Historic Preservation and Residential Property Values: Evidence from Quantile Regression

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Abstract

Historic designation is increasingly used as a means to achieve both preservation and community economic development. This study considered the effects of historic designation on residential property values in Baton Rouge, Louisiana, USA. The results support the well-established notion in urban economics literature that historic preservation has a positive impact on property values. However, appreciation of property values may displace less-affluent residents of historic districts after designation takes place. The results also show that the lower-end properties gain the most value from historic preservation. Thus, it must indeed be recognised that with increasing values comes the very real possibility that displacement of neighbourhood residents can occur.

1. Introduction

The cultural and historical resources of a community tell the story of its past and create a degree of uniqueness that separates its identity from other communities. These resources also provide motivation for residents to identify with the community, its past and the events that have shaped it. Maintaining physical reminders of the past creates a deeper sense of place that enhances residents' and visitors' perceptions of a neighbourhood. In addition, obtaining an official historic designation to further preservation can generate a wide range of economic benefits through the rehabilitation and adaptive reuse of historic properties, the attraction of heritage tourism visits and improvement of a neighbourhood's character. Another benefit—and the focus for this paper—is the role that local historic preservation might assume in improving property values and the creation of possible ripple effects on the value of property in surrounding neighbourhoods. However, strong price capitalisation of low-priced properties after historic district designation also implies a potential for displacement of low-income households.

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If property values are both enhanced and sustained, then historic designation might be seen as more than just a tool to preserve the physical structure of buildings and facilities. It could also be an asset for community preservation and an economic development strategy for urban areas, central cities, small towns and suburbs. Indeed, historic buildings and neighbourhoods often are the focus of redevelopment efforts, either as obstacles or catalysts. On the one hand, redevelopment and land use changes may draw the ire of preservationists by transforming historic structures, landscapes or the character of a neighbourhood. On the other hand, historic landmarks may be exploited as amenities to foster local redevelopment.

Recent literature suggests that there are positive amenity values capitalised into home sales prices from historic preservation (see Diaz *et al.*, 2008; Coulson and Leichenko, 2001; Clark and Herrin, 1997; Asabere and Huffman, 1994; Ford, 1989). Mason (2005) is a comprehensive survey of many strands of literature relating to the value of historic preservation, most of which point to positive net impacts of historic preservation. While these studies show that properties within historic districts typically sell at a premium, that premium can be dependent on the type of designation. A 1991 study by Schaeffer and Millerick found that national designation positively impacts property values, while local designation negatively impacts property values. The authors attribute the difference to the more stringent controls in the local area and the enhanced prestige associated with being part of a national district.

Other issues raised in the literature include equity considerations, in particular, the possibility of displacement of low-income residents who can no longer afford to live in historic neighbourhoods (Smith, 1998). According to this argument, higher property values as the result of historic designation lead to increased rental prices and higher property taxes and these, in turn, may displace low- to moderate-income residents (Wojno, 1991). Although designation of historic districts cannot be equated with urban redevelopment and gentrification, which have been associated in many cases with the attraction of higher-income residents and increased housing prices, the potential for displacement of low- to moderate-income residents continues to be an important consideration. This is the case particularly in cities with very limited low-income housing supplies. Numerous studies point to the often significant and rapid socioeconomic changes in historic neighbourhoods undergoing revitalisation. For example, Schill and Nathan (1983) examined the US census profile data for years 1950–70 of several neighbourhoods, including historic areas such as Society Hill in Philadelphia and Georgetown in Washington, DC. In both these historic areas, the neighbourhoods' racial composition changed from significantly non-White to almost entirely White; and the median house values showed a significant appreciation. However, the distribution of price premiums of historic designation has not been closely examined. An effective method for examining the distribution of price premiums is quantile regression. This method allows for heterogeneity in property value impacts by allowing the estimated coefficients to vary along the conditional distribution of the dependent variable. Hence, it can be used to investigate distributional or equity aspects of outcomes.

To address the distribution of price premiums, this article offers additional empirical evidence on the relationship between house prices and historic designation. The methodology employed here allows for more robust interpretation of the effect or impact of both historic district designation and landmark designation. We focus on the impact of historic designation on residential property values in Baton Rouge, Louisiana. First, we assess the effects of historic designation on property values for single-family residential properties located in locally and nationally designated historic districts. Secondly, we consider the effect of proximity to historic landmarks that are recognised at the national level. Finally, we reflect on the effect that such designation has on adjacent property by examining buffers around subject property. We find a positive effect on residential sales prices for homes located within an historic district. Also, we find a positive effect on residential sales prices for homes located within the buffer area of the historic district. These results are robust to the spatial dependence common in residential transaction prices. Furthermore, our results show that residential properties that are in proximity to historic landmarks are also sold at price premiums. Moreover, unlike previous research, the methods used here, while accounting for spatial dependence in the data, improve inferences about the statistical significance of implicit prices of landmark characteristics by allowing price premiums to be dependent on the distribution of the housing prices. This approach deepens our understanding of the direct and indirect neighbourhood effects of historic landmarks.

