

DRAFT ONLY -- Do Not Cite Without Permission of the Authors

Do Housing Markets Value History? It Depends
Submarkets & Their Impact on Assessing Historic Preservation Zones

by

Christian L. Redfearn
University of Southern California

May 2, 2018

Abstract

In this paper we highlight complexities that arise from the presence of housing submarkets when assessing urban public policy. For many reasons, house prices have been exploited to extract signals about the impact of these policies. In order to extract useful information from transactions, researchers go to great lengths to control for the many factors contribute to the value of a house. We demonstrate that key assumptions required of these approaches may be inappropriate. The presence of distinct housing submarkets and their disparate dynamics across them can induce sensitivity in estimated policy impacts. In the case of historic preservation policies in Los Angeles, we find that the average effect found using typical empirical approaches can mask and mislead housing preservation impacts more locally. The results suggest that estimating average effects may only be the first step in informing policymakers. More work will be necessary to understand the impact of housing preservation within submarkets. These results may have broader implications for the use of house prices to inform policy.

1 Introduction

In this paper we highlight complexities that arise in assessing urban public policy using house prices as signals for their impact. The list of policies that make use of house price data is extensive; here we use historic preservation as a case study of many place-based policies that have been informed by assuming that house price capitalization before and after a policy change can reveal something about a policy's impact. A standard empirical approach involves hedonic analysis, in which several key assumptions are typically imposed in the process of estimating a policy's impact. Our results suggest that pooling data from different housing submarkets and assuming constant parameters across them is a mistake in complex urban areas. We find it difficult to construct adequate controls for the many other dimensions of change that occur within them. We find that best practices are surprisingly sensitive sample selection, functional form, and omitted variables. While it may be the case that an average effect can be recovered using commonly-accepted tools, the marked variation in a policy's impact across submarkets may render the average effect less helpful in anticipating the specific outcome.

The data for our case study are drawn from Los Angeles and from a subsample of housing sales in and around several Historic Preservation Overlay Zones (HPOZs). There are now 33 active HPOZs in Los Angeles. And though famous for its housing shortages, the City has recently created five new historic districts, comprising nearly 2,000 housing units that will further restrict potential new supply in these areas.¹ These districts can encompass a significant portion of the stock (at relatively low density); almost five percent of housing units in New York City – almost 12 percent of housing units in Manhattan – are in historic preservation districts (Been 2011, Glaeser 2010).

These forms of land-use regulation are typical in large metropolitan areas and may become more common if recent trends toward urbanization persist (Landis 2017, Landis 2016). Increased demand for urban housing will put pressure on land to be used at higher intensity, which will in turn encourage more removal of older, low density housing stock. But rising incomes will also raise demand for amenities, which may include historic properties. At issue is whether or not markets provide the optimal level of renovation and preservation. The social benefits that may accrue due

¹See the Los Angeles Department of City Planning's Office of Historic Resources for more: <https://preservation.lacity.org/hpoz>

to the existence of an individually historic structure may be diffuse, leading to redevelopment of a historic dwelling because the owner cannot capture the external benefits of preserving it. While designation of individual historic dwellings has been a long-standing tool for policy makers, it has been further argued that designating clusters of dwellings may offer further protection when it is the neighborhood character itself that provides a distinct additive benefit. These policies impose a potentially significant cost when owners lose the ability to redevelop their property, and the costs may be larger as these districts restrict housing supply (Waights 2016). As these regulations are being considered, it is reasonable for policy makers to ask: “What is the effect of historic designation?” Our results suggest that this question should be answered with: “It depends.”

House prices have become a common data source for assessing capitalization and the costs and benefits of particular policies. Because housing is expensive and immobile, homeowners are assumed to seriously consider the service flows from surrounding amenities and disamenities in bidding on a house. There is ample evidence that house prices can signal responses to policy changes (Cheshire and Sheppard 1995, Haurin and Brasington 1996, Bartik and Smith 1987). Housing is of course a multidimensional good that captures a long list of physical attributes, parcel attributes, and locational amenities. Hedonic methods have become standard to control for structural and parcel variation. But beyond controls for the size of a house and its lot, the number of bedrooms and bathrooms, it is common to assume neighborhood fixed-effects as a reasonable proxy for the net benefits of the locational amenities. It is also common to use time-dummies to adequately capture the broader level of house prices over time. The familiarity with this approach is a potential problem we explore here: many key assumption are imposed rather than tested.

The primary contribution we make in this paper is highlighting how the diversity of submarkets within metropolitan areas – even those within close proximity – act to undermine the standard assumptions and induce errors in hedonic estimates. We find that not only are dwellings across HPOZs are quite different from one another, but the dwellings just adjacent to HPOZs are different by construction. In important ways, these groups of dwellings act as distinct submarkets, behaving differently over the course of the business cycle with regard to house prices but also with regard their hedonic prices. This implies that while there may be elements of neighborhood characteristics that remain constant, the fixed-effects that are needed to recovered the parameters of interest are

not, in fact, fixed. The time-varying component is then an omitted variable that can confound other parameter estimates. This poses a general challenge, but in particular for the differences-in-differences methods that have seen more use in historic preservation papers. In these models, the treatment and control groups are required to share a common trend, but we find no evidence to support the common-trend assumption.²

Rather than assuming that all the observations are drawn from a constant distribution in order to recover an average effect of historic preservation designation, we look within submarkets and allow the data to reveal the impact of preservation more locally. We find no simple, single story can be told about the effect of preservation. We do find examples of significant benefits of historic preservations overlay zones. But we also find neighborhoods in which dwellings within the HPOZs are penalized. With regard to the central externality that motivates preservation, we find exposure to an HPOZ has become consistently more valuable over time. But there are a number of alternative dynamics that could also explain this trend apart from an increasing premium for historic character. Taken together, the results resist a simple yes/no answer as to whether a city should enact another HPOZ. The results more clearly point to a need to assemble a more nuanced theoretical framework and empirical evidence to arrive at a confident suggestion for policy makers.

