Land Use Policy 99 (2020) 105042

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

The price premium of heritage in the housing market: evidence from Auckland, New Zealand

David Bade [a], Jose Gabriel Castillo [b,*], Mario Andres Fernandez [c], Joseph Aguilar-Bohorquez [d]

[a] Heritage Unit, Auckland Council, Auckland, New Zealand
[b] College of Social Sciences and Humanities, Escuela Superior Politécnica del Litoral, ESPOL, Guayaquil, Ecuador
[c] Research and Monitoring Unit, Auckland Council, Auckland, New Zealand, and ESAI Business School, Universidad Espiritu Santo, Guayaquil, Ecuador
[d] Department of Applied Economics, University of Minnesota, St. Paul, MN, USA

ARTICLE INFO

JEL classification:
C21
R1
R2
R5
Z10

Keywords:
Heritage
Heritage premium
Hedonic price models
Housing market
Conservation areas

ABSTRACT

Heritage places are one of many urban features that shape the form and identity of a city. Local government regulations protect and conserve heritage but in so doing also generate restrictions or opportunity costs for homebuyers and developers. In this paper, we take Auckland, New Zealand, as case study and estimate price effects of two different forms of local government heritage protection: scheduled heritage places and Special Character Areas. We find a statistically significant price penalty of around -9.6% for houses protected for heritage values, between years 2006-2016. Yet, we also identify an external and local price premium, related to the number of heritage places around a house. This local density effect is approximately 1.7% for an additional heritage place in a radius of 50 meters around the house, and decreases as the radius under analysis expands. We also find a price premium for a house located in Special Character Areas, for which the effect is positive and reaches 4.3%. Reported effects are robust to several specifications but are highly dependent on time dynamics.

1. Introduction

Heritage shapes the form and identity of cities. Heritage may refer to any (tangible) place or site, or (intangible) traditional practice or knowledge that is endowed with historical or cultural significance (ICOMOS, 2010). Heritage is associated with externalities that add value to local housing markets (e.g., landscaping or aesthetic values), but is also a public good where maintenance and preservation costs are not necessarily shared among those who enjoy the benefits. This disparity between public benefits and private costs leads to a perceived burden with owning heritage, which justifies public intervention for preservation (Koster and Rouwendal, 2017; Moro et al., 2013). Understanding the net economic effects of heritage in the housing market remains an empirical challenge. Results are often inconclusive and not easily generalizable: urban regulations over land use and construction are diverse and differ between cities and development needs; while cities have different natural, historical, and cultural backgrounds. This paper offers robust evidence of the heterogenous effects of different heritage preservation policies in the real estate market, in particular, heritage-listed properties/buildings in heritage areas (HA) and those Special Character Areas (SCA), also known as conservation areas.

Heritage rules preserve and protect heritage values by limiting demolition, rebuilding or alterations to heritage buildings. However, these rules also create restrictions on the range of potential land uses. This clash then results on trade-offs to homebuyers when deciding to locate in a heritage-listed house, while developers may find it more advantageous to deliver housing in non-heritage areas given the relatively weaker regulations. Therefore, the net effect of heritage on housing prices is context-dependent. A positive effect may reflect homebuyers' preferences on certainty and permanence of preservation rules that will prevent alterations on the character value of heritage houses (Ahlfeldt and Maennig, 2010; Ahlfeldt et al., 2017; Lazrak et al., 2014; Wright and Eppink, 2016; Schaeffer and Millerick, 1991; Leichenko et al., 2001; Coulson and Lahr, 2005). A negative effect may in turn imply perceived and real restrictions related to what can and cannot be done to a building due to strict construction, development and maintenance regulations (Been et al., 2016; Koster et al., 2012; Turner and Haughwout, 2014).

Economic literature on heritage separates internal and external

* Corresponding author.
E-mail addresses: david.bade@aucklandcouncil.govt.nz (D. Bade), jcastil@espol.edu.ec (J.G. Castillo), mario.fernandez@aucklandcouncil.govt.nz (M.A. Fernandez), aguil213@umn.edu (J. Aguilar-Bohorquez).

https://doi.org/10.1016/j.landusepol.2020.105042
Received 10 September 2019; Received in revised form 4 May 2020; Accepted 19 August 2020
Available online 9 September 2020

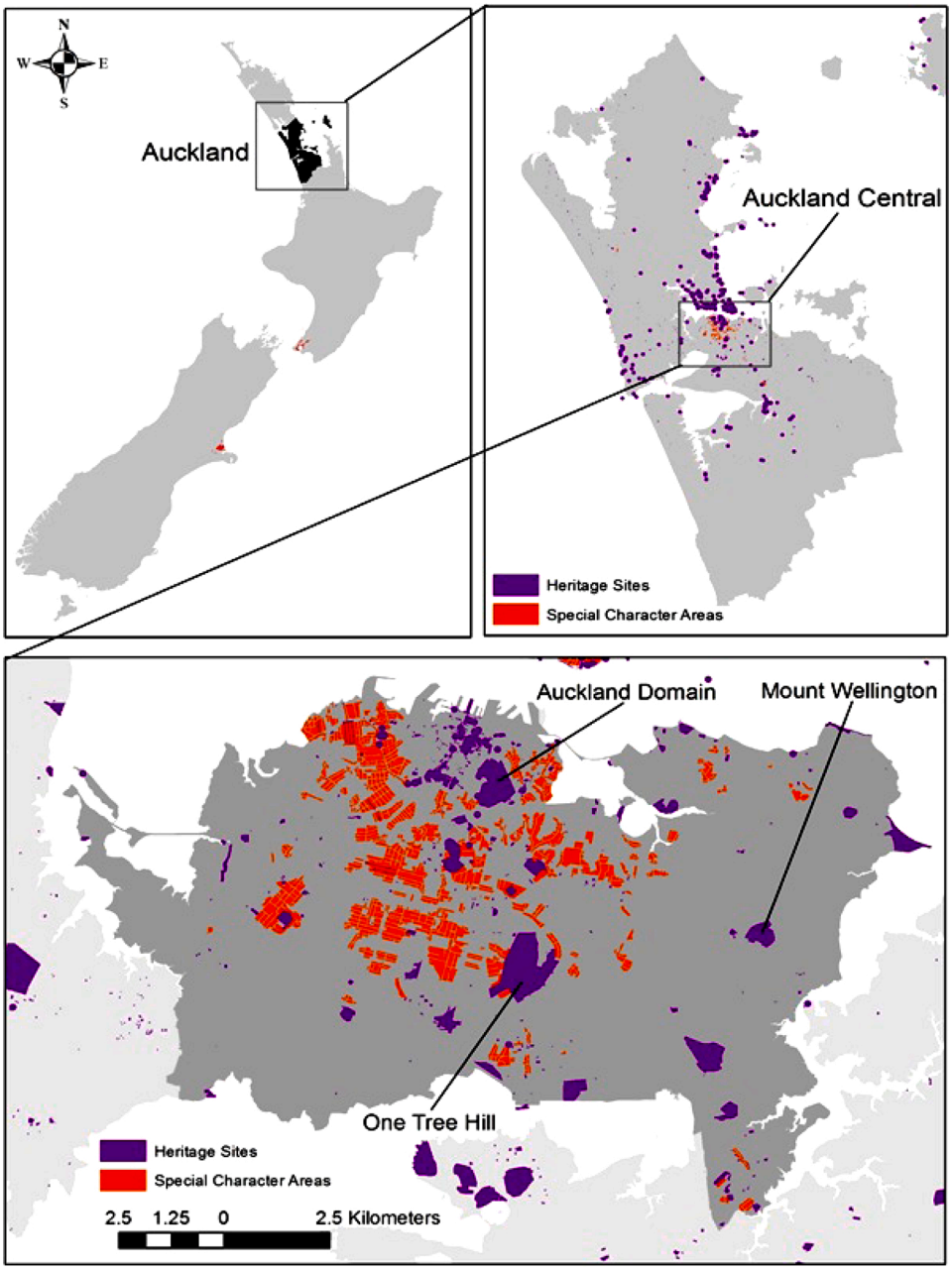


Fig. 1. Heritage places and special character areas in Auckland (2-columns fitting image, use color).

effects. Internal effects apply to properties/buildings that have been listed as heritage, for which particular construction or renovation rules apply; while external effects in turn occur on neighbouring non-heritage houses, that is, the presence of spillover effects (Ahlfeldt and Maennig, 2010). For example, Ahlfeldt et al. (2012) find that houses located in conservation (heritage) areas in England are sold for a premium of 9% that increases relative to the size of the area and years since heritage designation. Moro et al. (2013) find in Dublin, Ireland, that some types of heritage sites, such as historic buildings, memorials and the Martello towers, provide positive spillovers to property prices, whereas archaeological sites result in price discounts. Ahlfeldt and Maennig (2010) find a negative effect ranging between 3 and 5%, for heritage places in Berlin. They also find a localized price premium from positive externalities in surrounding properties that decreases from 2.8%, for houses located within 50 m of a historical landmark, to 1.4% if within 100 m, and 0.1% if within a 600 m radius. Deodhar (2004) analyze heritage-listed houses in the Ku-ring-gai suburb in Sydney, and find a premium of 12%.

In New Zealand, heritage places are defined as features possessing aesthetic, archaeological, architectural, commemorative, functional, historical, landscape, monumental, scientific, social, spiritual, symbolic, technological, traditional, or other tangible or intangible values, associated with human activity (ICOMOS, 2010). The urban form of Auckland, New Zealand's largest city, is particularly defined by a relatively young heritage landscape and a unique profile comprising a wide range of open spaces and conservation areas, beaches, wetlands, and volcanic features. There are approximately 2,500 heritage places in the city, including archaeological sites, churches, halls, industrial buildings, monuments, residences, shops, lighthouses and schools. Fig. 1 shows that, for example, the Auckland Domain (one of the city's most visited parks) contains a variety of heritage places, such as Māori (New Zealand's indigenous people) and European archaeological sites, memorials, buildings, structures and trees.

