas. View is a dummy variable identifying transactions outside conservation areas with a view on buildings inside conservation areas. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside conservation areas. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to conservation area boundary trends (0 at boundary). Observations are weighted by the inverse of the number of transaction in a neighbourhood. View area is a buffer of varying width outside conservation areas. Standard errors (in parentheses) are clustered on neighbourhoods. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Tab. A5. Distinctiveness effects: Placebo conservation area boundaries

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price	(5) Ln price
CA x Δ distinctiveness (adjusted)	-0.213***	-0.040	0.173**	0.167***	0.013
	(0.060)	(0.088)	(0.065)	(0.052)	(0.049)
View x Δ distinctiveness (adjusted)	0.031	0.057	0.116**	0.057	0.064
	(0.048)	(0.082)	(0.044)	(0.043)	(0.063)
Buffer x Δ distinctiveness (adjusted)	-0.191*	-0.127**	-0.040	0.113***	0.024
	(0.095)	(0.051)	(0.056)	(0.037)	(0.057)
CA dummy	Yes	Yes	Yes	Yes	Yes
View dummy	Yes	Yes	Yes	Yes	Yes
Buffer dummy	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Year x neighbourhood effects	Yes	Yes	Yes	Yes	Yes
CA distance x neighbourhood effects	Yes	Yes	Yes	Yes	Yes
Weighted	Yes	Yes	Yes	Yes	Yes
Boundaries shifted by (meters)	-100	-50	0	50	100
N	7,871	7,871	7,871	7,871	7,871
r2	0.919	0.918	0.919	0.919	0.918

Notes: Baseline model is model (4) in Table 2 in the main paper. Unit of observation is transactions. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside conservation areas. View is a dummy variable identifying transactions outside conservation areas with a view on buildings inside conservation areas. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside conservation areas. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to conservation area boundary trends (0 at boundary). Observations are weighted by the inverse of the number of transaction in a neighbourhood. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.2 Alternative design indices

Table A6 complements columns (2) and (3) in Table 3 in the main paper by applying our baseline econometric model (specification 6) including and excluding boundary distance trends to alternative design indices. We find that the conservation area design effects are robust to using the differenced attractiveness score instead of the differenced distinctiveness score, whether it is adjusted for interviewee characteristics or not. The view area design effect, while within the same range of the baseline model estimate, is consistently not statistically significant. The results are even weaker when we construct our design measure based on the alternative question inquiring about how attractive buildings are to look at. We conclude that the results are somewhat sensitive to the wording in the design questionnaire, revealing the importance of using formulations that seek to abstract from personal tastes and preferences.

Tab. A6. Design capitalization effects: Varying design indices

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price	(5) Ln price	(6) Ln price
CA x Δ design index	0.233***	0.196***	0.119**	0.096+	0.091+	0.090**
	(0.069)	(0.059)	(0.050)	(0.060)	(0.056)	(0.041)
View x Δ design index	0.068	0.044	0.023	0.066	0.040	0.037
	(0.061)	(0.047)	(0.050)	(0.049)	(0.039)	(0.037)
Buffer x Δ design index	0.002	0.018	0.020	-0.061	-0.033	-0.019
	(0.060)	(0.039)	(0.041)	(0.050)	(0.038)	(0.037)
Design index	Attractive-ness (raw)	Attractive-ness (adjusted)	Attractive-ness (adjusted)	Buildings are attrac-tive to look at (raw)	Buildings are attractive to look at (ad-justed)	Buildings are attractive to look at (ad-justed)
CA dummy	Yes	Yes	Yes	Yes	Yes	Yes
View dummy	Yes	Yes	Yes	Yes	Yes	Yes
Buffer dummy	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year x neigh. effects	Yes	Yes	Yes	Yes	Yes	Yes
CA dist. x neigh. effects	Yes	Yes	-	Yes	Yes	-
Weighted	Yes	Yes	Yes	Yes	Yes	Yes
N	7871	7871	7871	7871	7871	7871
r2	0.919	0.919	0.914	0.919	0.919	0.914