In this sense, the contribution we make in this paper cannot be used directly to help policymakers to anticipate the effects of the next HPOZ in Los Angeles – or in other cities. Rather, our main contribution speaks those who are trying to understand the economic forces at work in metropolitan areas by using house prices. Amid a large number of stakeholders – all with anecdotes of their own about what is best regarding preservation regulation, policy makers would benefit from sound, robust evidence on the impact of historic preservation. This is true of many place-based policies (Glaeser and Gottlieb 2008). While we focus on preservation, our hope is that these results can advance our understanding of how best to make use of housing data to better inform policy makers.

In Section 2, we discuss the various fundamentals at work in historic districts, including basic theoretical and standard econometric approaches in this area. There is considerable work on both. In Section 3, we explore the data to a greater extent than is commonly done. We do this to begin to document submarket variation. In Section 4 we examine imposed assumptions and in Section 4,

²There is an extensive literature on this issue. See Imbens and Wooldridge (2009), and Bertrand, Duflo, and Mullainathan (2004) much for starting points to it.

we demonstrate the sensitivity of our key results to different submarkets, various benign functional forms, and omitted variables. Finally in Section 5, we report our best efforts at estimating the impact of preservation across the submarkets and use these results to draw some larger inferences about empirical work in urban areas.

2 Historic Preservation Economics & Econometrics

While formalized enunciations of the basic economics forces at work in historic preservation can be found in the literature (Been, Ellen, Gedal, Glaeser, and McCabe 2016, Ahlfeldt, Moeller, Waights, and Wendland 2013, Noonan and Krupka 2011), it be more directly summed up in two quotes from a comment section on CurbedLA:³

“Great that LA is recognizing the fact that preserving old homes is saving our history. Too much new ugly architecture being created. Nothing beats the style and quality of the old home.”

and

“Buying a historical home is nightmare. Doing anything to it cost 3 to 4 times normal repairs. Needed to repair a balcony on historical home. Contractor said he would do it for \$3,000 and in 3-4 days. Neighbors complained and inspectors stopped the job. 3 months later and \$15,000 later the same job the contractors was going to do using the same materials had turned into \$15K money pit for permits and multiple inspections. The same job and same everything that would have taken 4 days. After that I put the home for sale. Imagine if we had major repairs like plumbing, roof, or electrical issues. Lord have mercy you will go bankrupt and homeless in no time.”

In order to understand the micro-foundations that lead to the creation of an HPOZ it is useful to understand who can authorize an HPOZ and how this process is undertaken. From the Office of Historic Resources website on it’s “How to Establish and HPOZ” page:⁴

The process typically begins informally, at a grass-roots level, with a local neighborhood group organizing community meetings to explain to residents how the HPOZ process

³<https://la.curbed.com/2013/3/27/10259456/a-guide-to-owning-in-a-historic-preservation-overlay-zone> – Curbed Los Angeles is a website that reports on all manners of land use policies and outcomes in the Los Angeles area.

⁴See the Los Angeles Department of City Planning’s Office of Historic Resources for more: <https://preservation.lacity.org/hpoz/new-policies-and-program-initiatives/how-establish-hpoz>

works and to gauge possible interest in creating an HPOZ. Community members often ask their City Council members for assistance, and most HPOZs are formally initiated by the City Council through a motion by the Council member of the district. Under the HPOZ Ordinance, the Director of the Planning, the Cultural Heritage Commission, or the City Planning Commission may also initiate an HPOZ. An HPOZ may also be initiated through a formal application by owners or renters within the district; in these cases only, the ordinance requires that signatures of at least 75% of owners or lessees be obtained.

Before an HPOZ may move into the formal adoption process, an historic resources survey of the proposed district must be prepared. The survey details the historic and architectural significance of the neighborhood and identifies structures and features as either “contributing” or “non-contributing” to the district. A contributing structure is a building that was constructed during the predominant period of development in the neighborhood and that has retained most of its historic features. A non-contributing structure is one that was either constructed after the major period of the neighborhood’s development, or has been so significantly altered that it no longer conveys its historic character.

Once the historic resources survey is completed, it is reviewed by Department of City Planning staff for completeness and accuracy. The Department of City Planning also holds public workshops and hearings in the community before taking the HPOZ through the adoption process. An HPOZ becomes effective only after the completed Historic Resources Survey is certified by the Cultural Heritage Commission. Because the HPOZ includes changes to zoning within the proposed area, it must be adopted as an ordinance by the City Planning Commission and the full City Council, following full public hearings.

The survey of the dwellings includes recording the year built, the architect who designed the house, the style of the house, its current state of alteration and quality, and its contribution to the historic character of the neighborhood. This survey is then used to construct the boundaries of a proposed HPOZ. The boundaries of an HPOZ are defined somewhat flexibly. That is, the goal is to create a contiguous neighborhood of dwellings that reflect a certain historic character. But there appears to be an active negotiation about adding an additional house. Clearly there are houses inside the HPOZs that are not historic. At the same time, there are many historic houses that are not in historic preservation zones. The desire to include more houses is somewhat balanced by the need to create cohesiveness within the zone and to be able to earn neighborhood support for the

zone.

It is during this phase of the formation of the HPOZ that the economic and econometric complexities begins to appear. That is, though the single margin of historic preservation is the focus of most academic research in this area, there are many margins at work that both influence prices and may condition the effect of preservation on house prices.

For example, the process of HPOZ formation makes clear that a great deal of sample selection by construction. This builds in the likelihood that the “buffer” dwellings around and HPOZ act as a submarket that is somewhat distinct from the HPOZ itself. If it were the case that this implied only a fixed premium or discount, the standard econometric approaches would not be problematic. However, we find that these premia and discounts vary considerably over time. More than just the structural attributes may differ inside and outside the boundaries; other important house prices fundamentals might vary systematically as well. For example, income and wealth, cultural preference, expectations about future land prices, and the larger neighborhood context all exert influences on house prices and are also clustered.