Though the value of environmental and urban amenities (through hedonic prices modelling) has been extensively investigated in Auckland

(Auckland Council, 2017; Allpress et al., 2016; Rehm and Filippova, 2008; Filippova, 2009; Fernandez et al., 2019; Fernandez and Bucaram, 2019), research on the value of heritage is scarce. This research gap has become relevant in the last decade as pressures to boost housing supply and densification of the city have put pressure on heritage preservation in the city, such as the desire to demolish heritage houses to deliver modern housing. Hence, the purpose of this paper is to estimate the price effects of two types of heritage designations in Auckland: heritage areas (HA, henceforth), which may also include features such as historical buildings, structures and archaeological sites (also known as listed buildings/properties); and, the Special Character Areas (SCA, henceforward), which are residential or business streetscape areas identified as having collective and cohesive historical and aesthetic values (also known as "conservation areas") (Auckland Council, 2018). Preservation rules and legislation for the HA and SCA are different, which may result in different effects on housing prices.

We estimate hedonic price models using a dataset of 226,286 sales transactions occurring between 2006 and 2016, which, along with variables on internal housing characteristics, were extracted from the Valuation Rates Dataset compiled by the Auckland Council. We control whether a house is located within an HA, SCA, or both. We also calculate the distances between each house to the nearest HA or SCA. We also focus on the spillover effects and account for heritage density, which is calculated as the number of heritage places in a radius of 50, 100 or 200 m. around each house (Moro et al., 2013; Franco and Macdonald, 2018; Ahlfeldt et al., 2012). Other controls include time effects as well as urban characteristics, such as whether the house is located within a special housing area (SHA, henceforth) and legacy districts prior to the city amalgamation in 2010 (see Section 2)

We find a negative price effect of 9.6% for houses located within an HA, whereas houses located within a SCA have a price premium of 4.3%. The coefficient of the interaction between SCA and HA is significant and positive (13.1%), suggesting that the dominant market effect of heritage corresponds to SCA rather than HA. We also find that in a radius of 50 m the price premium is 1.7% per additional heritage place, this premium declines to 1.4% for a radius of 100 m, and to 0.05% for a radius of 200 m. Results are robust to a number of specifications and the inference strategy accounts for potential correlation at specific neighborhoods (census area units), former legacy districts and time dynamics.

This paper identifies the effect of heritage preservation rules on house prices in Auckland - of particular interest given the current tension arising from urban expansion and densification, and the need to deliver more affordable housing in Auckland. With the robust assessment of the net price effect of different heritage preservation policies, this work provides evidence relevant to the design and enhancement of site protection, land-use and urban planning policy platforms. The paper is structured as follows: Section 2 describes the Auckland context and heritage scheduling process, Section 3 details the hedonic model and empirical approach, Section 4 presents results, and Section 5 concludes the paper.

2. Heritage in Auckland

Auckland is New Zealand's largest city and main powerhouse of the national economy. Roughly a third of all New Zealanders live in the city, and this share is projected to grow to 50% by 2060 (Statistics New Zealand, 2016). Auckland, therefore, faces a challenge in coping with this growth and balancing the growing economy while also maintaining public amenities and infrastructure.

Māori were the first humans to settle in the region in the fourteenth century. The Māori name for Auckland is Tāmaki Makaurau (Tāmaki of a hundred lovers), referring to the plentiful natural resources that attracted Māori to the region, and later British and Irish settlers during the colonization of New Zealand from the mid-nineteenth century. The settlement began close to the port and expanded across the region as transportation links developed, resulting in a number of suburb hubs and the sprawling of Auckland. Auckland's heritage thus encompasses extensive archaeological features and landscapes associated with Māori or post-European settlement or activity, burial grounds, historic cemeteries, memorials or monuments, historic gardens and plantings, historic buildings, structures or objects, and traditional townscapes and streetscapes.

Heritage in Auckland is valued as an amenity for its aesthetic, symbolic, and educational attributes. There are over 75 historical societies with volunteers who offer their time to research and advocate for local history, and over 60 heritage trails that highlight the history of the local area for the public. A 2019 survey of Aucklanders showed that 91% believed the protection of heritage was important, and 94% had visited a heritage place in the past year (Bade, 2019).

2.1. Heritage management and special character areas in Auckland

Several organizations contribute to the management of Auckland's heritage. Some have statutory responsibilities (using regulatory control measures), while others, such as local historical societies, community groups and individuals, are driven by a knowledge of and passion for heritage (using non-regularly control measures to raise the awareness of preservation). Those with statutory responsibilities include Heritage New Zealand and the Auckland Council. The Auckland Council has the duty to uphold the Resource Management Act (1991) (RMA) which defines heritage as "natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures." Under the RMA, the "protection of heritage from inappropriate subdivision, use, and development" is a matter of national importance. Special character is treated as an amenity in the RMA for which the Auckland Council must have "particular regard to." To uphold the RMA, the Auckland Council protects Auckland's heritage and special character through the scheduling of heritage places and SCAs in the AUP.

In this paper we focus on two forms of heritage protection: scheduled heritage places and special character areas. The process for a heritage place and special character area to be identified for protection and management is as follows: First, a heritage place or special character area can be nominated by any member of the public, a historical society, a government heritage organization, or by the Auckland Council. In most cases, places or areas are nominated as a result of the Auckland Council heritage survey program, which systematically investigates areas of Auckland for their heritage significance. Once nominated, the places or areas are evaluated to determine whether they meet the threshold for potential inclusion in the Unitary Plan schedule. For heritage places, they must have considerable values in at least one of the following eight criteria: historical, social, Mana Whenua (Māori), knowledge, technology, physical attributes, aesthetic, and context values. For special character areas, two factors must be considered: physical/visual qualities and historical values. If the place or area meets the threshold for scheduling, a plan change process can take place. A plan change is a public process to make a change to the Unitary Plan. Members of the public, the land owner, heritage organizations, iwi (Māori tribe), and others may submit on the plan change for or against the place or area being scheduled. A plan change hearing is then held whereby a panel of independent commissioners, review the plan change, listen to the submitters and come to a decision on whether or not the place or area should be scheduled as a heritage place or as a special character area. The panel weighs the benefits of the protection and management of a heritage place against other matters, such as reasonable use of a property. Overall, the schedule process can take a year or longer, depending on whether a decision is subject to appeal. When the schedule decision is made, it is identified in Schedule 14 or Schedule 15 of the AUP.

There are about 2,500 scheduled heritage places in Auckland and 50 scheduled SCAs. Between 2006 and 2012 around 100 heritage places were added to the heritage schedule, and in 2013 further 220 places were added to the schedule. Only a handful of special character areas were added during the same period. Once on the schedule, a heritage overlay area (HA) is determined, as well as a geographical extent for an SCA. The

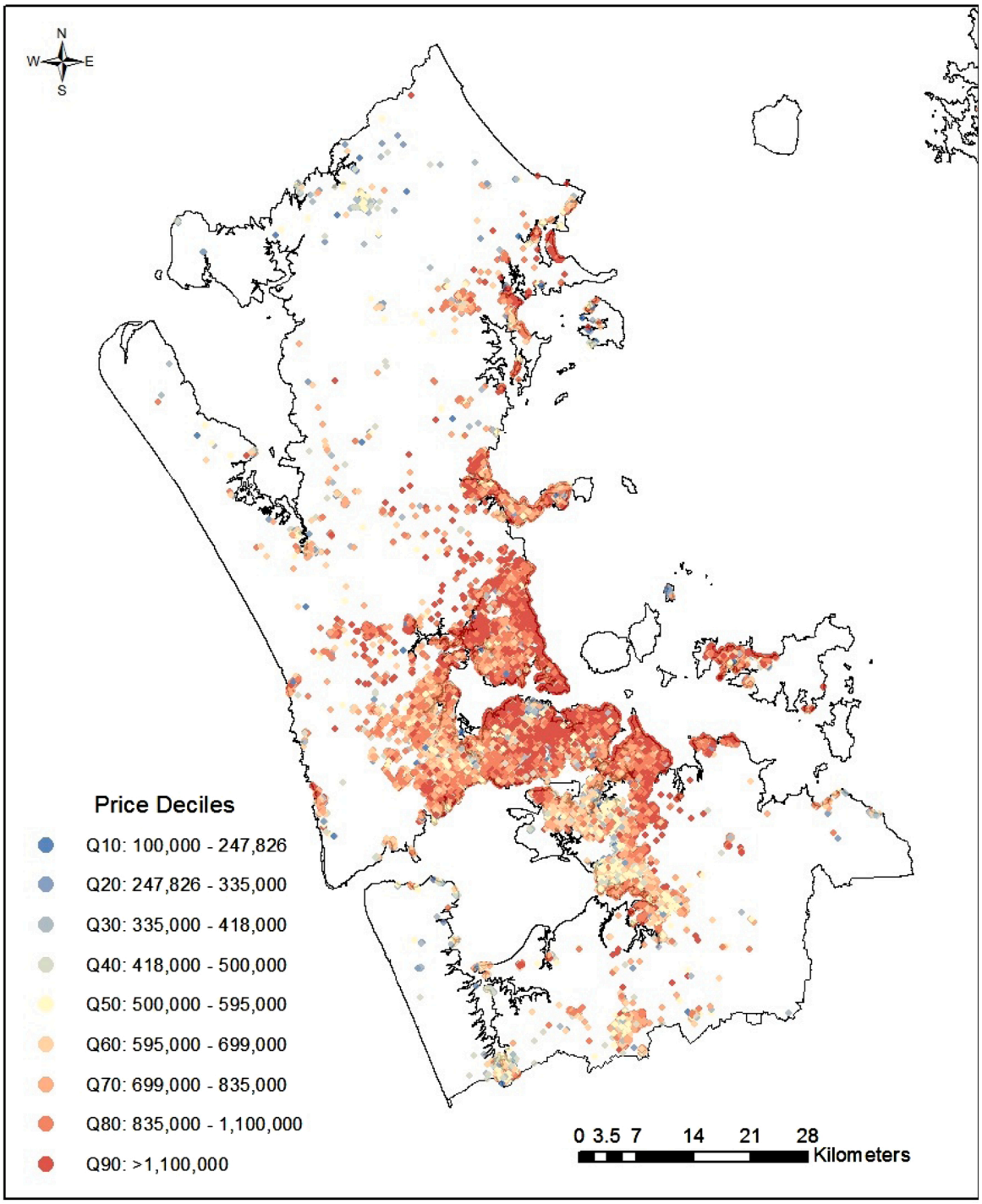


Fig. 2. Spatial distribution of sales transactions in Auckland, by price deciles, 2006-2016 (1.5-column fitting image, use color).