The rest of the paper is organised as follows. Section 2 provides background information. Section 3 presents a detailed description of data and construction of the control variables used in a simple empirical framework. Section 4 offers an explanation of the empirical results obtained using quantile regression. Section 5 concludes.

2. Background Information

The National Register of Historic Places and local historic landmark and historic district designations are two very different programmes that recognise and protect historic properties in the US. Some historic properties and districts may receive both types of designation in communities where local historic preservation commissions have been established. The National Register listing is primarily an honour, meaning that a property has been researched and evaluated according to established procedures and determined to be worthy of preservation for its historic value. The listing of a historic or archaeological property in the National Register does not obligate or restrict a private owner in any way unless the owner seeks a federal benefit such as a grant or tax credit. For a private owner, the chief practical benefit of the National Register listing is eligibility for a 20 per cent federal investment tax credit that can be claimed against the cost of a certified rehabilitation of an income-producing historic building.

Similarly, local governments may establish a historic preservation commission. The East Baton Rouge Parish Historic Preservation Commission (HPC) in Louisiana is considered a part of the planning functions of city–parish government and is administrated by the staff of the Office of the Planning Commission. According to the East Baton Rouge Parish HPC, historic district designation is intended to protect and enhance the existing character of a community, not to change it. In addition to the honour and prestige of being recognised as a local historic district or landmark, local designation also provides protection. Local historic district and landmark designations are the most effective forms of protection to maintain the historic character of a neighbourhood or property. Local historic district designation allows the HPC to enforce demolition by neglect violations against property owners who allow their buildings to deteriorate. Also, once a neighbourhood is designated as a local historic district, the HPC has jurisdiction over all demolitions in the district, thus keeping to a minimum demolition that leaves the neighbourhood with vacant lots. In addition, while there are tax benefits associated with a National Register designation, currently there are none for local district or landmark designation. Furthermore, historic district or landmark designation does not affect the usage or zoning of any property.

Baton Rouge contains eight National Register Historic Districts: Spanish Town, Beauregard Town, Roseland Terrace, Main Street, Louisiana State University, Drehr Place, Kleinert Terrace and Southern University. For example, Spanish Town was placed on the National Register on 31 August 1978. Spanish Town was laid out in 1805 and is the oldest neighbourhood in the City of Baton Rouge. Its narrow intimate streets, its irregular block layout and its high concentration of old buildings give it the special character of a neighbourhood that grew up before the age of the automobile. Spanish Town includes a continuum of styles dating back to 1823, including Greek Revival architecture (notably the Stewart-Dougherty House), Queen Anne, shotgun houses and craftsman bungalows. Some of the buildings in this neighbourhood are also on the list of National Historic landmarks.[1] On the other hand, Southern University was placed on the National Register on 20 May 1999. Southern University is significant in the areas of education and ethnic heritage, but the district itself includes no residential property.

A community may designate local districts and landmarks that are not listed in the national register. Since the legislation enabling states to designate historic districts requires that a designation report be prepared before a local landmark or local district is designated, some local preservation commissions use a National Register nomination as the basis for the local designation report (For this reason, the two types of designation are sometimes confused.) However, a National Register listing does not mean that local designation will necessarily follow. Furthermore, there are two different designations: local landmarks and local districts. Landmark designations apply to individual buildings, structures, sites, areas or objects that are studied by the commission and judged to have historic, architectural, archaeological or cultural value. Local district designation applies to entire neighbourhoods or other areas that include many properties.

3. Data and Baseline Hedonic Price Model

Hedonic price models represent a way to estimate the marginal implicit prices of differentiated characteristics of real property (Rosen, 1974). Such models specify the sale price of a dwelling to be a function of the vectors of physical characteristics of the house, **H**; localised market conditions, **M**; a vector of location and time-trend variables representing fixed effects for the exact geographical location and year and season of sale, **F**; and a vector of variables of interest representing if a particular dwelling is in the nationally or locally designated historic district, **N**; or

$$\ln Price = c + \alpha \mathbf{H} + \delta \mathbf{M} + \phi \mathbf{F} + \beta \mathbf{N} + \varepsilon$$

where, c is the regression constant and ε the error.