Despite the many sources of house price variation, it is common to elide such nuances to keep both the theoretical and empirical work focused and tractable. A good example of best-practice approaches to both is Been, Ellen, Gedal, Glaeser, and McCabe (2016). In this paper the authors develop a formal model of historic districts and stockholder’s incentives, and derive the equilibria that allow the empirical work to follow directly. The authors are keenly aware of the markets being studied, their theory is solid, and the data they use may be unmatched in the US in terms of length, coverage, and observations. They find average effects that support their theory. But interestingly, they find marked differences between the impact of preservation districts in Manhattan and outside Manhattan. They offer a compelling rationale – that the value of the redevelopment options are higher in Manhattan. But this is just one example of how submarket dynamics influence average effects. However, they offer no further examination of other types of variation within Manhattan or within the outer boroughs.

Another rich paper is (Ahlfeldt, Moeller, Waights, and Wendland 2013), who similarly provide several theoretical insights before making use of a very broad data set covering England over several decades. But in the course of extending differences-in-differences to include regression discontinuity

analysis, they report neighborhood controls simple as “Yes”. That is, they impose fixed effects. Housing submarkets are not novel but in practice they are treated as static. We document that our housing submarkets are not only quite dynamic but they may pose significant problems for these types of empirical approaches.

To explore how submarkets might undermine standard empirical approaches, let’s begin with the notion of historic character. The very definition of what constitutes historically important real estate is subjective. By one measure anything over 50 years old in Los Angeles should be considered historic. But even where architects and historians could agree on what constituted a set of structures that were relevant to the evolution of Los Angeles, it may be that the structures are functionally obsolete for their residents. The variation of the styles, quality, and craftsmanship across neighborhoods resists a simple taxonomy of “historic” or not. Contrast the differences between the dwellings in the Windsor Square HPOZ and those in the Lincoln Heights HPOZ and it will be more clear that an average effect for all HPOZs may be hard to interpret.

From the Windsor Square web page:

The Windsor Square Investment Company’s vision for development was a neighborhood of elegant homes, with lots of no less than 100 feet frontage and over 300 feet in width. Windsor Square was planned to be the most exclusive neighborhood in Southern California and the largest upper-class subdivision ever marketed in Los Angeles. Residences in Windsor Square represent various periods of development and a variety of architectural styles. Early residences feature examples of the Craftsman and Beaux Arts or Classical Revival styles while later residences reflect the popularity of Period Revival styles including Spanish Colonial, Mediterranean, Tudor, English, French, and American Colonial Revival styles. Contemporary and California Ranch styles are also represented in Windsor Square. The Windsor Square HPOZ was adopted by City Council in 2004.

Figures 1 and 2 are taken from LADCP’s Office of Historic Resources and examples of the architecture and condition of the dwellings in Windsor Square.

Figures 3 and 4 are also from the Office of Historic Resources, and show both the kind of architecture that is being protected in the HPOZ. The first pair of images betray large lots and big homes, but also considerable unmeasured quality: landscaping, trim, windows and brick work of high craftsmanship. The second pair of images show smaller units and lots, but also obvious historic elements. Of these two, Figure 3 reflects the great potential of these historic homes and



Figure 1: Dwellings In the Windsor Square HPOZ

the rationale for protecting them. Figure 4 illustrates the condition for some of these dwellings.

And from the Lincoln Height page:

To ensure the success of this early community, water pipes were installed at a considerable expense by Dr. John Strolher Griffin, William H. Workman, and John Gates Downey. In 1876, Griffin and Downey established one of the city's first streetcar lines to connect the East Los Angeles subdivision with downtown. Houses in Lincoln Heights vary in architecture and include examples of Victorian-era, Arts and Crafts, and Period Revival styles. The majority of residences were not architect-designed, but builder/contractor or homeowner constructed, and housed working- and middle-class families.

In the eyes of the organizing committees, these two HPOZs share elements of historic relevance. But even when newly developed, the target audiences for the two populations were decidedly different. One began as a premier neighborhood, the other as homes for working households. One less obvious source of heterogeneity is the accumulated depreciation that has occurred over the past hundred years. There simply is no data source for maintenance histories for the two communities. But driving through both neighborhoods makes clear that the Windsor Square HPOZ is fully comprised of homes that have been well kept, while Lincoln Heights has many more examples of historic homes that are in great need of reinvestment than there are homes that could match the level of investment in Windsor Square. Over our sample, 92 percent of the dwellings in Windsor Square are considered as contributing to the historic character of the HPOZ. The average house



Figure 2: Dwellings In the Windsor Square HPOZ

price in Windsor Square is over one million dollars. In Lincoln Heights, only 81 percent of the units are historic in nature, and the average price is \$183,000.

Perhaps most important is the heterogeneity that exists beyond the boundaries of an HPOZ. Windsor Square is located amid some of the most expensive neighborhoods in the Los Angeles Basin. Lincoln Heights, on the other hand, is located in a largely working-class neighborhood in East Los Angeles. While the relative ranks of these neighborhoods within metropolitan Los Angeles may be relatively stable over time, the shocks to these different segments of these population are likely to contribute to house prices in different ways over time.

Finally, it is hard not to notice one further difference between Lincoln Heights and Windsor Square. Lincoln Heights' location in East Los Angeles is near the center of the Hispanic cultural core of Los Angeles. Less than three percent of the neighborhood is white. The large majority of historic dwellings in the HPOZs were developed for non-Hispanics with northern European histories in mind. It is beyond the scope of this study to examine this thoroughly, but to the extent that there are different architectural preferences across cultures, it may be possible that a premium for preservation could depend on the households in the neighborhood that contains the HPOZ.

Submarkets are not the only challenges for assessing historic preservation policy. The literature has been grappling with small data sets, missing variables, poorly recorded data, etc. but has found



Figure 3: Dwellings In the Lincoln Heights HPOZ

some consensus that historic preservation districts are more valuable than others (Mason 2005, Ford 1989, Leichenko, Coulson, and Listokin 2001, Coulson and Lahr 2005, Clark and Herrin 1997, Coulson and Leichenko 2001, Treffeisen 2003, Asabere, Hackey, and Grubaugh 1989, Noonan 2007). But there is a growing number of papers that focus on the effects of introducing a new district rather than on the relative value of existing historic districts. There are numerous ways in which dwellings in historic districts might be different in terms of location and unmeasured quality, so it is the arrival of a new district that would allow for identification of the net benefit.