geographical extent of HAs or SCAs usually follow property boundaries although sometimes follow landscape features, such as for archaeological sites. The area within the extent is subject to the respective heritage or special character provisions of the AUP. As a result, any work to modify, restore, demolish, destruct or relocate any aspect of the HA or SCA must require a resource consent, so the Auckland Council can ensure the work does not harm or destroy any heritage values.

HA and SCA provisions differ. HA rules are more stringent and, as they focus on protecting heritage values such as the original fabric of a building, have stronger controls on demolition and alterations. Heritage is given a higher level of protection in legislation as it is a matter of "national importance" under the RMA (1991), [1] and often carries greater importance relative to other planning issues. The SCA rules in turn focus on maintaining the collective historical values of an area through managing the appearance of the streetscape. That is, SCA are considered more as an amenity matter with a lower heritage status compared to the HA[2] .

[1] RMA, section 6(f)
[2] Under the RMA section 7.

2.2. Heritage premium in Auckland?

In November 2010, Auckland's previous regional council and its seven cities and district councils (Auckland City, Manukau, Waitakere, North Shore, Papakura, Rodney and Franklin) amalgamated to form the Auckland Council (the "Super City"), a local government authority following a government-led Royal Commission on Auckland Governance. The aim was to make Auckland's governance more efficient and to allow the city to develop into a vibrant metropolitan center. As a result, the AUP, a planning rulebook for all of Auckland, was developed and adopted in 2016. The AUP sets rules for what, where and how buildings can be built in the city. Building decisions are conditional to the considerable public benefits of heritage, but also to the costs to maintain and conserve the heritage values placed on private owners. While the benefits of owning heritage relate to the pleasure or enjoyment associated with owning a heritage place, the costs or burdens are more visible (Deodhar, 2004). The real and perceived costs include: maintaining and ensuring alterations and extensions to heritage buildings are sympathetic, the opportunity cost of forgoing land development opportunities, lengthier approval processes, and costlier materials and tradespeople relative to modern building materials and methods.

Few studies explore the effects of heritage on house prices in Auckland or even in New Zealand. Fig. 2 shows how the housing market transactions are distributed across the city. During the development of the AUP, studies were conducted to ascertain the economic value of heritage properties. One finds that there is a positive relationship between older buildings and property values for sales in the Auckland suburb of Point Chevalier (Small, 2014). After controlling for other factors, buildings constructed before 1950 were sold for around $65,000 more. Another study finds that, after controlling for the location, condition, and size of the dwellings, individuals are willing to pay 9.8% more for older (pre-1940) dwellings. In addition, each additional pre-1940 dwelling in a meshblock (i.e., neighborhood area) leads to a 0.3 per cent premium for each dwelling in the area (Nunns et al., 2015). These studies suggest that Aucklanders are willing to pay a premium for older houses. We extend previous heritage studies by incorporating not only the age of buildings but also the explicit location of a house within a HA or SCA, or both, the distance to the nearest HA or SCA. We also go beyond heritage houses but include a wide range of other heritage places to construct the density variables described in Section 3.

3. Empirical approach

3.1. Hedonic price method extended

To estimate the heritage price premium we use hedonic price models for their versatility to reveal preferences and trade-offs that households incur when choosing between different houses, land and locations within a single market, or across submarkets (Rosen, 1974; Zabel, 2015). Those trade-offs capture jointly the value that households place on heritage and other amenities and; consequently, the willingness to pay for particular heritage attributes and their associated external effects (Moro et al., 2013). Thus, in equilibrium, premiums or penalties of amenities are capitalized into housing prices (Ahlfeldt and Maennig, 2010).[3]

Our first specification divides house prices into its value-bearing attributes as follows:[4]

$$\ln(\text{Price})_{it} = \beta_0 + \beta_1 \text{HA}_i + \beta_2 \text{SCA}_i + \beta_3 (\text{HA}_i \times \text{SCA}_i) + \theta_1 \text{DistanceHA}_i + \theta_2 \text{DistanceSCA}_i + X_{it}\gamma_1 + W_{it}\gamma_2 + \delta^{AU} + \alpha^D + \lambda^m + \omega_t + \varepsilon_{it} \quad (1)$$

where $\ln(\text{Price})_{it}$ is the variable of interest representing the logarithm of the house's i price per square meter in period t. HA and SCA are time invariant dummy variables denoting whether a house is located within a heritage area or special character areas, respectively; hence, β_1 and β_2 capture the average marginal effect on housing prices of each heritage preservation policy. On top of both effects, β_3 captures the interaction of both policies, that is, the differential effect on the price of a house/property designated as heritage within a SCA, versus those outside a SCA. Importantly, as we do not observe the specific dates of the heritage designation of HA and SCA, there is the risk of attenuation bias due to measurement error.[5] Nonetheless, most of the designation of HA and SCA occurred decades ago and any changes to preservation rules happened in late 2016, when the Auckland Unitary Plan came into force. Also, we include the distance to the nearest heritage place and SCA, the marginal effects per Km are then captured in the coefficients θ_1 and θ_2, respectively.

X_{it} is a vector of housing internal characteristics that consists of variables such as construction materials; construction conditions; building floor area; actual living space area, number of car spots; the zone type is residential, among others (see Appendix for more details). We also include variables like the linear and squared house's age at moment of sale, land value, whether the house is located in a volcanic viewshaft and whether the house is located in a blanket height sensitive (BHS) area. Viewshafts are areas with views to volcanic features where the maximum building height permitted is lower than in other areas to preserve the aesthetic value of volcanic cones views. Similarly, in BHS there is a building height limit restriction of eight meters around the base of volcanic cones because of the close-up views of the cones from the immediate public surroundings (Auckland Council, 2017). To control for other landscape amenities, we also include categorical variables for views such as: city, suburb or landscape views (Rohani, 2012; Filippova, 2009; Samarasinghe and Sharp, 2008). Additionally, from a digital elevation model we obtain the altitude, slope angle, and slope orientation (aspect) of each house (Gibbons et al., 2014). γ_1 corresponds to the vector of coefficients or marginal effects of each associated variable.

However, heritage effects may be confounded with other environmental amenities or urban and neighborhood features. For instance, some heritage places are contiguous or within open spaces (e.g., parks or reserves). Also, some properties are within Special Housing Areas (SHA), which are areas designated as part of a mechanism to fast-track development of housing, in order to mitigate the Auckland housing shortage.[6]

We also include an additional set of controls, W_{it} is a vector consisting on the linear and squared distances to the nearest open space, coastal area, freshwater waterway, wetland, volcanic feature, and Mana Whenua site. These variables are proxies for environmental amenities

[3] Among economic valuation methods, hedonic pricing stands as one of the most robust and data intensive methods; however, it is not free of criticism, mostly related to basic assumptions that are necessary for its calculation, including: the price of properties is set in a competitive market (i.e., there are no restrictions to trading such as those in subsidized housing projects), the willingness to pay is met by the household ability to pay (i.e., no binding budgetary constraints), among others.

[4] We subindex at house and year level only, slightly abusing notation. Other fixed effects parameters included in the specifications are superindexed accordingly to avoid index congestion.

[5] We thank an anonymous reviewer for pointing this out.

[6] Any project above 14 dwellings are requested to allocate a percentage to affordable housing. Most large developments have to provide at least 10 per cent of affordable housing set at prices that were affordable to specified income groups (Auckland Council, 2013). SHA were argued to be effective alternatives to produce affordable housing that would not otherwise be produced without resorting to public subsidies and producing the affordable units in segregated, stigmatized and geographically dispersed areas (Schuetz et al., 2009, 2011; Kontokosta, 2014).

and separate their price effects from heritage and SCA (Brasington and Hite, 2005; Conway et al., 2010). Other distance variables included proximity to main roads, a potential disamenity associated with traffic and noise (Swoboda et al., 2015), and distance to the CBD that can reduce commuting costs (Brasington and Hite, 2005). Correspondingly, γ_2 is the vector of coefficients for marginal effects of each associated regressor.