Palmquist (1991) and others note that economic theory alone does not provide sufficient guidance for selecting the functional form of particular explanatory variables within hedonic equations. The log-linear hedonic specification is used due to its ease of interpretation, especially because the coefficient of a dummy variable can then be interpreted as the percentage change in the dependent variable (house price) associated with the independent variable (presence of historic designation).[2]

We use a sample comprising broker-assisted housing transactions completed between October 1984 and April 2005. The data are drawn from the Multiple Listing Service (MLS) sales reports for Baton Rouge, Louisiana, a medium-sized urban area that has been the subject of much academic housing market research. The sample period ends three months before Hurricane Katrina affected the area of study. In addition, we restrict our attention to detached single-family houses sold within a contiguous region within the urban area. There is evidence that the prices of houses in new sub-divisions diverge significantly from the broader market until new development reaches a critical mass (Sirmans *et al.*, 1997); we avoid this potential pricing bias from new development by including in our sample only those houses that are at least two years old. In order to avoid outlier influence on our estimates, we exclude from the sample houses that take fewer than 14 or more than 400 days to sell, houses that sell for less than $40 000 or more than $320 000, houses with unusually small (less than 300 square feet) or large (greater than 4500 square feet) living area and houses with unusually small or large area under roof net of living area (110 and 4000 respectively). The resultant dataset comprises 28 025 transactions.

The house characteristics, **H**, include standard features such as number of bedrooms, bathrooms, fireplaces, age and its square, living area and its square, and net area and its square. Table 1 reports the means and standard deviations of the variables used in the empirical models. The sales price (*Price*), days on the market prior to sale (*DOM*), number of bedrooms (*Bedrooms*), number of bathrooms (*Bathrooms*), number of fireplaces (*Fireplaces*), the age of the house (*Age*) and living area (*Living area*) are drawn directly from the MLS report for each sale. The *Net area* variable is calculated as the difference between the total square footage under the roof less the square footage of living area, and it captures the size of utility rooms, garages, covered porches, carports, etc. Location is indicated by a set of dummy variables that control for 265 census blocks, which are measured by the census value closest in time to the observed transaction. Fixed effects for year and season of sale are obtained using appropriately defined sets of dummy variables.

Neighbourhood housing market conditions, **M**, are measured in part by *Listing density*, the number of competing houses that

Table 1. Description of variables and summary statistics (N = 28 025)

Variable	*Description*	*Mean*	*SD*	*Minimum*	*Maximum*
Price	Selling price	112 475.10	53 462.97	40 000	320 000
DOM	Days on market	86.57	71.60	14	400
Bedrooms	Number of bedrooms	3.33	0.61	1	7
Bathrooms	Number of bathrooms	2.02	0.48	1	7
Fireplaces	Number of fireplaces	0.68	0.53	0	3
Living area	Square feet of living area	1 947.57	589.83	359	4 493
Net area	Square feet of other area	707.48	319.20	110	3 925
Age	Age of house	21.07	16.17	2	143
Vacant	Vacant house dummy variable	0.30	0.46	0	1
Renter	Renter-occupied house	0.05	0.21	0	1
Repeat sale	House sold more than once	0.46	0.50	0	1
Smaller	Negative deviations from local mean living area	0.07	0.10	0	0.89
Larger	Positive deviations from local mean living area	0.11	0.19	0	2.06
Listing density	Competing listings weighted by days	2.53	2.13	0	20.151
Spring	Season dummy variable	0.28	0.45	0	1
Summer	Season dummy variable	0.29	0.45	0	1
Fall	Season dummy variable	0.23	0.42	0	1

are for sale at the same time a house is on the market. Listing density measures the intensity of competition from other houses for sale per day on the market. A greater number of competing houses for sale surrounding a given house increases competition for buyers, but at the same time it can lead to shopping externality effects as the greater concentration of listings draws more potential buyers to the neighbourhood. The signs of the coefficients on the listing density variables therefore reveal the relative strength of the spatial competition and shopping externality effects. The rationale for including neighbourhood market conditions variables in the hedonic model is very simple (Turnbull and Dombrow, 2006). Intuitively, the number of houses for sale in a small neighbourhood surrounding a particular house can have localised effects on the distribution of prospective buyers and sellers, the rationale typically used to justify spatial interdependencies in sales prices. Following Turnbull and Dombrow (2006), neighbourhood market conditions are measured by the average number of competing listings in the neighbourhood each day the house is on the market, *Listing density*. This variable is constructed in such a way that it controls for the window of opportunity to buyers who might be interested in any of the competing houses. It avoids counting as competition for the whole marketing period of house *i* those houses that sell before house *i* sells. The distance weighting reflects the assumption that houses farther away represent weaker competition than those located closer to house *i*. Previous studies find that neighbourhood competition variables are typically significant in the price equation (Turnbull and Dombrow, 2006; Turnbull *et al*., 2006; Zahirovic-Herbert and Turnbull, 2008).