Several more recent papers find less evidence that districts are beneficial on net. After controlling for selection issues, Noonan and Krupka (2011), find that historic preservation districts in Chicago make dwellings in and outside districts less valuable. Asabere and Huffman (1994), Heintzelman and Altieri (2013) find that dwellings inside historic districts are also less valuable. And there are active debates about the larger effects on designation on housing supply (Glaeser 2010) and gentrification/dislocation (Zahirovic-Herbert and Chatterjee 2012). In this paper, we do not enter the debate directly because we have new results to contribute. Rather, we raise the issue submarkets may have been complicating how these empirical results should be interpreted.



Figure 4: Dwellings In the Lincoln Heights HPOZ

3 Data & Submarkets

The data we use in our analysis are drawn from two sources. We first use DataQuick’s house sale transactions data from 1988 to the end of 2012. The observations cover house sales in west and northeast Los Angeles. From that universe, we construct smaller samples from which to explore local housing submarkets in the neighborhoods around the historic preservation overlay zones. The second data set defines the historic preservation overlay zones themselves. The Los Angeles City Department of Planning’s Office of Historic Resources has created an inventory of dwellings within the HPOZs, enumerating those which are considered to contribute to the historic character of the HPOZ and those that do not. By merging the two data sets, we are able to create a database that includes housing price data along with the date of sale, a number of key hedonic characteristics, as well as membership in an HPOZ, and whether or not the dwelling contributes to the historic district. The DataQuick data also include a dwelling’s longitude and latitude so that we can calculate distances between dwellings and distances to the nearest HPOZ.

We chose to work with the 17 of the 33 HPOZs that would allow us to focus on learning about the influence of submarkets on standard empirical approaches. We ruled out HPOZs that were isolated because they offered little chance to find clean identification of the preservation designations. We also eliminated those HPOZs that began after the onset of the housing crash. While we include sale

data from 1988 to 2012, we do not study the HPOZs started after 2006. We felt the shock from the housing bust would dominate other signals. From the 17 HPOZs, we formed three clusters around which to shape our analysis. The three clusters are the “Wilshire Boulevard corridor cluster,” the “Pasadena Freeway corridor cluster,” and the “Santa Monica Freeway cluster.” As you can see from Figure 5, there is a natural organization of the clusters in terms of physical proximity, but they also share some common housing fundamentals and outcomes such as socio-economic characteristics, access to jobs, and house price levels. In the tables below, we report the same summary statistics

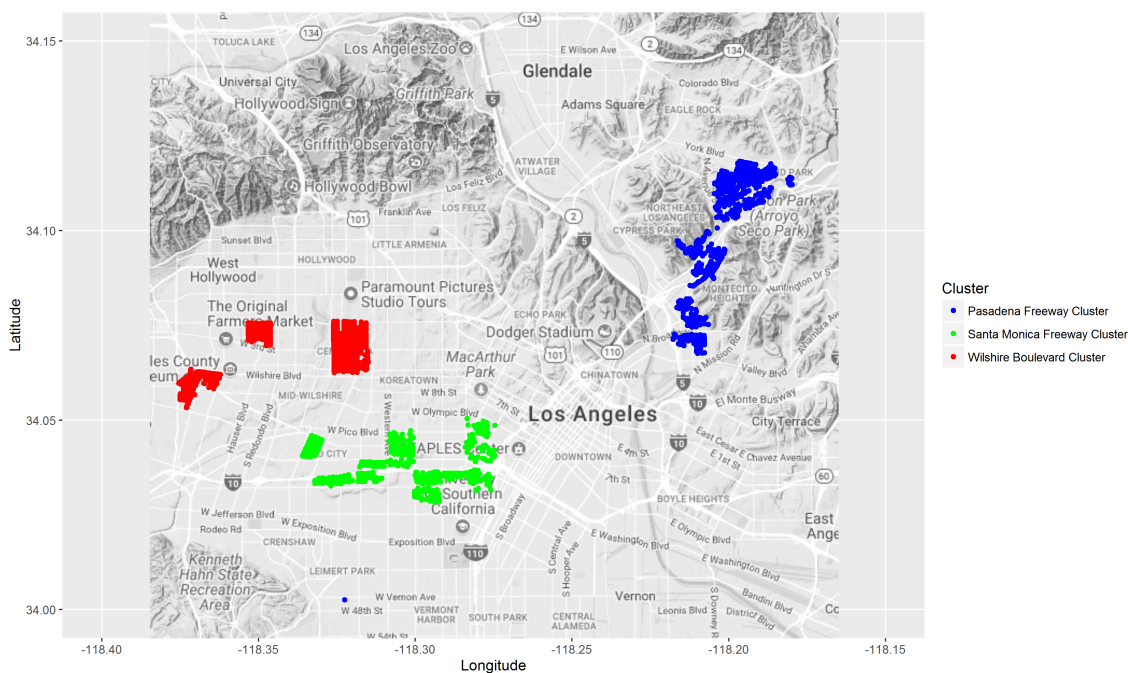


Figure 5: Three Clusters of HPOZs

for within the clusters. The goal of this section is to look for distinct submarkets within smaller geographies.

Table 1 reports summary statistics for the universe of our data – essentially the large rectangular area shown in Figure 5. The first line reports statistics for the 118,000 observations in the “Full sample” and shows that the typical house in our universe had an average sale price of \$468,000, was built in 1936, has 1,800 square feet of interior space and 7,200 square feet of lot area. It has three bedrooms and two baths.