Finally, in order to account for the influence of neighborhoods, school zones and unobservable issues of labor markets, in addition to potential influences of relative wages, unemployment rates and crime rates (Filippova, 2009), we include fixed effects by Area Unit (AU), δ^{AU}. AU are non-administrative geographic areas containing a population of 3,000" 5,000 people (Statistics New Zealand, 2016). These are defined for statistical purposes of taking censuses but greatly coincide with neighborhood limits. We aggregate the 400 AU in Auckland to 193 in order to have at least 800 transactions per aggregated AU, aggregation was implemented in terms of geographic contiguity. Furthermore, Auckland has undergone significant changes in the last decade, particularly the amalgamation of the former regional and legacy districts in 2010. In addition to changes in the governance scheme, previous administrative, social and environmental factors, as well as infrastructure and services provided in the previous districts may have affected market dynamics and prices behavior. To control for potential correlation at pre-amalgamation districts level, we include district fixed effects, α^D; and, for time and market dynamics (seasonality and trends) or any other time variant omitted factors, we incorporate year and monthly dummies captured in parameters λ^m and ω_t. ε_{it} is the idiosyncratic error term, assumed to be independent conditional on all included regressors.

To assess whether the effects are local, specific to the heritage designation or to the heritage agglomeration, we construct three variables depicting heritage places density (HD): the number of heritage places in the radii of 50 m, 100 m and 200 m around the housing unit. The original specification is modified as follows:

$$\ln(\text{Price})_{it} = \beta_0 + \beta_1 \text{HA}_i + \beta_2 \text{SCA}_i + \beta_3(\text{HA}_i \times \text{SCA}_i) + \kappa_r \text{HD}_i^r + \theta_1 \text{DistanceHA}_i + \theta_2 \text{DistanceSCA}_i + X_{it}\gamma_1 + W_{it}\gamma_2 + \delta^{AU} + \alpha^D + \lambda^m + \omega_t + \varepsilon_{it} \quad (2)$$

where κ_r is the marginal effect of the number of heritage places within a radii of r meters (i.e., 50 m, 100 m and 200 m).[7]

Models are estimated through ordinary least squares (OLS) using high-dimension methods to control for the high number of fixed effects available (Correia, 2017).[8] An important aspect about inference in this line of research is related to the adequate cluster level for the standard errors, which is particularly useful in analyzing spatial unobserved dependence. By including spatial fixed effects, such as area units (a proxy for neighborhoods) and legacy districts, we assume that unobserved heterogeneity is specific to these unit levels. By estimating the model through OLS, and assuming i.i.d. idiosyncratic errors, inference occurs on the basis that spatial correlation and dependence are fully accounted for by the spatial-specific fixed effects. However, in practice, cluster-specific fixed effects may not fully control for cluster correlation and heteroscedasticity (Cameron and Miller, 2015). Thus, spatial dependence can be more complex where spatial weights may be used (Anselin and Lozano-Gracia, 2008). To overcome these problems, we take a direct approach by including the full set of dummies for the spatial and time fixed effects, and estimate multi-way cluster-robust standard errors (Cameron et al., 2011; Cameron and Miller, 2015). Provided we observe houses sold multiple times, and in order to account for within neighborhood unobserved heterogeneity, we adjust robust standard errors at two-way clustering at house and AU. Main results are shown considering these arguments. Importantly, we tested different clustering levels for robustness, and conclusions remain the same whether for the HA and SCA dummies or for the different radii for heritage density (see the Appendix A for further details).

3.2. Data

Price data for house sales were extracted from the Auckland Council Valuation Rate Dataset. The dataset consists of sales transactions between January 2006 and December 2016. The initial dataset comprised of about 226,000 transactions. We excluded outliers and non-arms-lengths transactions, as well as observations with missing or inconsistent information. As initial estimations are sensitive to extreme values, we truncate the data through a boxplot elimination approach to get 218,497 valid observations for the final analysis. Overall we removed only 3.5% of the original sample. The year with the highest per cent of removed observations was 2010, and the year with the least per cent of removals was 2015 (see Table B.1 in the appendix). Other sample changes due to the estimation procedure (singleton elimination, Correia (2017)) and model specifications are analyzed on a case by case basis.

The dataset geocoded all transactions, which means we can determine the proximity of houses and properties to heritage places and SCA, and calculate distances to the nearest urban and environmental amenities. Fig. 2 shows the spatial distribution of house sale transactions in Auckland. Furthermore, our dataset is a combination of spatially-referenced datasets for sales transactions, containing information on housing characteristics, location (AU and legacy districts), and distances to environmental amenities. Table 1 shows descriptive statistics of all the variables used.

Data for the environmental amenities come from the online portals of the Auckland Council and New Zealand's Department of Conservation. Though further categorization of open spaces is possible, for example, conservation areas (for natural heritage) or regional reserves, in this paper we do not pursue to estimate implicit prices for environmental amenities. Still, it should be mentioned that houses are on average located within 150 m to an open space or 1.65 km to a coastal area, which greatly defines the city's urban form (Allpress et al., 2016).

4. Results

To provide a detailed analysis of the effects of HA and SCA on the housing market in Auckland we separate the results into three subsections: the first two relate to the price-premium on house prices, and the last section discusses the dynamics of the estimated effects.

4.1. Housing and the heritage price-premium

Table 2 shows estimates for Equation (1). We concentrate on the results for HA and SCA variables.[9] The results confirm that, under several specifications, a price premium exists for houses located within an SCA;[10] however, contrary to the results in other studies, and once

[7] We show results of this specification by each radii.

[8] Coding and details can be found in the author's website: http://scorreia.com/software/reghdfe/

[9] See the Appendix for results on the full specification.

[10] About 6.3% of the houses in the sample are within a SCA.

Table 1
Descriptive statistics

	Mean	SD	Min	Max
Price of sale (NZD)	726,486.15	482,519.11	39,000	13,990,000
Floor area of house (m-sq)	148.67	75.82	13	2676
Land value (NZD)	352,980.68	267,774.04	0	10,000,000
Land area (m-sq)	1,463.69	3,834.16	22	645,021
Ln(Price of sale/Floor area)	8.46	0.40	7	10
Heritage (=1)	0.01	0.08	0	1
Located in SCA (=1)	0.06	0.24	0	1
Heritage buffer (50m)	0.02	0.24	0	18
Heritage buffer (100m)	0.13	0.61	0	20
Heritage buffer (200m)	0.56	1.86	0	20
Located in SHA (=1)	0.04	0.19	0	1
House age (years)	34.41	26.86	1	181
Located in volcanic viewshaft (=1)	0.17	0.38	0	1
Located at blanket height (=1)	0.02	0.15	0	1
Car spots freestanding	0.47	0.71	0	10
Car spots with roof	0.77	0.84	0	10
Distance to nearest historic heritages (Km)	0.57	0.57	0	9
Distance to nearest SCA (Km)	4.16	5.46	0	80
Distance to nearest Mana Whenua site (Km)	5.75	7.90	0	87
Distance to wetlands (Km)	1.30	0.89	0	6
Distance to parks with volcanic features (Km)	7.03	8.74	0	91
Distance to green areas (Km)	0.36	0.29	0	3
Distance to AU centroid (Km)	0.62	0.87	0	23
Distance to CBD (Km)	13.03	10.32	0	96
Distance to nearest river (Km)	0.43	0.49	0	3
Distance to nearest marine area (Km)	11.42	8.75	0	58
Distance to nearest beach (Km)	4.15	6.23	0	62
Distance to nearest main road (Km)	0.87	0.71	0	5
Distance to nearest school (Km)	0.56	0.66	0	13
Distance to nearest SHA (Km)	1.59	3.88	0	81

Notes: SCA and SHA stand for Special Character Area and Special Housing Area, respectively. CBD stands for Central Business District. Distance to green areas (Km) is the distance to the nearest park, conservation area, ecological area, reserve, or golf camp.

controlling for several potential confounding factors, we find a consistent negative premium for houses that are within HA. For our preferred specification (Column 5), other things equal, we find that the heritage effect by itself implies a negative response of about -9.6% on housing prices per square meter.[11] Interestingly, heritage designation has a positive and significant effect on houses if they are located within a SCA (4.3%); or a premium of around 7.91% if within both, HA and a SCA. These results are robust to several specifications and fixed effects.[12]

The price dynamics of the housing market hinders the fact that heritage designated constructions, as well as the neighborhoods where such public interest has been placed, are not directly comparable to those constructions outside these areas. As shown in Fig. 3a, failing to control for geographical factors, and other housing and environmental amenities characteristics, might bias the results towards positive ground. This would be the result of estimating the direct regression of housing prices on the HA dummy only, no controls included, a naive specification. Something similar happens for the SCA effect, albeit in this case in the opposite direction (see Fig. 3b in the Results section).

Furthermore, we observe that for the basic specification in Column 1 in Table 2, without controls, the price premium for any house located within a HA is not significant; however, there is a high and significant price premium (31.5%) for houses on a SCA (the interaction effect is also high, positive and significant), and we do not find any significant effects for houses located in a SHA. This baseline specification ignores a number of likely relevant variables that jointly determine the price formation in the housing market.

To isolate the HA and SCA effects, we test the robustness of the results and address potential biases due to confounding factors Moro et al. (2013); we control sequentially for several fixed effects until the full specification on Equation (1). All regressions include month and year fixed effects, as is customary in hedonic price models. Once we control for housing internal characteristics in Column 2, the magnitude of the marginal effect for HA increases considerably and becomes highly significant, but for the SCA effect, it decreases drastically; yet, it remains statistically significant. The interaction term is also statistically significant and positive in all specifications. The model in Column 3 introduces controls for district amenities, which isolate the effects of urban and environmental aspects from heritage places and SCA (because of geographic contiguity); or else, results may reflect the preference of households to environmental amenities rather than built heritage places (Brasington and Hite, 2005; Conway et al., 2010). In Column 4 we add AU fixed effects to control for neighborhood unobservable characteristics (e.g., quality of public services, or noise contamination), given the high segmentation of Auckland(tm)s housing market (Bourassa et al., 2003; Filippova, 2009). For specifications in Columns 4 and 5, once controlling for neighborhood heterogeneity, distance variables to SCA or heritage places are no longer significant. Note that, although the housing market dynamics is affected by the district's amalgamation, most of the changes come from the districts outside of central Auckland (see Section 4.3 for details). Fig. 1 shows that most heritage areas and SCA are in central Auckland and in the North Shore, which coincide with the location of higher-price houses. Furthermore, legacy districts were large and highly heterogeneous relative to AU, which capture more meaningful neighbourhood-level correlation. Hence, we observe that including the pre-amalgamation district fixed effects have little impact on the overall average results.