Equally as important in this application, this variable explicitly accounts for the type of neighbourhood market conditions that drive spatial dependence in the housing markets. We model the spatial competition effects directly and therefore obviate the usual rationale for applying spatial estimation methods. In addition, we include dummy terms for each census block group, controlling for any static, local characteristics that may influence property values. We further allow error terms to be clustered at the census-block level. This makes our standard error estimates robust to spatial autocorrelation at the census-block level. This use of clustering and local spatial dummy variables is yet another version of spatial econometric methods and follows Davis (2004). What remains after inclusion of these neighbourhood effects is property-level heterogeneity, which is controlled for with property-level covariates.

We also include the relative house size variables *Larger* and *Smaller* to capture the atypicality effect.[3] These variables measure the extent to which a given house is either larger or smaller than the average living area in the surrounding neighbourhood. Following Turnbull *et al.* (2006), indexing all houses within a one half-mile radius of house *i* by *J*, the standardised measure of the relative house size is

$$Localsize_i = \frac{Livingarea_i - \sum_{j \in J} Livingarea_j / N_j}{\sum_{j \in J} Livingarea_j \,/\, N_j}$$

where, N_j is the number of surrounding houses in the neighbourhood *J*.

In order to allow for asymmetrical relative house size effects on sales price, we define the relative size variables $Larger_i$ and $Smaller_i$ as the absolute values of the positive and negative values of $Localsize_i$ respectively

$$\begin{aligned} Larger_i &= |Localsize| \text{ for } Localsize_i > 0 \\ &= 0 \text{ otherwise} \\ Smaller_i &= |Localsize| \text{ for } Localsize_i < 0 \\ &= 0 \text{ otherwise} \end{aligned}$$

Finally, to capture real property marketing conditions, we include additional variables. *Vacant* is a dummy variable indicating an unoccupied property. When controls for spatial competition/shopping externalities and unobserved atypicality or undesirable attributes are included in the model, the *Vacant* coefficient should primarily pick up the combined effects of higher seller holding costs and lower seller bargaining power. Similarly, we define the *Renter* variable as a dummy variable that indicates the presence of a renter during the current transaction. Table 1 shows that 30 per cent of transactions are for vacant houses in the sample, while 4.5 per cent are renter-occupied.

The main variables of interest relate to historic districts and landmarks. The first, *Historic district,* is a dummy variable for whether or not a house is in a recognised historic district. One could imagine this effect to be positive or negative since it is likely to have positive aesthetic effects, but often also implies limitations on a homeowner's ability to alter existing structures. Historic districts are relatively small areas. Our dataset includes 394 sales transactions for the houses that are located in the eight historic districts (six of these include residential areas). The second, *Historic landmark*, is a dummy variable for whether or not there is a recognised historic landmark within one mile of a particular house. There are 4122 houses that are within a one-mile radius from a designated historic landmark.[4] This captures less formal neighbourhood effects. Other specifications include the buffer analysis and the distance to the nearest historic landmark. *Near historic district* is a dummy variable for houses that are within 500 feet of the nearest historic district boundary. Implementing this approach, the *Historic district* variable captures both positive and potentially negative effects of historic designation, while the *Near historic district* variable includes houses across the street from historic district boundaries, thus capturing the positive effects of historic properties without any limitations on homeowners. There are 247 such observations. Finally, we also include a variable to capture the exact distance from the historic landmark, *Historic landmark distance*, for all houses that are identified as having at least one historic landmark within one mile.

Table 2 reports four different OLS model estimates for our sample. Column (1) contains the baseline model estimates. Our main variable of interest, *Historic district* is included in model (2) followed by estimates of model (3), which includes other historic-district-related neighbourhood effects. Finally, model (3) is re-estimated with the clustered standard errors to control for spatial dependence in the housing market in model (4). The base model, model (1), specifies the natural log of sales price as a function of the selling time, house characteristics, location and time-period dummy variables (not reported), and the set of variables capturing neighbourhood housing market conditions. The coefficients on these variables follow expectations.[5] For example, the results suggest that living area and net area have a positive effect on market value and are significant at the 1 per cent level. In all models, living area is more valuable than net area and older houses sell for less. Also, as expected, the days-on-market coefficient is negative.