Note: Baseline model is model (4) in Table 2 in the main paper. Unit of observation is transactions. Adjusted design indices are neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Raw values are neighbourhood means across the scores reported by individuals. Reported Δ design indices can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside CA. View is a dummy variable identifying transactions outside CA with a view on buildings inside CA. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside CA. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to CA boundary trends (0 at boundary). Observations are weighted by the inverse of the number of transaction in a neighbourhood. Standard errors (in parentheses) are clustered on neighbourhoods. + $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.3 Income, education and crime

In column (5) of Table 3 in the main paper we report results of a model including a range of controls for socio-economic characteristics of the resident population and the density of various crimes. In column (1) of Table A7 we present the estimated effects of the socio-economic variables. As expected, property prices tend to be higher where incomes and education levels are higher. The ethnic variables are more difficult to interpret due to collinearity. They are primarily included to absorb as many correlated characteristics as possible. Conditional on education and income levels as well as various shares of ethnic groups we find that diversity is associated with a premium.

Tab. A7 Design effects: Controlling for socio-economic composition and interaction effects

	(1) Ln price		(2) Ln price		(3) Ln price	
CA x Δ distinctiveness (adjusted)	0.137**	(0.054)	0.131**	(0.058)	0.099+	(0.067)
View x Δ distinctiveness (adjusted)	0.087*	(0.045)	0.086*	(0.045)	0.078*	(0.043)
Buffer x Δ distinctiveness (adjusted)	-0.031	(0.059)	-0.033	(0.059)	-0.028	(0.057)
Median Income (2005 in 1000 £)	0.002**	(0.001)	0.002**	(0.001)	0.002**	(0.001)
Degree share (%, output area)	0.004***	(0.001)	0.004***	(0.001)	0.004***	(0.001)
Share of Mixed population at total population	0.062	(0.254)	0.074	(0.258)	0.050	(0.261)
Share of Asian population at total population	0.129	(0.180)	0.129	(0.180)	0.123	(0.183)
Share of Black population at total population	-0.140	(0.126)	-0.141	(0.126)	-0.152	(0.127)
Share of Chinese population at total population	-0.033	(0.170)	-0.032	(0.171)	-0.043	(0.172)
Herfindahl of ethnic segregation	0.159*	(0.089)	0.160*	(0.088)	0.145+	(0.089)
Δ Distinctiveness x Δ Median Income (in 1000 £)			0.003	(0.003)	0.002	(0.002)
Δ Distinctiveness x Δ Degree share (%)			-0.002	(0.003)	-0.004+	(0.003)
CA / View / Buffer dummies	Yes		Yes		Yes	
Controls	Yes		Yes		Yes	
Crime controls	Yes		Yes		Yes	
Distinctiveness x Δ socio-economic controls	-		-		Yes	
Year x neighbourhood effects	Yes		Yes		Yes	
CA distance x neighbourhood effects	Yes		Yes		Yes	
Weighted	Yes		Yes		Yes	
N	7,871		7,871		7,871	
r2	0.923		0.923		0.923	

Notes: Model (1) is model (5) in Table 3 in the main paper, showing additional parameter estimates. Unit of observation is transactions. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) / View / Buffer is a dummy variable identifying transactions inside conservation areas / outside CA with a view on buildings inside CA / within a 0-50 meter buffer area outside CA. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. Crime controls includes density of the following crimes: Anti-social behaviour, property crime, violent crime, theft. CA distance x neighbourhood effects are neighbourhood specific distance to CA boundary trends (0 at boundary). Observations are weighted by the inverse of the number of transaction in a neighbourhood. Standard errors (in parentheses) are clustered on neighbourhoods. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In column (2) we additionally allow for an interaction effect between the differenced distinctiveness score and differenced income and differenced degree share. This is to allow the design effect to vary in income and education levels. The results do not support that the design effect varies significantly in these variables and the conservation area design capitalization effects is reduced marginally only. In column (3) we present a very demanding model in which we allow the design effect to vary in all socio-economic variables. In this model the conservation area design capitalization effect is reduced by about one third and just about statistically insignificant (at the 10% level). Briefly summarized, we find evidence for design-based sorting, but limited evidence that the estimated premium is primarily driven by this sorting.