Our preferred specification is shown in Column 5. This specification shows that, once controlling for AU effects, the city's amalgamation did not introduce any further changes on the capitalization of heritage and SCA in housing prices. Also, note that the fixed effects for AU and Legacy Districts do not significantly increase the goodness of fit for the specifications in Columns 4 and 5 relative to 3. As mentioned, holding other things equal, there is a negative statistically significant effect of -9.6% in the price of a house located within an HA, whereas the price premium for a house located within a SCA becomes significant and of a magnitude of 4.30%. The coefficient for the interaction effect is significant, high and positive, that is, there is a net correction that points to the fact that the dominant market effect for an specific property, when both conditions hold, lies on the SCA attributes rather than HA alone.[13] While the heritage designation price effect falls in negative grounds outside SCA,

[11] To interpret the results we follow Halvorsen et al. (1980) to adjust the dummy coefficients for percentage changes, that is: $(e^{\beta} - 1) \times 100$.

[12] A reasonable doubt derives from potential preferences' heterogeneity in those properties within both preservation policies (i.e., within both HA and SCA). To confirm our results, we estimate model 5 in Table 2 for house/properties within and out the SCAs, independently. As expected, estimated coefficient for heritage outside the SCAs (93% of the sample) remains around the same negative magnitude; while the estimated effect for heritage for properties within the SCAs is around 3.8%; which corresponds to the difference between the interaction term and the heritage dummy in Table 2.

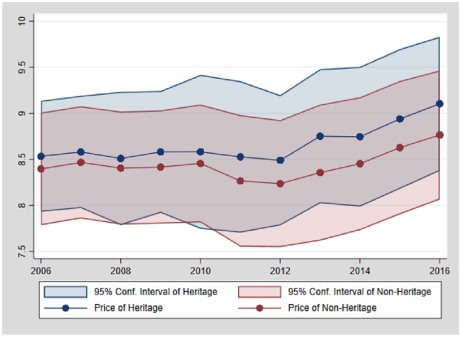
[13] Inference is at two-way clustering at house and areal unit level. Regardless of the clustering strategy, results for heritage and SCA are robust and conclusions hold.

Table 2
Heritage market premium on housing, main results

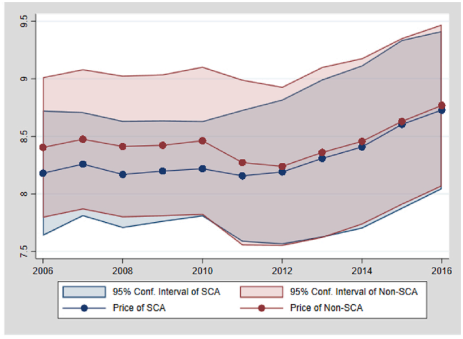
Ln(price of sale/floor area)	(1)	(2)	(3)	(4)	(5)
Heritage (=1)	−0.0018	−0.0851***	−0.1077***	−0.1006***	−0.1007***
	(0.0439)	(0.0203)	(0.0180)	(0.0284)	(0.0284)
Located in SCA (=1)	0.2740***	0.0731***	0.0528***	0.0430***	0.0430***
	(0.0305)	(0.0186)	(0.0115)	(0.0083)	(0.0083)
Heritage*SCA	0.1554**	0.1441***	0.1570***	0.1233***	0.1233***
	(0.0629)	(0.0370)	(0.0299)	(0.0319)	(0.0319)
Located in SHA (=1)	−0.0528	−0.0421	−0.0260	−0.0387***	−0.0387***
	(0.0440)	(0.0376)	(0.0234)	(0.0141)	(0.0140)
Distance to nearest historic heritages (Km)	−0.1339***	−0.0455*	−0.0179	−0.0094	−0.0095
	(0.0365)	(0.0232)	(0.0124)	(0.0102)	(0.0102)
Distance to nearest SCA (Km)	−0.0224***	−0.0084***	0.0129***	−0.0003	−0.0006
	(0.0039)	(0.0027)	(0.0046)	(0.0057)	(0.0058)
Household characteristics	No	Yes	Yes	Yes	Yes
Districts amenities	No	No	Yes	Yes	Yes
Areal unit FE	No	No	No	Yes	Yes
Pre-amalgamation districts FE	No	No	No	No	Yes
Month of sale FE	Yes	Yes	Yes	Yes	Yes
Year of sale FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.3121	0.5216	0.5879	0.6193	0.6193
Observations	218494	211021	211021	211021	211021

Notes: SCA and SHA stand for Special Character Area and Special Housing Area, respectively. Fixed Effects-FE. Housing characteristics include: building age, linear and squared house age at moment of sale, land value, car spots free standing, car spots with roof, and dummy variables of located at volcanic viewshaft, located at blanket height, zone type, district before amalgamation, slope orientation, view scope, mass view, walls material, roof material, walls condition, roof condition and house type. Districts amenities include linear and squared distances from houses to the nearest: Mana Whenua site, wetlands, volcanic feature, green area, Auckland city center, CBD, waterway, main road, marine area, beach, school, SHA and squared distances to nearest heritage place and nearest SCA. Robust standard errors in parenthesis, for a two-way clustering at house and areal unit levels (Cameron et al., 2011; Correia, 2017)

* Significant at 10 percent level.
** Significant at 5 percent level.
*** Significant at 1 percent level.



(a) Annual average of natural logarithm of housing price per square meter, by heritage designation



(b) Annual average of natural logarithm of housing price per square meter, by SCA designation

Fig. 3. Selling price dynamics of the housing market in Auckland, by heritage and SCA designations (2-column fitting image, use color) (a)Annual average of natural logarithm of housing price per square meter, by heritage designation, (b) Annual average of natural logarithm of housing price per square meter, by SCA designation.

for houses located within a SCA it renders a positive price premium of approximately 3.5%, for a compound effect of around 7.9% over houses that are scheduled as heritage within a SCA.

A major reason for the differences between HA inside and outside SCAs is the effect on neighboring properties. SCA rules apply for the whole block or street and act to protect the character of the street from developments of poor quality. As a result, homeowners know that their neighboring houses will preserve their character value in terms of design, subdivision, setback etc. On the contrary, stand-alone HA houses (not in an SCA or in relatively deprived areas of the city) could have unattractive neighboring buildings right around to the property line, without official consent; consequently, decreasing any heritage market value. The overlap between HA and SCA promotes relative homogeneity in the heritage character of blocks or streets (including houses), rather than the preservation of a single feature as in the case of heritage houses alone. Therefore, the positive interaction observed is meaningful in this context. After controlling for numerous urban and environmental amenities, the interaction effect captures the combined effect from the posh neighborhoods where SCAs tend to locate and the amenity value of SCAs (e.g. streetscape and aesthetics) relative to more specific HA houses, located in relatively more deprived areas in the city.

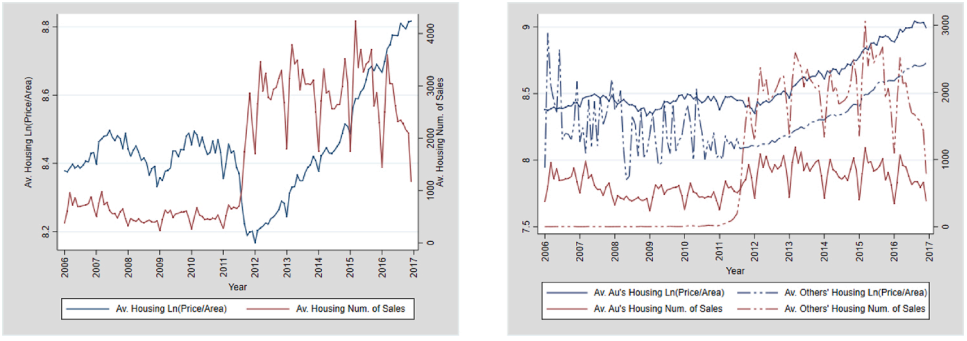
Furthermore, not every AU has a heritage place; hence, results might be biased (attenuated) by the number of properties that are not influenced by any heritage spillovers or regulation in place. We should also expect some heterogeneity of the results conditional on the interaction between the year of the transaction and the AU. This concern relies on the heterogeneity and concentration of heritage places, through our estimations account for the average effects, other things equal. To further explore the consistency of our results, first we estimate our model with a subsample of those AU for which there is at least one heritage place. This reduces to approximately 40% of the original sample (see Table B.4 in the Appendix). Then, we test our main specification with the interaction fixed effects for year and AU or legacy districts (see Table B.5 in the Appendix). Results and conclusions remain