Table 1: Summary Statistics: Universe of Observations & Subsamples

	N	Price	Yr. Built	Liv. Area	Lot Size	Beds	Baths
Full Sample	118,381	468,630	1936	1,810	7,248	2.90	2.05
In HPOZ	6,974	534,764	1921	2,223	7,430	3.36	2.12
Contributing	5,703	576,488	1919	2,344	7,672	3.46	2.18
Non-Contributing	1,271	347,549	1928	1,680	6,345	2.91	1.87
In Buffer	7,399	366,741	1927	1,700	6,440	2.93	1.81
In Control	104,898	471,942	1938	1,792	7,282	2.87	2.06

Table 2: Summary Statistics: Smaller Universe & Subsamples

	N	Price	Yr. Built	Liv. Area	Lot Size	Beds	Baths
Full Sample	36,691	413,104	1931	1,778	6,779	2.99	1.93
In HPOZ	6,084	535,445	1920	2,259	7,656	3.42	2.15
Contributing	4,996	580,691	1919	2,389	7,917	3.52	2.22
Non-Contributing	1,088	327,677	1927	1,659	6,458	2.93	1.85
In Buffer	7,399	366,741	1927	1,700	6,440	2.93	1.81
In Control	23,208	395,814	1935	1,677	6,658	2.89	1.91

The next row – “In HPOZ” – reports the averages for all the dwellings within the HPOZs in our universe. This subsample is further divided into those dwellings in HPOZs that have been defined as contributing to the historic character of the HPOZ and non-contributing members of an HPOZ. HPOZ dwellings are, on average, significantly more expensive than those outside them; the dwellings are larger and have larger lots. But these averages also mask variation within the HPOZs. Non-contributing dwellings are smaller than contributing and even smaller and less expensive than those dwellings outside the HPOZs. The prices for contributing dwellings are 66 percent higher than non-contributing. Finally, Table 1 reports our buffer and control samples. Both vary across each other and with the dwellings in the HPOZs.

Because the universe of data includes such a large area, we also considered a smaller universe of data, drawn from areas around each of the clusters. In Table 2, the same exercise is repeated using this smaller universe.

The striking feature of Table 2 is that the difference between non-contributing and contributing houses in HPOZs is greater using the smaller, more geographically concentrated sample. On average, a contributing house sells for \$580,000, is almost 2,400 square feet on an 8,000 square-foot lot with three bedrooms and more than two baths. While the non-contributing dwellings are

significantly smaller, they trade for \$327,000. This 77 percent difference in sale price between contributing and non-contributing homes is not explained by measured physical characteristics of the dwellings – or the location.

The “buffer” observations – which includes the dwellings around the HPOZs and the “control” observations – those just beyond the buffer zone, but still relatively close. The use of the smaller universe seems to suggest a better control due to more similar physical characteristics.

But both versions of the universe of data reveal several relevant regularities. First, dwellings in HPOZs are significantly more expensive than any other subsample in the tables. Moreover, the contributing dwellings are even more valuable, while the non-contributing are the least valuable of any of the four subsamples. These same patterns, however, also hold for the size and lot characteristics. Year built also betrays a pattern in which the older the home, the more valuable it is.

To explore the impact of submarkets on standard hedonic approaches, we turn to the three clusters enumerated above. Here we report the same summary statistics by cluster. These areas are shown in Figures 6, 7, and 8.

The first of the three clusters is the Santa Monica Freeway corridor cluster. A map of the HPOZs and the buffer dwellings is shown in Figure 6. The map shows seven HPOZs that follow the I-10 freeway toward downtown Los Angeles. The figure is familiar in that the buffer follows 250 meters from the edge of each HPOZ. This is a common appeal, to control for access to an amenity. But even here we can see some challenges. In some cases, another HPOZ prevents a buffer from existing fully around the HPOZ. In others – toward the east, the land uses change such that there are fewer and fewer single family residences as the data include the campus and environs around the University of Southern California, as well as downtown Los Angeles. But perhaps more insidious is the other set of amenities that exercise obvious influences on house prices: USC and the campus’ expansion have put more demand pressure in this area; the turnaround in downtown Los Angeles has spilled over somewhat into a neighborhood called City West, adjacent to the Pico-Union HPOZ, and the obvious exposure to the 12-lane freeway itself could complicate the housing analysis. Of course, these are all factors that could be controlled for explicitly, but typically assumed to be included in the local fixed effects.

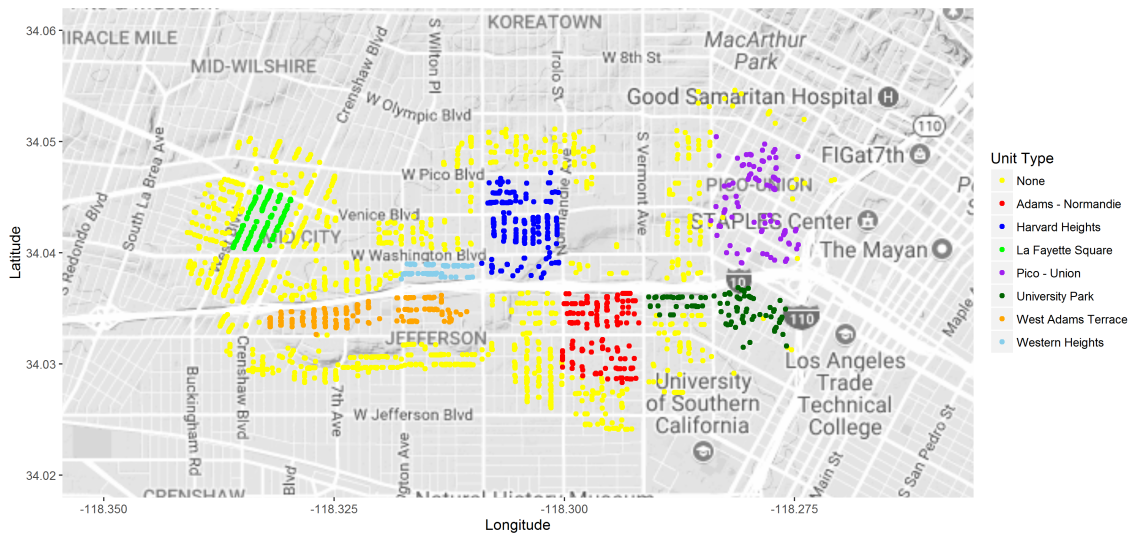


Figure 6: Santa Monica Freeway Cluster HPOZs & Buffer

With regard to the summary statistics, the patterns above in two universes of data are somewhat similar. The contributing dwellings in the Santa Monica Freeway cluster are the most expensive of the four subsamples within the cluster. The non-contributing dwellings are again the least valuable. But interestingly, the price differences are somewhat compressed compared to the relatively large differences in physical attributes. The contributing dwellings in the Santa Monica Freeway cluster are much larger than any other group. The same is true for the lot size the number of bedrooms. It is also interesting to note that the vintages are on average similar. It is common to have significant