Controlling for crime hardly affects the design effect. This is in line with differenced crime densities not being strongly correlated with differenced distinctiveness scores as shown in Table A8. Thus, it does not seem as if crime and anti-social behaviour are more or less likely to occur in more or less distinctive areas.

Tab. A8. Differenced neighbourhood variables vs. differenced distinctiveness score

	(1) Δ ln Crime density: All reported crimes	(2) Δ ln Crime density: Anti-social behaviour	(3) Δ ln Crime density: Property crime	(4) Δ ln Crime density: Violent crimes	(5) Δ ln Crime density: Theft	(6) Δ Degree share (%)	(7) Δ Income (in 1000 £)
Δ distinctiveness score (adjusted)	-0.133 (0.129)	-0.058 (0.177)	0.000 (0.126)	-0.180 (0.155)	-0.226+ (0.152)	8.277** (3.270)	5.055** (2.203)
N	48	48	48	48	48	48	48
r2	0.009	0.001	0.000	0.011	0.030	0.141	0.135

Notes: Unit of observation is neighbourhood. Δ ln crimes, Δ income and Δ degree share are expressed as differences between the means of these variables across transactions within an inside and an outside 250m buffer drawn around a conservation area (CA) boundary. Income data merged to transactions are Experian estimates of the median household income in a census ward. Degree shares merged to transactions are from the 2001 census and available at the output area level. Δ distinctiveness score is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Standard errors (in parentheses) are heteroscedasticity robust. $^{+}$ p < 0.15, * p < 0.1, ** p < 0.05, *** p < 0.01.

4.4 Instrumental variable models

In model (8) in Table 3 in the main paper we address the concern that it is potentially the same households who reported design scores and bought properties inside conservation areas. Unobserved preference shocks could therefore introduce an endogeneity problem. Building on the evidence provided in Figure 4 we use the year of designation of a conservation area and the density of listed buildings inside a conservation area, both interacted with the conservation area dummy, as instruments for the interaction of the CA dummy and the differenced distinctiveness score (*CA x Δ distinctiveness score*). While we limit the presentation of instrumental variable estimates to one model in the main paper to save space, we report a broader range of estimates here in Table A9.

Tab. A9. Distinctiveness effects: Instrumental variable models (2SLS)

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price
CA x Δ distinctiveness (adjusted)	0.212***	0.221***	0.119	0.156
	(0.080)	(0.082)	(0.207)	(0.201)
View x Δdistinctiveness (adjusted)	0.065	0.082*	0.059	0.079+
	(0.046)	(0.048)	(0.044)	(0.049)
Buffer x Δdistinctiveness (adjusted)	0.001	0.002	-0.049	-0.033
	(0.050)	(0.050)	(0.107)	(0.106)
CA dummy	Yes	Yes	Yes	Yes
View dummy	Yes	Yes	Yes	Yes
Buffer dummy	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Year x neighbourhood effects	Yes	Yes	Yes	Yes
CA distance x neighbourhood effects	-	-	Yes	Yes
Weighted	-	Yes	-	Yes
Kleinbergen Paap F-statistic	10.160	9.873	5.880	6.407
Hansen J-statistic (p-value)	0.642	0.956	0.580	0.994
N	7,871	7,871	7,871	7,871
r2	0.728	0.719	0.721	0.713

Notes: Model (2) is model (8) in Table 3 in the main paper. Unit of observation is transactions. Adjusted design indices are neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Raw values are neighbourhood means across the scores reported by individuals. Reported Δ design indices can range from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside CA. View is a dummy variable identifying transactions outside CA with a view on buildings inside CA. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside CA. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x Neighbourhood effects are neighbourhood specific distance to conservation area boundary trends (0 at boundary). Instruments for CA x Δ distinctiveness are CA x year of conservation area designation and CA x natural log of listed building density within the respective conservation area. CA distance x neighbourhood effects partialled out from other variables to ensure that the covariance matrix of orthogonality conditions is full rank. Observations are weighted inversely to the number of observations in a neighbourhood in (2) and (4). Standard errors (in parentheses) are clustered on neighbourhoods. + $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