Table 3
Heritage market premium on housing, buffer analysis

Ln(price of sale/floor area)	(1)	(2)	(3)	(4)
Heritage (=1)	−0.1007***	−0.1113***	−0.1062***	−0.1052***
	(0.0284)	(0.0295)	(0.0276)	(0.0293)
Heritage buffer (50m)		0.0173**		
		(0.0077)		
Heritage buffer (100m)			0.0140**	
			(0.0060)	
Heritage buffer (200m)				0.0049**
				(0.0024)
Located in SCA (=1)	0.0430***	0.0423***	0.0407***	0.0401***
	(0.0083)	(0.0083)	(0.0084)	(0.0085)
Heritage*SCA	0.1233***	0.1183***	0.1099***	0.1218***
	(0.0319)	(0.0322)	(0.0304)	(0.0324)
Located in SHA (=1)	−0.0387***	−0.0389***	−0.0388***	−0.0390***
	(0.0140)	(0.0140)	(0.0140)	(0.0140)
Distance to nearest historic heritages (Km)	−0.0095	−0.0086	−0.0054	−0.0040
	(0.0102)	(0.0102)	(0.0103)	(0.0108)
Distance to nearest SCA (Km)	−0.0006	−0.0006	−0.0007	−0.0008
	(0.0058)	(0.0058)	(0.0058)	(0.0058)
Housing characteristics	Yes	Yes	Yes	Yes
Districts amenities	Yes	Yes	Yes	Yes
Areal unit FE	Yes	Yes	Yes	Yes
Pre-amalgamation districts FE	Yes	Yes	Yes	Yes
Month of sale FE	Yes	Yes	Yes	Yes
Year of sale FE	Yes	Yes	Yes	Yes
R-squared	0.6193	0.6194	0.6196	0.6195
Observations	211021	211021	211021	211021

Notes: Heritage buffer (#m) is the heritage density, or the number of heritage places on a radius of # meters next to the property. SCA and SHA stand for Special Character Area and Special Housing Area, respectively. Fixed Effects-FE. Housing characteristics include all the set of controls of the main model. Robust standard errors in parenthesis, for two-way clustering at house and areal unit levels (Cameron et al., 2011; Correia, 2017)

* Significant at 10 percent level.
** Significant at 5 percent level.
*** Significant at 1 percent level.



(a) Entire market (b) Separated market

Fig. 4. Monthly trend of the average price and the total number of sales of housing in the full and separated by districts market (2-column fitting image, use color) (a) Entire market (b) Separated market.

consistent for both heritage preservation policies, across all the specifications.

The detailed results are shown in Table B.3 in the Appendix. Some additional findings deserve some attention. Land value and distance to amenities such as waterways, main roads, school and SHAs imply positive price effects. In turn, the number of car spots with roof, house location in the former Waitakere legacy districts or in zones specified for community uses or other specific zone (defined by territorial authority) imply negative price effects. Note that the control variables considered explain more than half of the housing prices variation ($R^2 = 0.62$).

4.2. Heritage-density effects

Until now, results relate each house to the location within or outside any HA or SCA, as well as the distance to the nearest heritage place or SCA. Although this is evidence of price capitalization of both heritage preservation policies, the challenge to reveal the part of the effect that derives from house's location and formal designation, or spillover effects and other external factors, remains open. We then explore the density of heritage places as a potential source of the price effect. Table 3 shows the results of estimating the model in equation (2), where Column 1 repeats our preferred specification from Column 5 of Table 2, but models from Column 2 to Column 4 include the results of the number of heritage places within the different radii tested. There is a sort of aura effect of heritage density in the housing prices formation process. We find a premium of 1.74%, on average, per an additional heritage place within the 50 m radius. Still, to overcome the average negative effect of heritage designation/location reported in the previous section, at the 50 m radius a house or building should be surrounded by at least 6 heritage places. The actual average number of heritage places within each radii is far lower than needed to overcome the average negative effect of the designation: 1.29 heritage places at the 50 m; 1.67 at the 100 m, and;

2.92 at the 200 m radii. Hence, the overall heritage effect remains predominantly negative.

Likewise, the heritage density effect is highly local and the net effect for a single place is quantitatively similar to the main specification shown in Column 1. The average price premium per additional heritage place declines to 1.4% for the 100 m radius, and then to 0.5% for the 200 m; the effect remains significant. Rather than proximity to the nearest heritage place, which is not statistically significant in any specification, it is the number of places that affect the heritage premium on housing prices and only a handful of properties, less than one percent, report positive heritage effects due to the density that surrounds them.[14] Evaluated at the sample mean for the house floor area (see Table 1), and other things equal, the reported density premium imply an increase of NZ$12,804 for each additional place in a radius of 50 m, NZ$10,335 in a radius of 100 m, and; NZ$3,611 in a radius of 200 m.

The effect of the SCA, SHA, Heritage and their interaction, remains robust to the introduction of the density buffers.

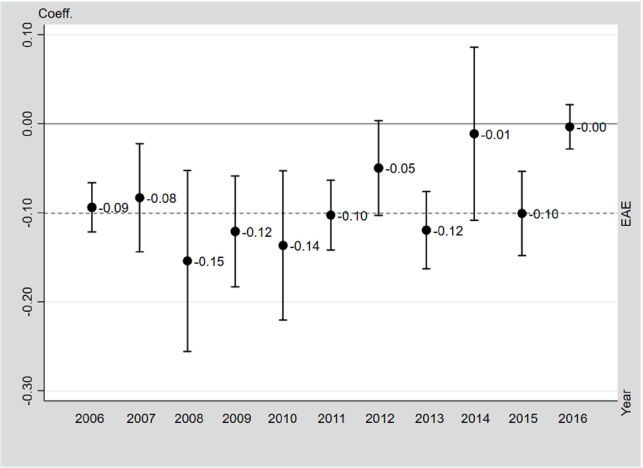
4.3. Dynamics and time effects

Hitherto, our results for heritage and SCA on the housing market compile the average effect in search of an overall conclusion, accounting for heterogeneous time effects. However, the housing of a city like Auckland deserves a closer look. The Auckland housing market has undergone a complete bust-recovery-boom cycle in the last decade. Although we do not tackle directly in this paper the causes of this dynamic, in general, some of the potential sources are: massive foreign migration rates starting in 2012 (particularly from Asia); housing shortages due to resulting high demand; sky-rocketing house prices (e.g. median prices doubling between 2006 and 2016); and the amalgamation of eight local councils into the Auckland "Super City," in November 2010, which redefined the city's urban planning.

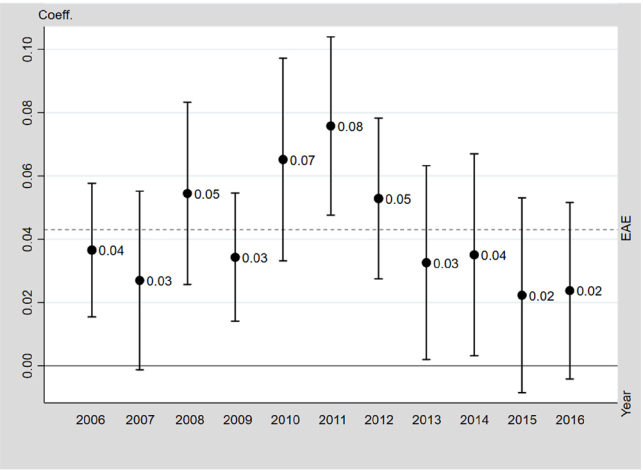
A first thing to note relates to the volatility of price's dynamics, conditional on the HA and SCA designation. Fig. 3 displays the evolution of average prices and its dispersion over the housing market for both types of designation. What is noticeable is the price dispersion before the amalgamation of the former districts of Auckland: the behavior of prices is erratic but rests at lower levels following the amalgamation. This is particularly true for the SCA properties (see Fig. 3)b, for which we observe drastic changes in the interval dynamics. Similarly, the heritage designation does not show an important differential effect in terms of volatility, and; while the average prices of houses within HA appear higher, they are not comparable in terms of characteristics because the heritage price effect is quite the opposite, once accounting for relevant physical and location characteristics.

Past work suggesting a positive correlation between trading activity, the length of time a property is in the market, and the level of prices, is well established (Clayton et al., 2010; Leung and Feng, 2005). Some theoretical efforts aiming to explain this correlation rely on models approaching the buyers' liquidity channel, that is, the availability of resources for the down payment. For example, owners that want to move to a different location, for any reason, during a depressed market, by selling their house might risk not having enough liquidity to back the down payment in the new location. Hence, when prices fall they might keep their current house longer (Stein, 1995). In this environment, the credit supply has an important role to play. In the same line of argument, income shocks in the housing market, that work through the household liquidity constraints, help to explain the volatility of housing prices (Ortalo-Magne and Rady, 2006).

The housing market in Auckland has its own particularities. Panel (a) in Fig. 4 shows results for the complete Auckland market. We observe a positive correlation between trading volume and prices; however, the



(a) Heritage



(b) SCA

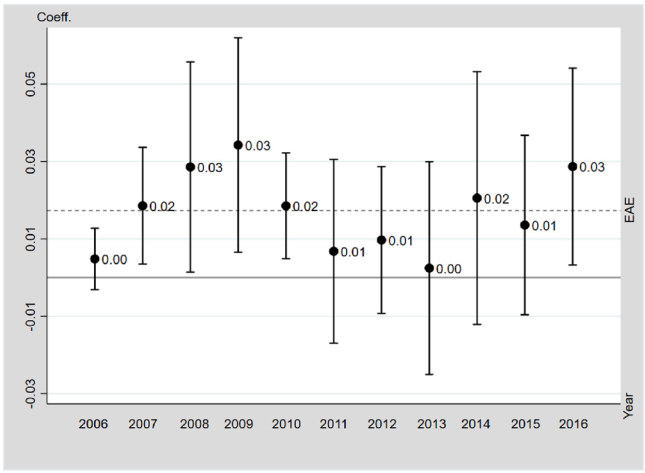
Fig. 5. Beta dispersion of heritage and SCA dummies around the estimated average effect (EAE), by year of sale (1.5-column fitting image) (a) Heritage (b) SCA.

dynamics reveal different patterns. In 2011, the year for which the market capitalized on the amalgamation process, shows a drastic change in the housing volume of sales that accounted for an increase of 152.3%, between 2010 and 2011; the level and volatility of the monthly transactions also changed dramatically. Simultaneously, the formation process of housing prices initiated a period of rampant inflation, which changed the trend of the previous years, permanently. Note also that the period before the amalgamation process comprises only around 15% of the transactions in the period of analysis.[15] Rather than market equilibrium dynamics, we observe that prices follow a trend that is hardly met by fundamentals related to cost of capital, construction, rent, etc.; something that should be considered when assessing other external effects, such as heritage, the aim of this paper.