Table 3: Summary Statistics: Santa Monica Freeway Corridor & Subsamples

	N	Price	Yr. Built	Liv. Area	Lot Size	Beds	Baths
Full Sample	8,837	313,658	1919	1,856	6,545	3.16	1.71
In HPOZ	1,443	327,365	1912	2,408	7,293	3.78	1.88
Contributing	1,265	338,007	1911	2,483	7,346	3.85	1.88
Non-Contributing	178	251,738	1920	1,880	6,921	3.26	1.89
In Buffer	1,761	271,667	1915	1,882	6,424	3.21	1.64
In Control	5,633	323,274	1922	1,706	6,391	2.99	1.68

age difference between the contributing dwellings in HPOZ and the buffer dwellings. But here, all the averages except the one from the broader set of control dwellings are from the same vintage.⁵

In Table 4, summary statistics include those for the Pasadena Freeway corridor. Here we get the striking reversal from the others, in which contributing dwellings are the least expensive of all. In this cluster, the most expensive dwellings are those furthest from the HPOZs, and even the buffer stock is more expensive than either the contributing or non-contributing dwellings. In this cluster, it is worth noting that much of the physical stock is very similar across the four samples. Living area, lot size, number of bedrooms, and the number of baths are all very similar across the groups. Only the age difference seems to matter, with the control group being significantly younger than those in the HPOZ

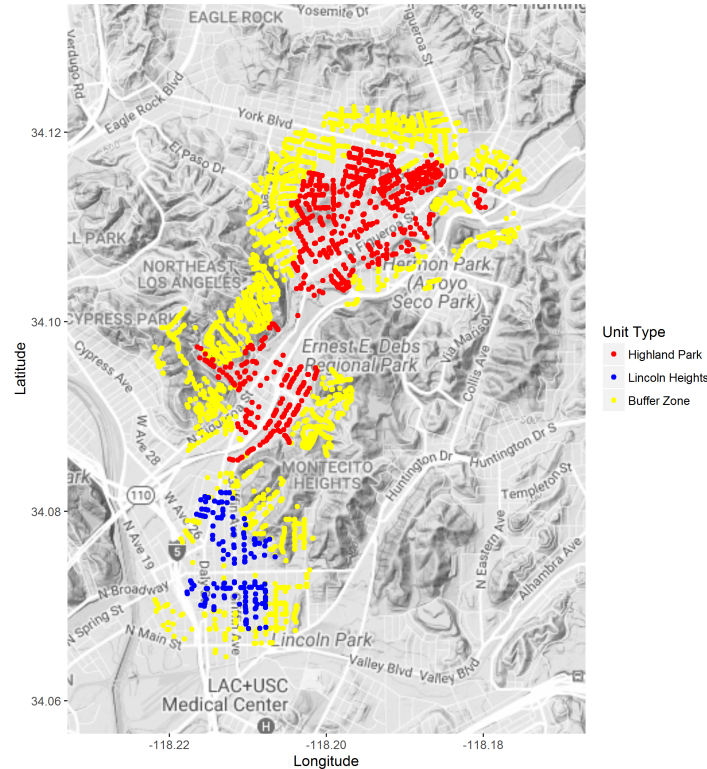


Figure 7: Pasadena Freeway Cluster HPOZs & Buffer

Figure 7 also suggest the simple distance measures may complicate controlling for neighborhood variation. To the northern and western side of the Highland Park HPOZ, a typical buffer looks appropriate. But to the east, we see two potential issues. First, the northern end of includes a

⁵Coulson and McMillen (2008) find that cohort and vintage effects are distinct from age effects.

Table 4: Summary Statistics: Pasadena Freeway Corridor & Subsamples

	N	Price	Yr. Built	Liv. Area	Lot Size	Beds	Baths
Full Sample	17,185	252,087	1938	1,318	6,334	2.60	1.63
In HPOZ	2,067	221,404	1918	1,337	5,796	2.68	1.40
Contributing	1,375	214,618	1915	1,354	5,765	2.67	1.33
Non-Contributing	692	234,888	1925	1,303	5,857	2.68	1.53
In Buffer	3,624	241,968	1934	1,225	5,633	2.51	1.55
In Control	11,494	260,795	1943	1,344	6,652	2.62	1.69

small number of dwellings in South Pasadena, a generally much wealthier community and likely a poor control for the dwellings in the HPOZ. Second, to the west, both HPOZ members and buffer dwellings cross the 110 Freeway, with the buffer dwelling located high above the HPOZ below in the arroyo. View is a premium in Los Angeles, and the buffer dwellings here are again poor controls. The buffer for the Lincoln Heights HPOZ is limited by different land uses, the freeways, and the topography.

In the third cluster, we have even more challenges to the standard buffer design. In Figure 8, we see the limitations of doing with this without some care. The Miracle Mile HPOZ is the most