Furthermore, all equations include a dummy variable for houses that are vacant during the listing period. The price equation estimates follow popular notions as well as what has been typically found to date: vacancy leads to lower selling price. We also report the estimates when the general atypicality variables *Larger* and *Smaller* are included in the model. *Larger* price effect estimates appear consistent with Haurin's atypicality hypothesis. In particular, a larger home in a neighbourhood of smaller homes may have a lower value than the same house located in an area with comparably sized homes. However, *Smaller* price effect estimates are not consistent with Haurin's atypicality hypothesis. The coefficient on this variable is positive

Table 2. Regression results, dependent variable: ln(*Price*) (*N* = 28 025)

Independent Variables	*(1)* *Ln(Price)*	*(2)* *Ln(Price)*	*(3)*[a] *Ln(Price)*	*(4)*[b] *Ln(Price)*
DOM	**–0.0001**	**–0.0001**	**–0.0001**	**–0.0001**
Bedrooms	**–0.0120**	**–0.0119**	**–0.0118**	**–0.0118**
Bathrooms	**0.0253**	**0.0252**	**0.0249**	**0.0249**
Fireplaces	**0.0217**	**0.0216**	**0.0217**	**0.0217**
Living area (in thousand square feet)	**0.8360**	**0.8360**	**0.8330**	**0.8330**
Net area (in thousand square feet)	**0.1670**	**0.1670**	**0.1680**	**0.1680**
Age	**–0.0113**	**–0.0113**	**–0.0114**	**–0.0114**
Age_sq	**0.0001**	**0.0001**	**0.0001**	**0.0001**
Living area_sq (in thousand square feet)	**–0.0001**	**–0.0001**	**–0.0001**	**–0.0001**
Net area_sq (in thousand square feet)	**–0.0003**	**–0.0003**	**–0.0003**	**–0.0003**
Vacant	**–0.0604**	**–0.0603**	**–0.0604**	**–0.0604**
Renter	**–0.0728**	**–0.0728**	**–0.0730**	**–0.0730**
Repeat sale	**0.0081**	**0.0080**	**0.0080**	**0.0080**
Smaller	**0.3120**	**0.3120**	**0.3090**	**0.3090**
Larger	**–0.3140**	**–0.3140**	**–0.3140**	**–0.3140**
Listing density	ns	ns	ns	ns
Historic district		**0.0657**	**0.0947**	**0.0947**
Near historic district			0.0386**	0.0386*
Historic landmark			**0.0750**	**0.0750**
Historic landmark distance			**–0.0937**	**–0.0937**
Constant	**10.77**	**10.77**	**10.76**	**10.76**
Observations inside historic district	394	394	394	394
Observations inside landmark buffer	4122	4122	4122	4122
Observations inside district buffer	247	247	247	247
R^2	0.902	0.902	0.902	0.902

[a] Estimation with robust standard errors.

[b] Estimation with clustered standard errors.

Notes: Coefficients on dummy variables for year of sale and location controls based on census block groups are not reported here. Coefficients in **bold** have p < 0.01; ** p < 0.05, * p < 0.1.

and significant, perhaps capturing the possibility that smaller homes located in more affluent communities may benefit because of their location in a desirable neighbourhood. Overall, the explanatory power of our models is strong, with coefficients of determination of approximately 90 per cent.

We now turn our attention to the variables of interest. The results in Table 3 demonstrate a positive effect on residential prices on those houses that are in the historic district. After controlling for differences in structure sizes, property characteristics and locations, the coefficient is positive and significant at the 1 per cent level. It indicates that there is a price premium of about 6.5 per cent for houses located in the nationally designated historic districts. This value translates into more than a $7000 price premium at the mean house price of $112 475. This premium is comparable with the price premiums in the historic district literature. For example, Leichenko *et al.* (2001) find historic district premiums ranging from 4.9 per cent to 20.1 per cent in seven Texas cities. We also find a price premium for properties in close proximity to the historic districts. The coefficient for the historic district buffer variable, *Near historic district*, is positive and statistically significant at the 1 per cent level as well. In addition, the coefficient on this variable indicates a 3.8 per cent price premium for houses sold within walking distance of historic district boundaries. This price premium of properties in close proximity to a historic district may capture the effect of positive externalities without incurring the costs of regulation. Similarly, it can be due to neighbouring property owners' willingness to invest in their own properties with the assurance that nearby historic properties will not substantially deteriorate.

Furthermore, the additional variables of interest in Table 3, the landmark variables, tell an interesting story. Houses that are in close proximity to historic landmarks sell for a substantial premium over comparable properties (7.5 per cent higher prices). We control for the distance from the landmark, *Historic landmark distance*, and find that as one moves further away from the landmark the price premium falls. Interestingly, these properties in landmark districts receive only a 2 per cent lower premium than properties in the historic districts. Controlling for effects of spatial dependence in the data, model (4) appears to have no major changes in our estimates. So far, these results are broadly consistent with much of the previous literature and conventional wisdom.