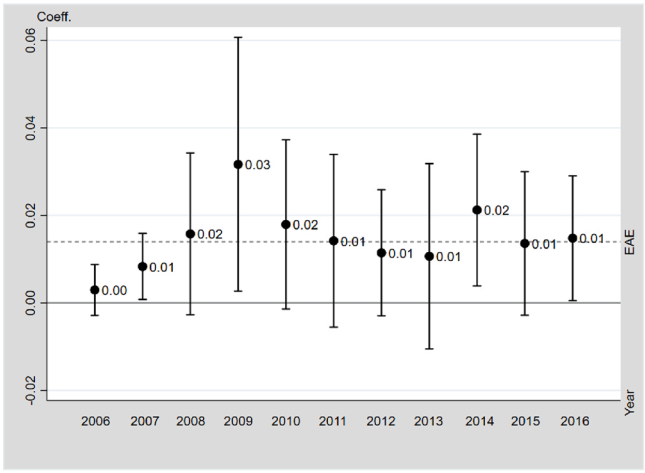
However, when looking at differences between the former council entities of Auckland (Panel (b)), namely Auckland City, which accounts for around 40% of all city's transactions registered in our data between 2006 and 2016, it becomes evident that most of the market effect comes not from the center but from drastic changes in the periphery. Cities like

[14] For the biggest effect reported at the 50 m radius, only 27 properties fulfill the minimum condition; 92 for the 100 m buffer, and; 735 for the 200 m radius.

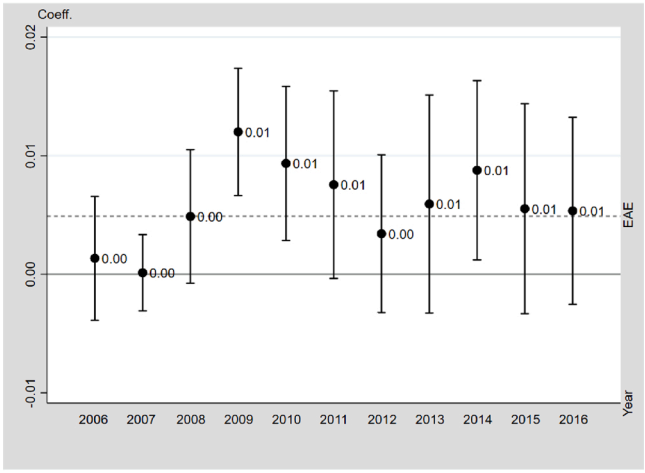
[15] If we think of both variables as a stochastic process, the monthly trading volume would represent a stationary process that suffered an impulse in 2011 which changed its trading level; while the housing prices is a unit root process for which the impulse changed the trend permanently.



(a) Heritage density: 50m buffer



(b) Heritage density: 100m buffer



(c) Heritage density: 200m buffer

Fig. 6. Beta dispersion of heritage density buffers around the estimated average effect (EAE), by year of sale (single-column fitting image)(a) Heritage density: 50m buffer (b) Heritage density: 100m buffer (c) Heritage density: 200m buffer.

Manukau, the North Shore and Waitakere; changed the market dynamics completely (see Table B.2 in the Appendix for numerical details). In the Auckland City, the average monthly transactions slightly increased after the amalgamation and the dynamics remained around the same level.

Two important points arise when looking at our data. First, while the volatility of housing prices was important before the districts' amalgamation, the volatility of prices in the periphery's districts becomes a smooth process afterwards, and follows closely the prices' trend of Auckland City. Secondly, the price adjustment comes jointly from the dramatic increase of the market transactions in the periphery. Although there are current efforts to incorporate information derived from identified districts' under-reporting after the city's amalgamation,[16] it is also plausible that the interest on new developments increased demand on housing and buildings that were previously neglected, either due to different laws and regulations, or due to different perceptions over public services and market potential. Transaction reported in our data for the main market, Auckland City, changed slightly and the pattern follows around the same monthly average before and after the "Super City's" formation.

These market changes should severely impact the way the housing market values any feature under scrutiny. We concentrate only on heritage and the SCA effect. To observe the dynamics of the heritage price premium in this context, we estimate the main specification in Equation (1), only this time on a yearly basis (i.e.; regressions do not include year fixed effects). Fig. 5 displays the coefficient for the dummy for HA and SCA for the housing market by year. Between the period of analysis, the negative price premium for HA (Panel (a)) in the housing market is significant under standard inference levels, for the most part except for years 2012, 2014 and 2016. Interestingly, while the heritage effect remains consistently negative, after the amalgamation the mass pattern moves towards non significant grounds; in other words, while heritage designation negatively affected the housing prices, after the market changed gears in the amalgamation process, heritage became less of a differentiation element. 2016 closes with a precise zero effect.

Panel (b) of Fig. 5 shows the time dynamics for the SCA effect, where the price premium for housing ranges between 3% and 8%, during years 2006 and 2011. Afterwards, we capture a declining trend in the price premium which remains significant until 2014; the effect in years 2015 and 2016 are non-significant at standard inference level. Starting in 2010 the number of housing sales reported in our dataset increased annually until reaching a peak in 2015; sales in 2016 halted and slightly decreased, possibly due the introduction of loan-to-value ratios for mortgage lending in October 2013 (20% deposit for owner occupier loans and 35% for investors). In general, the Auckland housing market slowed as a result, which may explain —partially— why households (at least those who managed to get a mortgage) become more selective on the attributes of a house and environmental amenities, rather than HA or SCA zoning. Another potential reason relates to new housing policies introduced in 2016; the new AUP zoning allowed further densification of residential areas and modified regulations made the AUP more permisive for new construction and densification of houses within both heritage preservation policies, HA or SCA. Those changes added value to houses because of the option to redevelop to more profitable housing (Martin and Norman, 2018); but reduced protection of HA and SCA values. In addition, the observed dynamic respond to the sensitivity of housing prices to short-run perspectives over market development and demand shocks.

We perform the same analysis for the heritage buffers in the housing market. Different to patterns observed in the average effects, the buffers constructed for the different radii remain positive; however, not all years show statistical significance (e.g. 2013). The heritage effect on the buffers stabilizes after the amalgamation (Fig. 6).

[16] There is no current estimations of the level of under-reporting problem. Yet, given the number of transactions in the periphery, and the fact that we control for districts fixed effects, we do not expect abrupt changes in the results.

5. Discussion and concluding remarks

This paper investigates the effects on housing prices of two different forms of heritage preservation rules: heritage areas (HA) and special character areas (SCA). We estimate hedonic price models for sales transactions between 2006 and 2016 in Auckland, New Zealand. We find that a price premium exists if a house is located within an SCA (4.3%), or within both, HA and a SCA (7.91%). On the contrary, houses within an HA only, report an average price reduction of around -9.6%. It seems that, as the neighbours of a heritage building in a SCA also have restrictions, the heritage restrictions do not have such a price effect as when their neighbours have no restrictions. It is as if a heritage building in a SCA is the best house in the street. Ahlfeldt et al. (2012) also find a positive effect of listed buildings within conservation areas (although some results are not statistically significant). Furthermore, for every heritage feature or landmark within a 50, 100 or 200 m radius around any house, there is a price premium of 1.7%, 1.4% and 0.5%, respectively. Our results show that associated externalities of heritage have a positive but localized effect on the prices of properties (Leichenko et al., 2001; Noonan et al., 2007; Ahlfeldt and Maennig, 2010; Moro et al., 2013). Nonetheless, houses located within an HA suffer a price discount (-9.6%) likely reflecting the more stringent development rules of HA relative to SCA, and the attractiveness for buyers of living in a stable streetscape of historic character. Estimating the value of heritage is challenging. There are potential confounding effects because other environmental and urban amenities in Auckland also make areas appealing, attract higher-income households and drive up prices (Franco and Macdonald, 2018; Florida and Mellander, 2009; Brueckner et al., 1999). There is also the risk of omitted-variable bias. The efforts on causal inference would require some form of (as good as) random heritage designation, which is implausible considering that heritage is by itself an endogenous identification process –places designated as such are the most likely to be chosen, either by communities or authorities, due to their historical or cultural conditions–. In Auckland numerous heritage places are contiguous or within open spaces that are known to be of value to residents; hence, any (causal) identification of the actual contribution of heritage on housing prices requires a setting with sufficient variation in landscape patterns and amenities (Hicks and Queen, 2016). However, considering the large number of covariates utilized in our regressions, we argue that the risk of omitted-variable bias is strongly mitigated.

Our results reveal the greater stringency of HA rules relative to SCA rules, as well as the changing attitude towards SCA during the development of the Auckland Unitary Plan (AUP). During the Auckland Unitary Plan hearings (early 2013-late 2016), heritage and SCA rules were strongly debated. The benefits of heritage compared to the potential for redevelopment were contested. Consequently, in 2016 the rules of some SCA were modified by the AUP, to allow development and greater housing densification (Fernandez and Martin, 2019). Hearings on preliminary versions of the AUP started in early 2013, though no final decision was enforced until the AUP came into force by late 2016. As a result, zoning was changed in 30% of SCA, allowing higher development potential and more flexibility on alternative uses of land. Those effects are captured by our regressions and the time dynamics estimated in the paper, which informs the discussion about heritage designation (HA and SCA) and its effect on housing prices in Auckland, as well as important insights into the difficult balance between historic preservation and boosting the growth of the city's housing market.