We find that in models excluding boundary distance effects (columns 1-2) the conservation area distinctiveness effect tends to be larger than in the baseline model. Conditional on boundary distance effects (column 3-4), the conservation area distinctiveness effect is smaller, but within the same range as in the respective model in Table 2 in the main paper. The distinctiveness effect, however, is not statistically significant due to large standard errors, probably because the instruments are weak in these models (KP F-stat<6.5). Overall, the results suggest that the results are not driven by unobserved preference shocks.

4.5 Distance weighted models

In model (9) of Table 3 in the main paper we employ an alternative approach to ensure that identification of conservation area distinctiveness effect originates from changes in prices at conservation area boundaries. Instead of controlling for boundary distance trends, we weight observations according to their proximity to the boundary. We use a standard Gaussian kernel with a bandwidth of 21.33 meters, which select following Silverman (1986). In Table A10 below we experiment with a broad range of bandwidths ranging from 10m to 250m. The results prove to be very insensitive to the choice of bandwidths.

Tab. A10. Distance weighted models

	(1) Ln price	(2) Ln price	(3) Ln price	(4) Ln price	(5) Ln price	(6) Ln price
CA x Δ distinctiveness	0.183^{**}	0.186^{***}	0.165^{***}	0.170^{***}	0.167^{***}	0.164^{***}
(adjusted)	(0.077)	(0.035)	(0.031)	(0.037)	(0.040)	(0.041)
CA dummy	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year x neighbourhood effects	Yes	Yes	Yes	Yes	Yes	Yes
View area excluded	Yes	Yes	Yes	Yes	Yes	Yes
Weighted	Inverse neighbourhood transactions x inverse distance from CA					
Bandwidth (meters)	10	25	50	100	150	250
N	4,878	7,057	7,057	7,057	7,057	7,057
r2	0.960	0.938	0.926	0.921	0.919	0.918

Notes: Baseline model is model (9) in Table 3 in the main paper. Unit of observation is transaction. Conservation area (CA) is a dummy variable identifying transactions inside conservation areas. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness ranges from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. Observations are weighted inversely to the number of observations in a neighbourhood multiplied by a kernel function that decreases in distance from the conservation area boundary on either side (Gaussian kernel). Optimal bandwidth is 21.33 meters (Silverman rule). Standard errors (in parentheses) are clustered on neighbourhoods. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.6 Bootstrapped standard errors

Arguably, the first-order problem with standard errors in specification (6) is that the identifying variation in the design score stems from neighbourhoods, while the unit of observation is transactions. To avoid deflation of standard errors, we cluster standard errors on neighbourhood level in our benchmark specifications. The comparison between columns (1) and (2) in Table A11 reveals that accounting for the clustered nature of the data increases the estimated standard errors, even though the significance levels are not affected substantially.

There is the additional concern that our design measures are "generated regressors". To account for the uncertainty that arises from having to estimate the first-stage we implement a bootstrapping procedure. In column (3) we draw bootstrap (with replacement) samples from the first stage in 1,000 replications and use the distribution of second stage point estimates to compute the significance levels. This procedure results in relatively narrow standard errors and high significance levels. Reassuringly, the placebo *Buffer x Δ distinctiveness* effect still remains insignificant. In the remaining models we, in addition, also block bootstrap (clustering at the neighbourhood level) the second stage. With this procedure the resulting standard errors are within close range, but consistently smaller than in the corresponding models with clustered errors.