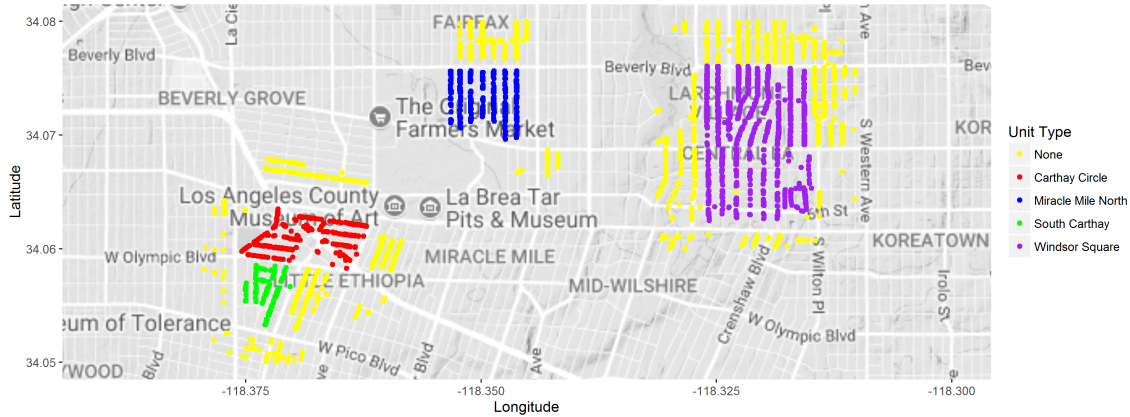


Figure 8: Wilshire Boulevard Cluster HPOZs & Buffer

Table 5: Summary Statistics: Wilshire Boulevard Corridor & Subsamples

	N	Price	Yr. Built	Liv. Area	Lot Size	Beds	Baths
Full Sample	10,669	754,832	1930	2,454	7,691	3.46	2.61
In HPOZ	2,574	904,280	1926	2,915	9,353	3.81	2.91
Contributing	2,356	924,642	1925	2,943	9,480	3.84	2.91
Non-Contributing	218	684,224	1938	2,608	7,988	3.46	2.85
In Buffer	2,014	674,389	1926	2,396	7,908	3.44	2.43
In Control	6,081	718,215	1932	2,278	6,915	3.33	2.55

problematic. Because of golf course, a major multi-family project, a major retail development, and retail lines arterials, the bulk of the buffer dwellings are across Beverly Boulevard. While plausible, it is potentially also a poor control.

Finally, Table 5 includes the statistics for the Wilshire Boulevard corridor. And here, the differences are quite striking. The price for contributing dwellings in this cluster of HPOZs is almost \$925,000. These dwellings are significantly larger and on larger lots, and have more bedrooms and bathrooms than do the buffer stock in the control groups. The non-contributing dwellings in the Wilshire Boulevard corridor are again the least valuable, despite having larger dwellings and on being much larger lots than the control groups.

It is clear from these three clusters and the summary statistics derived from them that there are marked differences across them and within them. The absolute level of prices as well as the relative price levels of the subsamples within them vary from cluster to cluster. While there was some evidence of preference-based sorting (Chay and Greenstone 2005), that question is left for future research.

In a cross-sectional analysis, the ZIP Code or census tracts fixed effects would likely soak up much of this variation. But in time-series data, the fixed effects would fail if the local fixed effects varied over time. Over the 25 years covered in this data, the city of Los Angeles has gone through multiple, pronounced cycles and this variation was not uniformly felt. The end of the Cold War and the decline in aerospace lead to particularly large shocks in some submarkets, while the rise of subprime in the housing bubble rose further in some places and fell further after that did other places. In the next section, we explore the extent of the local submarket variation across and within them.

3.1 Submarket House Price Dynamics

Of course submarkets exist (Bourassa, Hamelink, Hoesli, and MacGregor 1999, Bourassa, Hoesli, and Peng 2003, Goodman 1981, Goodman and Thibodeau 2003), but for historic preservation and other policies, the relevant question is whether submarket variation violates the common-trend assumptions and invalidates the standard differences-in-difference approach. In this section, we employ a uniform base model and apply it to many different subsets of the data to measure local house price dynamics within them. Our parsimonious base model is:

$$(1) \quad V = \alpha + \beta^{la} \log(livSF) + \beta^{ls} \log(lotSize) + \beta^{bed} beds + \beta^{bath} baths + \beta^a age + \beta^{a^2} age^2 + D + F + \varepsilon$$

where V is the observed sale price, β s are the implicit prices on *livingArea*, *lotsize*, number of *bedrooms*, and number of *bathrooms*. *Age* and *Age*² capture depreciation. D is a vector of quarterly time-dummies; F is a vector of zip code dummies. Our purpose is to make use of this base model and construct a set of house price indexes by submarket using the estimated coefficient on the time dummies. No historic covariates have been included in these regressions. Here we simply assume that historic effect is constant across time and space, and will not influence the constructed house price index.

In Figure 9, we report the indexes by submarkets. The black line is the estimated average price index using all 118,000 observations. We then subset that data. The orange lines with triangles is the price index for all HPOZ dwelling; the purple lines with circles is the index for those dwellings that are contributing dwellings. The green line with x's is estimated using housing sales from the areas. And, the blue dashed line is the control group – neither in an HPOZ or in the buffer areas.

The obvious first feature of the figure is the housing bubble and bust of the 2000s. But within that broad pattern, the submarkets reveal large differences, the most important of this is the separation between those in the HPOZs and those in the buffer areas. These three groups are central to our ability make statements about the effect of historic designation, but none of the three follow the same path, and seem to vary systematically over the cycle.

In Figure 10, we make the deviations more clear by constructing indexes relative to the index based on all observations. Recall that static differences would not complicate the standard empirical approaches, but here we see that all three series move substantially over time: the buffer series seems