4. Quantile Regression Model

In the prior analyses, we implicitly assume that property effects of historic preservation, in percentage terms, are constant across the distribution of houses by price. Indeed, we expect instead that the effects of many of the covariates would differ depending on the

Table 3. Regression results, dependent variable: ln(*Price*), key coefficients (*N* = 28 025)

Independent variables	*(1)* *Ln(Price)*	*(2)* *Ln(Price)*	*(3)*[a] *Ln(Price)*	*(4)*[b] *Ln(Price)*
Historic district		**0.0657*****	**0.0947*****	**0.0947*****
		(0.0229)	(0.0245)	(0.0343)
Near historic district			**0.0386****	**0.0386***
			(0.0187)	(0.0219)
Historic landmark			**0.0750*****	**0.0750*****
			(0.0107)	(0.0221)
Historic landmark distance			**–0.0937*****	**–0.0937*****
			(0.0147)	(0.0287)
Constant	**10.77*****	**10.77*****	**10.76*****	**10.76*****
	(0.0374)	(0.0374)	(0.0369)	(0.0628)
Observations inside historic district	394	394	394	394
Observations inside landmark buffer	4122	4122	4122	4122
Observations inside district buffer	247	247	247	247
R^2	0.902	0.902	0.902	0.902

[a] Robust standard errors in parentheses.
[b] Clustered standard errors in parentheses.
Notes: Coefficients on standard hedonic model variables as well as dummy variables for year of sale and location controls based on census block groups are not reported here. They are available from the authors upon request. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

value of the house. In this section, we test our hypothesis of heterogeneity using quantile regression to estimate how effects of all of the explanatory variables vary across the distribution of house sales by price, thus relaxing the assumption that the effects of the covariates are homogeneous. The outcomes of interest are still sales prices of detached single-family houses in the area. The marginal willingness to pay for a historic designation is likely to differ across the range of house prices.

Recent research shows that purchasers of higher-end houses value house characteristics, such as square footage or the number of bathrooms, differently from buyers of lower-end houses (Zietz *et al.*, 2008).[6] Housing researchers have long recognised that heterogeneous households, such as the rich and the poor, may value housing characteristics differently (Malpezzi, 2003). Several studies including Bayer *et al.* (2004), McMillen and Coulson (2007) and McMillen (2008) provide empirical evidence by constructing quantile house price indexes. Their studies identify significant variations in values of physical attributes across quantiles. Moreover, Mak *et al.* (2010) find that these quantile effects exist even in one single housing market segment.

To investigate differences in willingness to pay for the designation, we examine the willingness to pay along the distribution of house prices at various quantiles or percentiles. So, if the historic preservation affects houses in the lower 10 per cent quantile of houses (according to price) differently from houses in the 50 per cent quantile and the 90 per cent quantile, quantile regression allows for the consistent estimation of these different effects. To this end, quantile regression estimates a series of linear hedonic price equations that might look like this

$$\ln Price_\tau = c_\tau + \alpha_\tau \mathbf{H} + \delta_\tau \mathbf{M} + \phi_\tau \mathbf{F} + \beta_\tau \mathbf{N} + \varepsilon$$

in which the estimated coefficients depend on the quantile, τ, of the distribution of the natural log of house price. Furthermore, we use bootstrapped standard errors, which are significantly less sensitive to heteroscedasticity than analytical standard errors (Gould, 1992, 1997).

For hedonic price equations, quantile regression allows researchers to examine upper and/or lower reference curves as a function of several independent variables of interest without having to impose strict parametric assumptions (Buchinsky, 1994; Mata and Machado, 1996; and Koenker and Hallock, 2001).[7] Thus, if we assume that low- to moderate-income residents purchase low-priced houses, then the stronger value effect of historic preservation on the houses in the bottom quantile of the house prices distribution can lend support to the argument that increased property prices and rental prices as well as accompanying higher property taxes displace low- to moderate-income residents.

Table 4 summarises the quantile regression results. Column 1 contains the OLS model estimates (model (4) with census blocks as location controls and clustered standard errors) for ease of comparison. We also present the results for the following quantiles 10 per cent, 25 per cent, median, 75 per cent and 90 per cent. All of the coefficients on the baseline model covariates (housing characteristics) are consistent with those of Zietz *et al.* (2008). For example, the effect of the interior square footage of a house, *Living area*, is positive and increasing over the distribution. Conversely, the effect of the number of bedrooms, *Bedrooms*, is not significant at the bottom end of the price distribution but it is negative and significant at the top end of price distribution. Moreover, the coefficient is increasing in magnitude. Together, these two coefficients suggest that lower-end buyers care more about the number of bedrooms, while higher-end buyers care about the size of the living space in the house. This seems consistent with the notion that bedrooms act like a necessary good, while the size of the living space is more of a luxury good.