Tab. A11. Distinctiveness effects: Bootstrapped standard errors

	(1) Ln rice	(2) Ln rice	(3) Ln rice	(4) Ln rice	(5) Ln rice	(6) Ln rice	(7) Ln price
CA x Δ distinctiveness	0.168^{***}	0.168^{**}	0.168^{***}	0.168^{***}	0.160^{***}	0.134^{**}	0.230^{**}
(adjusted)	(0.047)	(0.064)	(0.025)	(0.063)	(0.049)	(0.055)	(0.103)
View x Δ distinctiveness	0.081^{*}	0.081^{*}	0.081^{***}	0.081^{*}	0.074^{+}	0.061	0.112
(adjusted)	(0.043)	(0.048)	(0.022)	(0.046)	(0.049)	(0.046)	(0.132)
Buffer x Δ distinctiveness	-0.028	-0.028	-0.028	-0.028	-0.020	-0.042	-0.054
(adjusted)	(0.042)	(0.059)	(0.024)	(0.049)	(0.048)	(0.041)	(0.126)
CA dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
View dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Buffer dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x neigh. effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CA distance x neigh. effects	Yes	Yes	Yes	Yes	-	Yes	-
Weighted	Yes	Yes	Yes	Yes	Yes	-	Yes
Sample	All	All	All	All	All	All	Non-historic pre-designation
Standard errors	Robust	Clus-tered	Bootstr. 1st stage	Bootst. 1st stage & 2nd stage	Bootstr. 1st stage & 2nd stage	Bootstr. 1st stage & 2nd stage	Boot-strapped 1st stage & 2nd stage
N	7,871	7,871	7,871	7,871	7,871	7,871	1,127
r2	0.919	0.919	0.919	0.919	0.915	0.917	0.959

Notes: Unit of observation is transactions. Model (2) is the baseline model from Table 2, column (4) in the main paper. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness ranges from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Conservation area (CA) is a dummy variable identifying transactions inside conservation areas. View is a dummy variable identifying transactions outside conservation areas with a view on buildings inside conservation areas. Buffer is dummy variable identifying transactions within a 0-50 meter buffer area outside conservation areas. Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to CA boundary trends (0 at boundary). Observations in (1-5) and (7) are weighted by the inverse of the number of transaction in a neighbourhood. Robust standard errors (in parentheses) are heteroscedasticity robust. Clustered standard errors are clustered on neighbourhoods. 1st stage bootstrapped standard errors in (3) are generated by bootstrapping samples of survey respondents (with replacement), placing the recovered design fixed effects second-stage price regressions in 1000 replications. 1st and 2nd stage bootstrapped standard errors, in addition, are block (clustered on neighbourhoods) bootstrapped (with replacement) in the second stage. $^{+}$ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.7 Non-linear approximation of distinctiveness effect

Throughout most of the main paper we remain restrictive with respect to the functional form of the price-design relationship. In Figure 8 of the main paper we present a transparent attempt to explore a potential non-linearity using neighbourhoods as a unit of analysis. Here, we provide a complementary analysis at the transaction level based on our baseline capitalization specification (6). To analyse the partial correlation between prices and the design interaction term we proceed as follows. First, we recover the residuals from the regression of the natural log of price against all covariates except the *CA x Δ Distinctiveness* interaction term. Second, we recover the residuals from a regression of the *CA x Δ Distinctiveness* interaction term against all other covariates. Third, we approximate the partial correlation by fitting polynomials of distinct orders and locally weighted regressions (LWR) into the residuals. We repeat the procedure for the *View x Δ Distinctiveness* interaction term.