Conflict of interest statement

The author declares that there is no conflict of interests to this work.

Author contribution

David Bade: Writing and critical analysis of the topic attended in the article

Jose Gabriel Castillo: Writing and critical analysis of the topic. Empirical analysis, data and results described in the article.

Mario Andres Fernandez: Writing and critical analysis of the topic. Empirical analysis, data and results described in the article

Joseph Aguilar-Bohorquez: Writing and empirical analysis. Data processing and analysis of the results.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.landusepol.2020.105042.

References

Ahlfeldt, G.M., Holman, N., Wendland, N., 2012. An Assessment Of The Effects Of Conservation Areas On Value. London School of Economics and Political Science. Final Report.

Ahlfeldt, G.M., Maennig, W., 2010. Substitutability and complementarity of urban amenities: External effects of built heritage in Berlin. Real Estate Econ. 38 (2), 285–323.

Ahlfeldt, G.M., Moeller, K., Waights, S., Wendland, N., 2017. Game of zones: the political economy of conservation areas. Econ. J 127 (605), F421–F445.

Allpress, J., Balderston, K., Nunns, P., 2016. How do Aucklanders value their parks?. A Hedonic Analysis Of The Impact Of Proximity To Open Space On Residential Property Values. Technical report Auckland.

Anselin, L., Lozano-Gracia, N., 2008. Errors in variables and spatial effects in hedonic house price models of ambient air quality. Empir. Econ. 34 (1), 5–34.

Auckland Council, 2013. Auckland Housing Accord.

Auckland Council, 2017. National Policy Statement on Urban Development Capacity 2016: Housing and business development capacity assessment for Auckland, Technical report.

Auckland Council, 2018. Auckland Unitary Plan.

Bade, D., 2019. Auckland's Heritage Counts 2019 Annual Summary.. Technical report, Auckland.

Been, V., Ellen, I.G., Gedal, M., Glaeser, E., McCabe, B.J., 2016. Preserving history or restricting development?. the heterogeneous effects of historic districts on local housing markets in new york city. J. Urban. Econ. 92, 16–30.

Bourassa, S.C., Hoesli, M., Peng, V.S., 2003. Do housing submarkets really matter? J. Hous. Econ. 12 (1), 12–28.

Brasington, D.M., Hite, D., 2005. Demand for environmental quality: a spatial hedonic analysis. Reg. Sci. Urban. Econ. 35 (jan (1)), 57–82.

Brueckner, J.K., Thisse, J.-F., Zenou, Y., 1999. Why is central Paris rich and downtown detroit poor?.: an amenity-based theory. Eur. Econ. Rev. 43 (jan (1)), 91–107.

Cameron, A.C., Gelbach, J.B., Miller, D.L., 2011. Robust inference with multiway clustering. J. Bus. Econ. Stat 29 (2), 238–249.

Cameron, A.C., Miller, D.L., 2015. A practitioner's guide to cluster-robust inference. J. Hum. Resour. 50 (2), 317–372.

Clayton, J., Miller, N., Peng, L., 2010. Price-volume correlation in the housing market: Causality and co-movements. J. Real Estate Finance Econ. 40 (Jan (1)), 14–40.

Conway, D., Li, C.Q., Wolch, J., Kahle, C., Jerrett, M., 2010. A spatial autocorrelation approach for examining the effects of urban greenspace on residential property values. J. Real Estate Finance Econ. 41 (aug (2)), 150–169.

Correia, S., 2017. Linear Models With High-Dimensional Fixed Effects: An Efficient And Feasible Estimator. Technical report. Working Paper.

Coulson, N.E., Lahr, M.L., 2005. Gracing the land of elvis and beale street: historic designation and property values in memphis. Real Estate Econ. 33 (3), 487–507.

Deodhar, V., 2004. Does the Housing Market Value Heritage?.: Some Empirical Evidence.. Technical report, Macquarie University, Department of Economics.

Fernandez, M.A., Bucaram, S., 2019. The changing face of environmental amenities: Heterogeneity across housing submarkets and time. Land Use Policy 83, 449–460.

Fernandez, M.A., Martin, S.L., 2019. What's so special about character? Urban Stud. 1–16.

Fernandez, M.A., Sanchez, G., Bucaram, S., 2019. Price effects of the special housing areas in Auckland. New Zealand Economic Papers.

Filippova, O., 2009. The influence of submarkets on water view house price premiums in New Zealand. Int. J. Hous. Mar. Anal. 2 (mar (1)), 91–105.

Florida, R., Mellander, C., 2009. There goes the metro: How and why bohemians, artists and gays affect regional housing values. J. Econ. Geogr. 10 (2), 167–188.

Franco, S.F., Macdonald, J.L., 2018. The effects of cultural heritage on residential property values: evidence from lisbon, portugal. Reg. Sci. Urban. Econ.

Gibbons, S., Mourato, S., Resende, G.M., 2014. The amenity value of english nature: a hedonic price approach. Environ. Resour. Econ. 57 (feb (2)), 175–196.

Halvorsen, R., Palmquist, R., et al., 1980. The interpretation of dummy variables in semilogarithmic equations. Am. Econ. Rev. 70 (3), 474–475.

Hicks, R.L., Queen, B.M., 2016. Valuing Historical And Open Space Amenities With Hedonic Property Valuation Models.

ICOMO, N.Z., 2010. ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value.

Kontokosta, C.E., 2014. Mixed-income housing and neighborhood integration: evidence from inclusionary zoning programs. J. Urban. Aff. 36 (4), 716–741.

Koster, H.R., Rouwendal, J., 2017. Historic amenities and housing externalities: evidence from the Netherlands. Econ. J. 127 (oct (605)), F396–F420.
Koster, H.R.J., van Ommeren FJ, Rietveld, P., 2012. Bombs, boundaries and buildings: a regression-discontinuity approach to measure costs of housing supply restrictions. Reg. Sci. Urban. Econ. 42 (4), 631–641.
Lazrak, F., Nijkamp, P., Rietveld, P., Rouwendal, J., 2014. The market value of cultural heritage in urban areas: An application of spatial hedonic pricing. J. Geogr. Syst. 16 (1), 89–114.
Leichenko, R.M., Coulson, N.E., Listokin, D., 2001. Historic preservation and residential property values: An analysis of texas cities. Urban Stud. 38 (11), 1973–1987.
Leung, C.K.Y., Feng, D., 2005. What drives the property price-trading volume correlation?. evidence from a commercial real estate market. J. Real Estate Finance Econ. 31 (Sep (2)), 241–255.
Martin, S., Norman, D., 2018. How the Unitary Plan adds value to properties.
Moro, M., Mayor, K., Lyons, S., Tol, R.S.J., 2013. Does the housing market reflect cultural heritage?. A case study of Greater Dublin. Environ. Plan. A 45 (12), 2884–2903.
Noonan, A.E., Hall, G., Blustein, D.L., 2007. Urban adolescents' experience of social class in relationships at work. J. Vocat. Behav. 70 (3), 542–560.
Nunns, P., Hitchins, H., Balderston, K., 2015. The value of land, floorspace, and amenities: A hedonic price analysis of property sales in Auckland 2011-2014. Technical report.
Ortalo-Magne, F., Rady, S., 2006. Housing market dynamics: On the contribution of income shocks and credit constraints. Rev. Econ. Stud. 73 (2), 459–485.
Rehm, M., Filippova, O., 2008. The impact of geographically defined school zones on house prices in New Zealand. Int. J. Hous. Mar. Anal 1 (oct (4)), 313–336.
Resource Management Act, 1991. Resource Management Act.
Rohani, M., 2012. Impact of Hauraki Gulf Amenity on the Land Price of Neighbourhood Properties, Technical report.
Rosen, S., 1974. Hedonic prices and implicit markets: product differentiation in pure competition. J. Political Econ. 82 (jan (1)), 34–55.
Samarasinghe, O.E., Sharp, B.M.H., 2008. The value of a view: a spatial hedonic analysis. New Zealand Economic Papers 42 (jun (1)), 59–78.
Schaeffer, P.V., Millerick, C.A., 1991. The impact of historic district designation on property values: an empirical study. Econ. Dev. Q. 5 (4), 301–312.
Schuetz, J., Meltzer, R., Been, V., 2009. 31 flavors of inclusionary zoning: Comparing policies from San Francisco, Washington DC, and suburban Boston. J. Am. Plann. Assoc. 75 (4), 441–456.
Schuetz, J., Meltzer, R., Been, V., 2011. Silver bullet or trojan horse?the effects of inclusionary zoning on local housing markets in the United States. Urban Stud. 48 (2), 297–329.
Small, J.P., 2014. Statement of primary evidence of John Philip Small on behalf of Auckland Council.(Economics - REgional Policy Statement).
Statistics New Zealand, 2016. Area Unit.
Stein, J.C., 1995. Prices and trading volume in the housing market: A model with down-payment effects. The Quarterly Journal of Economics 110 (2), 379–406.
Swoboda, A., Nega, T., Timm, M., 2015. Hedonic analysis over time and space: the case of house prices and traffic noise. J. Reg. Sci. 55 (sep (4)), 644–670.
Turner, M.A., Haughwout, A., Van Der Klaauw, W., 2014. Land use regulation and welfare. Econometrica 82 (4), 1341–1403.
Wright, W.C., Eppink, F.V., 2016. Drivers of heritage value: A meta-analysis of monetary valuation studies of cultural heritage. Ecol. Econ. 130, 277–284.
Zabel, J., 2015. The hedonic model and the housing cycle. Reg. Sci. Urban. Econ. 54 (sep), 74–86.