Table 4. Quantile regression results, dependent variable: ln(*Price*) (N = 28 025)

		(Quantile model)[b]				
Independent variables	(*OLS model*)[a] *Ln*(*Price*)	*Ln*(*Price*) *q10*	*Ln*(*Price*) *q25*	*Ln*(*Price*) *q50*	*Ln*(*Price*) *q75*	*Ln*(*Price*) *q90*
DOM	**–0.0001**	**–0.0001**	**–0.0002**	**–0.0002**	**–0.0001**	**–0.0001**
Bedrooms	**–0.0118**	0.0085*	ns	ns	**–0.0131**	**–0.0239**
Bathrooms	**0.0249**	**0.0259**	**0.0242**	**0.0234**	**0.0237**	**0.0222**
Fireplaces	**0.0217**	**0.0203**	**0.0166**	**0.0130**	**0.0102**	**0.0085**
Living area (in thousand square feet)	**0.8330**	**0.7130**	**0.7630**	**0. 8310**	**0.8540**	**0.8510**
Net area (in thousand square feet)	**0.1680**	**0.2650**	**0.1890**	**0.1440**	**0.1090**	**0.0865**
Age	**–0.0114**	**–0.0121**	**–0.0130**	**–0.0136**	**–0.0135**	**–0.0125**
Age_sq	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**
Living area_sq (in thousand square feet)	**–0.0001**	**–0.0005**	**–0.0005**	**–0.0006**	**–0.0006**	**–0.0006**
Net area_sq (in thousand square feet)	**–0.0003**	**–0.0009**	**–0.0004**	**–0.0003**	–0.0000*	0.0000
Vacant	**–0.0604**	**–0.0712**	**–0.0532**	**–0.0500**	**–0.0446**	**–0.0405**
Renter	**–0.0730**	**–0.0780**	**–0.0662**	**–0.0637**	**–0.0642**	**–0.0568**
Repeat sale	**0.0080**	**0.0138**	**0.0093**	0.0039*	0.0033	0.0002
Smaller	**0.3090**	**0.1830**	**0.2310**	**0.2890**	**0.3370**	**0.3260**
Larger	**–0.3140**	**–0.411**	**–0.4060**	**–0.3710**	**–0.2990**	**–0.1850**
Listing density	ns	**0.0017**	ns	–0.0009**	ns	–0.0018**
Historic district	**0.0947**	**0.0802**	**0.0658**	**0.0550**	**0.0588**	0.0545**
Near historic district	0.0386*	**–0.0228**	**–0.0022**	**0.0135**	**0.0150**	0.0635*
Historic landmark	**0.0750**	**0.0308**	**0.0422**	**0.0480**	**0.0644**	**0.0881**
Historic landmark Distance	**–0.0937**	–0.0307*	–0.0419**	**–0.0545**	**–0.0823**	**–0.104**
Constant	**10.76**	**10.67**	**10.76**	**10.84**	**10.92**	**11.00**
R^2/pseudo R^2	0.902	0.628	0.659	0.686	0.698	0.701

[a] Estimation with clustered standard errors.
[b] Estimation with bootstrapped standard errors.
Notes: Coefficients on dummy variables for year of sale and location controls based on census block groups are not reported here. Coefficients in **bold** have p < 0.01, ** p < 0.05, * p < 0.1.

Table 5 illustrates that the effects of historic districts and historic landmark sites exhibit strong trends up and down respectively, across the distribution of house prices. If the property is in a historic district, that designation is associated with the value increase of 8 per cent in the bottom quantile of house price distribution. This percentage increase has a downward trend and is equivalent to 5 per cent in the top of the house price distribution, the 90 per cent quantile. This suggests that low-end properties report stronger price increases, which can translate into more displacement of low-income residents if they are the buyers of low-end properties. Interestingly, the spillover effects are only present at the top end of house price distribution; the coefficient on *Near historic district* is positive and significant only in the 90 per cent quantile. Thus, a positive effect on residential sales prices for houses located within the buffer area of the historic district suggests that upper-end buyers enjoy the externality benefits of historic preservation by providing a form of insurance of future neighbourhood quality.