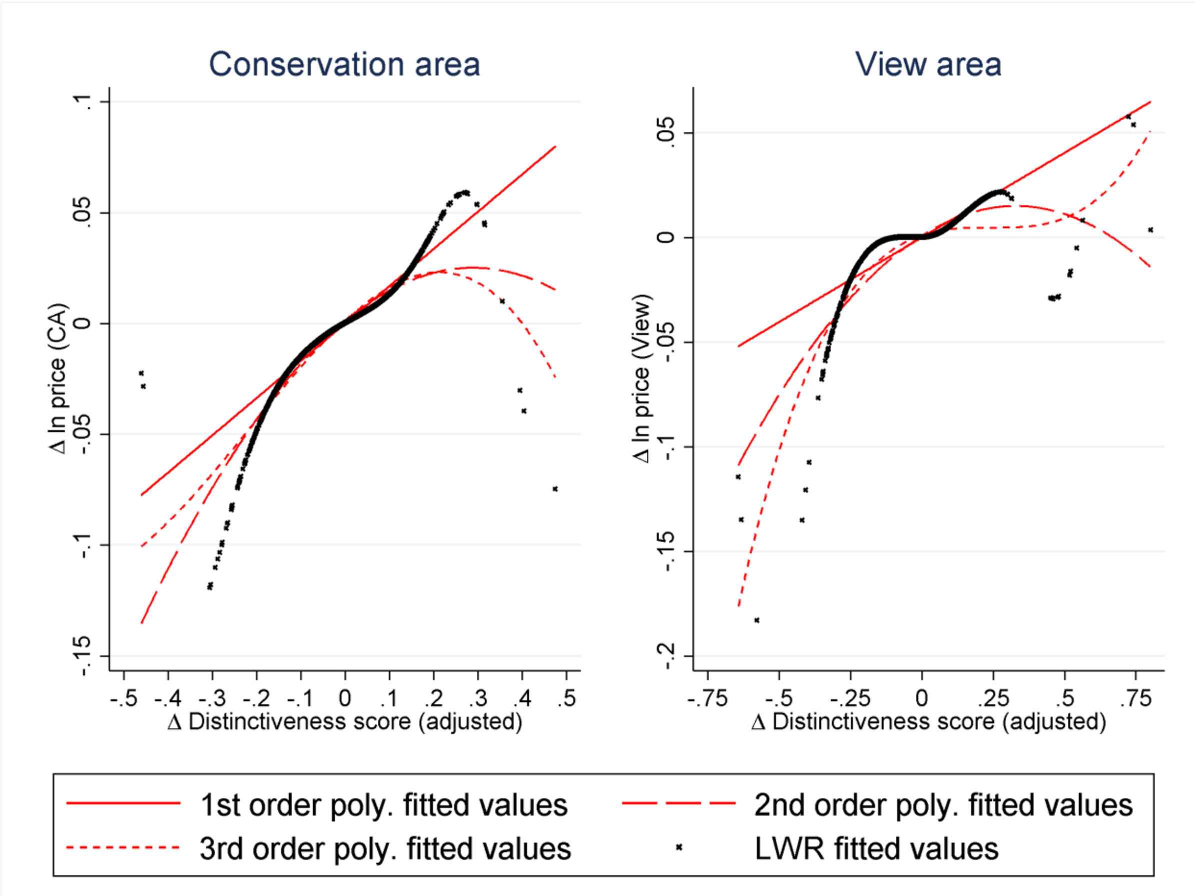
In Table A12 we report the resulting polynomial approximations up to order three of the conservation area distinctiveness effect (1-3) and view area distinctiveness effect (4-6). We illustrate these polynomial fits along with a LWR approximation in Figure A7. Figure A7 is suggestive of a non-linear relationship in some parts of the distribution, in particular in segments that seem relatively sparsely populated. To obtain a better impression of the overall distribution we compute the marginal effects from the third-order polynomial models in Table A12 (columns 3 and 6) and illustrate them in Figure A8. We find that the mean and median of the distribution of marginal conservation area design effects is slightly above the baseline estimate while the distribution of marginal view area design effects is centred on a value slightly below the baseline estimate. The marginal effects are generally within a narrow range for the vast majority of observations. Thus, we conclude that there is little evidence in support of a non-linearity in the design capitalization effect, although we caution against over-interpreting this result given the limited number of neighbourhoods from which we identify.

Tab. A12. Distinctiveness effects: Polynomial approximations

	(1) Δ Ln price	(2) Δ Ln price	(3) Δ Ln price	(4) Δ Ln price	(5) Δ Ln price	(6) Δ Ln price
Interaction effect	CA	CA	CA	View	View	View
[Δ Distinctiveness (adjusted)]^1	0.168***	0.165***	0.184***	0.081***	0.086***	0.045
	(0.033)	(0.033)	(0.042)	(0.029)	(0.029)	(0.039)
[Δ Distinctiveness (adjusted)]^2		-0.286*	-0.288*		-0.131*	-0.190**
		(0.169)	(0.169)		(0.073)	(0.082)
[Δ Distinctiveness (adjusted)]^3			-0.451			0.264+
			(0.599)			(0.167)
CA	Yes	Yes	Yes	Yes	Yes	Yes
View	Yes	Yes	Yes	Yes	Yes	Yes
Buffer	Yes	Yes	Yes	Yes	Yes	Yes
CA x distinctiveness	-	-	-	Yes	Yes	Yes
View x distinctiveness	Yes	Yes	Yes	-	-	-
Buffer x distinctiveness	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year x neigh. effects	Yes	Yes	Yes	Yes	Yes	Yes
CA dist. x neigh. effects	Yes	Yes	Yes	Yes	Yes	Yes
Weighted	Yes	Yes	Yes	Yes	Yes	Yes
N	7,871	7,871	7,871	7,871	7,871	7,871
r2	0.003	0.004	0.004	0.001	0.001	0.002
aic	-3711.330	-3712.204	-3710.770	-3711.330	-3712.562	-3713.047

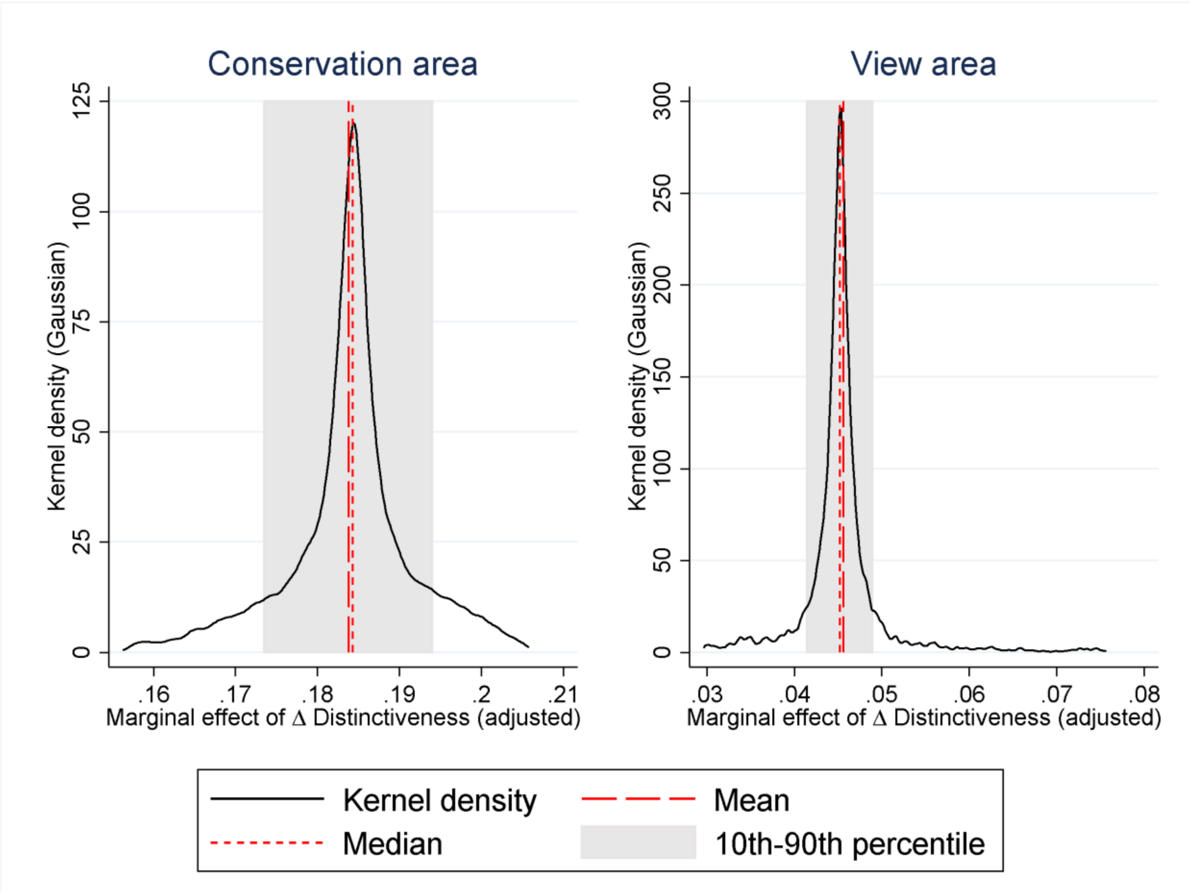
Notes: Baseline model is model (4) in Table 2. Models estimated using the Robinson procedure. Dependent variable is the residual from a regression of the natural log of sales price against all covariates except the one for which we report the coefficient in the table. Independent variable is the residual from the regression of the variable for which we report the coefficient against all other covariates. Conservation area (CA) / View / Buffer are dummy variables identifying transactions inside CA / transactions outside CA with a view on buildings inside CA / transactions within a 0-50 meter buffer area outside CA. CA x distinctiveness / View x distinctiveness / Buffer x distinctiveness are the same interacted with distinctiveness. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness ranges from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Controls include building age, floor space, the number of bathrooms, the number of bedrooms, whether a property is new, sells under leasehold, has a garage, has central heating, is a detached house, is a semi-detached house, is a terraced house, the distance to the nearest natural park, the nearest area of outstanding beauty, the nearest natural nature reserve, the nearest lake, the nearest river, the nearest bust stop, the nearest rail station, the nearest underground station, and a distance-weighted measure of average test scores at local schools. CA distance x neighbourhood effects are neighbourhood specific distance to CA boundary trends (0 at boundary). Observations are weighted by the inverse of the number of transaction in a neighbourhood. Standard errors (in parentheses) are heteroscedasticity robust. + $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Fig. A7. Distinctiveness effects: Non-linear approximations