Table 5. Quantile regression results, dependent variable: ln(*Price*), key coefficients ($N = 28\,025$)

	(Ols model)[a]	*(Quantile model)*[b]				
Independent variables	*Ln(Price)*	*Ln(Price) q10*	*Ln(Price) q25*	*Ln(Price) q50*	*Ln(Price) q75*	*Ln(Price) q90*
Historic district	**0.0947***** (0.0343)	**0.0802***** (0.0234)	**0.0658***** (0.0143)	**0.0550***** (0.0148)	**0.0588***** (0.0176)	**0.0545**** (0.0266)
Near historic district	**0.0386*** (0.0219)	**–0.0228** (0.0376)	**–0.00225** (0.0235)	**0.0135** (0.0195)	**0.0150** (0.0254)	**0.0635*** (0.0381)
Historic landmark	**0.0750***** (0.0221)	**0.0308***** (0.0108)	**0.0422***** (0.0102)	**0.0480***** (0.00898)	**0.0644***** (0.0160)	**0.0881***** (0.0197)
Historic landmark distance	**–0.0937***** (0.0287)	**–0.0307*** (0.0166)	**–0.0419**** (0.0164)	**–0.0545***** (0.0124)	**–0.0823***** (0.0205)	**–0.104***** (0.0246)
Constant	**10.76***** (0.0628)	**10.67***** (0.0489)	**10.76***** (0.0356)	**10.84***** (0.0364)	**10.92***** (0.0405)	**11.00***** (0.0418)
R^2/pseudo R^2	0.902	0.628	0.659	0.686	0.698	0.701

[a] Clustered standard errors in parentheses.
[b] Bootstrapped standard errors in parentheses.
Notes: Coefficients on standard hedonic model variables as well as dummy variables for year of sale and location controls based on census block groups are not reported here; they are available from the authors upon request. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In the same way, the coefficient on the *Historic landmark* variable exhibits an upward trend across the house price distribution. Although the coefficient is positive and significant for all of the quantiles, the upper-end house buyers record stronger price premiums. This can be in part due to the prestige of an official landmark designation in conjunction with the assurance that its desirable historic amenities will be fostered in the future by public regulation. These effects may make property owners in the surrounding area more willing to invest in rehabilitation and maintenance of their properties.

Altogether, the quantile regression analysis makes an important case for being wary of standard hedonic estimates that do not account for heterogeneity across the distribution. There are important, significant, impacts that may be hidden in the 'average' coefficient estimated by standard OLS, such as the differential impact of historic preservation in the upper- and lower-end houses in Baton Rouge, Louisiana.

5. Conclusion

Historic designation is increasingly used as a means to achieve both preservation and community economic development. This study considered the effects of historic designation on residential property values in Baton Rouge, Louisiana. Our results support the well-established notion in urban economics literature that historic preservation generally has a positive impact on property values and, in particular, that the historic designation is associated with average property value increases ranging between 5 per cent and 8 per cent of mean house value. Furthermore, designation of a neighbourhood as historic has positive spillover effects on property values for nearby residential properties. This finding supports using historic preservation and the designation of historic districts and landmarks as a policy tool for elected and community leaders seeking to find ways to protect and enhance residential property values in central cities. However, appreciation of property values may displace less-affluent residents of historic districts after designation takes place. It must indeed be recognised that with increasing values comes the very real possibility that displacement of neighbourhood residents can occur. Our results also show that the lower-end properties gain the most value from historic preservation. Thus historic preservation policies should be accompanied by efforts to retain affordable housing.

Notes

1. National Register of Historic Places, Spanish Town Historic District, selections from nomination document, 1978, National Park Service, Washington, DC (source: www.crt.state.la.us/hp/nhl/).
2. Box–Cox transformation is often used to evaluate alternative functional forms, but this procedure is not appropriate for dummy variables as used in the present study (Box and Cox, 1964).
3. Haurin's model offers an explanation for why houses with unusual attributes sell for less and take longer to sell (Haurin, 1988; Jud *et al.*, 1996). To capture the property atypicality effects, we use an alternative to this model that is presented in Turnbull *et al.*, (2006).
4. Roumain Building, Jared Young Sanders Jr House, St James Episcopal Church and St Joseph Cathedral are some of the examples of designated historic landmarks.
5. We do not report standard errors on any of these variables. However, they are available upon request.
6. OLS regression has typically been used in housing research to determine the relationship of a particular housing characteristic with selling price. Results differ across studies, not only in terms of size of OLS coefficients and statistical significance, but sometimes in the direction of effects.
7. An alternative to using quantile regression is to stratify dependent variables into subsets according to its unconditional distribution and then applying OLS on the subsets. Ries and Somerville (2004) show that after segmenting a sample into quantiles based on the price-per-square foot of housing, measures of school quality only affect high-end houses, most likely to be purchased by high-income buyers. Our technique of estimating a conditional quantile function avoids such truncation on the dependent variable. As argued by Heckman (1979), truncation of the dependent variable may create biased parameter estimates. Segmenting the data and estimating each section of the unconditional distribution yield incorrect results (Koenker and Bassett, 1978).

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