Notes: Unit of observation is transaction. Figure shows non-linear approximations of the conditional relationship between natural log of prices and distinctiveness in differences across conservation area boundaries (left) and view area boundaries (right). First, the residuals from a regression of the natural log of sales price against all covariates except the interaction between CA (left) or View (right) and the differenced distinctiveness score are recovered and plotted on the y-axis. Second, the residuals from the regression of CA (left) or View (right) and differenced distinctiveness score against all other covariates are recovered and plotted on the x-axis. Δ distinctiveness (adjusted) is the neighbourhood effects controlling for individual characteristics recovered from the estimation of equation (5). Reported Δ distinctiveness ranges from -2 (not at all distinctive relative to surrounding areas) to +2 (very distinctive relative to surrounding areas). Third, polynomial functions (based on estimates from Table A12) and locally weighted linear regressions are fitted to approximate the functional relationship between the recovered residuals. Locally weighted linear regressions use a Gaussian Kernel with a bandwidth of 0.1.

Fig. A12. Marginal distinctiveness effects in non-linear models (3rd order polynomial)



Notes: Figure shows the marginal Δ distinctiveness effects (adjusted) of the 3rd order polynomial models reported in Figure A7 and Table A12, column (3) and (6). The marginal effects are computed as $\sum_{o=1}^{3} 1/o \times \widehat{\aleph_o}\hat{\vartheta}^o$, where $\hat{\vartheta}$ is the residual from the regression of CA (or View) x Δ distinctiveness (adjusted) against all other covariates (used as dependent variable in Table A12) and $\widehat{\aleph_o}$ is o-order polynomial parameter in Table A12. Kernel densities are computed over all observations within 1st-99th percentile the distribution of marginal effects to improve the readability of the graph. Means and medians are computed using the entire distributions.