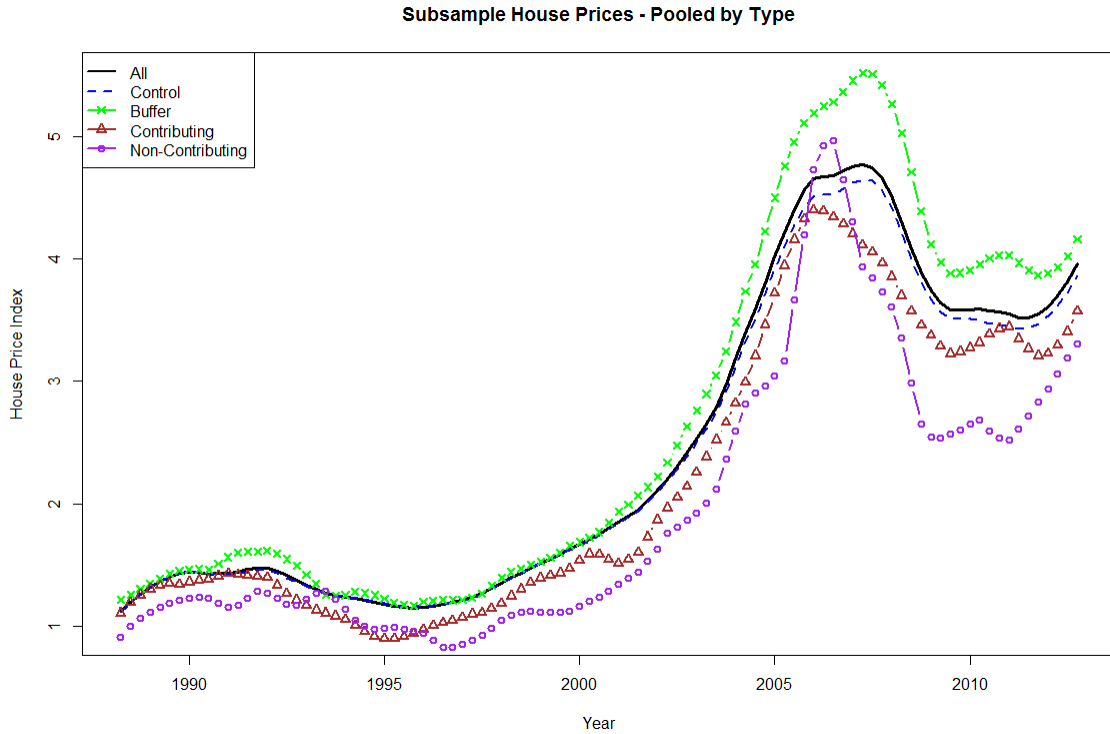


Figure 9: House Price Indexes by Market Type

to be pro-cyclical, while the non-contributing dwellings experience the largest volatility – spanning from +5 percent to -30 percent relative to the base.⁶ The index formed from contributing dwellings deviated less so, but still was not constant relative to the base index or the other control groups.

The submarkets in these figures was based on membership in or close to an HPOZ, and if one was a contributing dwelling within an HPOZ. But it is more common to think of submarkets as defined by space. In Figure 11 we plot indexes by our three clusters, and, again, we plot the relative indexes in Figure 12.

Both figures echo the overall pattern of house prices and the variation across the clusters. All three of the cluster indexes roughly track the baseline index through the bubble, but begin to deviate in 2004. Then the Santa Monica Freeway cluster house prices accelerated above the rest before falling further than than the others. The Wilshire Boulevard cluster, rises just above the baseline, but then clearly out-performs relative to the other clusters and the baseline after the housing bust. The Pasadena Freeway cluster, exhibits a minor deviation during the peak of the

⁶To be clear, the non-contributing index was the noisiest of the indexes. While the confidence intervals were wide, it was easy to reject the hypothesis that the contributing and non-contributing indexes shared a common series.

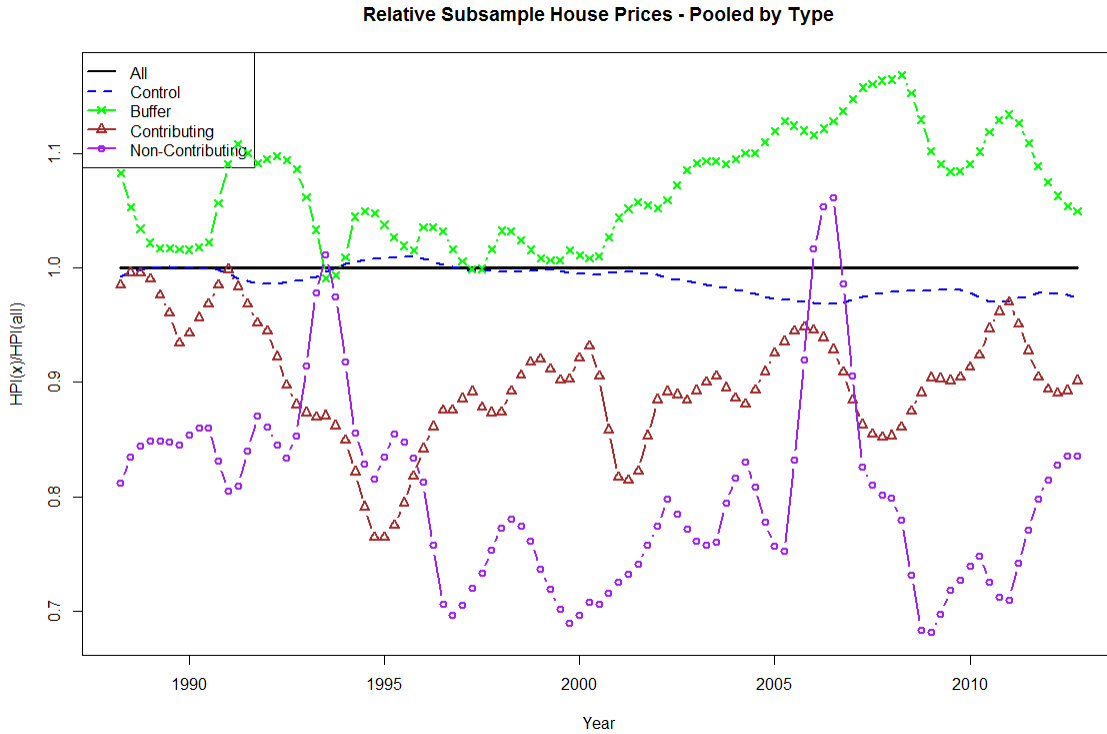


Figure 10: Relative House Price Indexes by Market Type (vs Universe)

housing bubble, but otherwise tracks the baseline.

It might be possible to speculate about the various fundamentals as work behind these disparate paths. For example, the Santa Monica Freeway cluster might have been more exposed to mortgage innovation and take up of subprime loans. The households in the Wilshire Boulevard cluster have significantly greater income and wealth, and perhaps they were better able to ride out the downturn. These are interesting hypotheses that warrant more research, but here the issue is about a common trend that would allow identification of historic preservation. These indexes do not support that assumption – by attributes, by location, or by historic characteristics.

4 Global and Local Approaches to Assessing Preservation

After exploring the existence of submarkets, it is time to examine their potential impact on the standard approach to assessing history preservation. Recall that the basic question being asked of this approach typically is “what is the average effect of historic preservation on house prices?” Of course, all coefficients come with standard errors. So the question we are asking now is not whether

Population & HPOZ Cluster House Prices

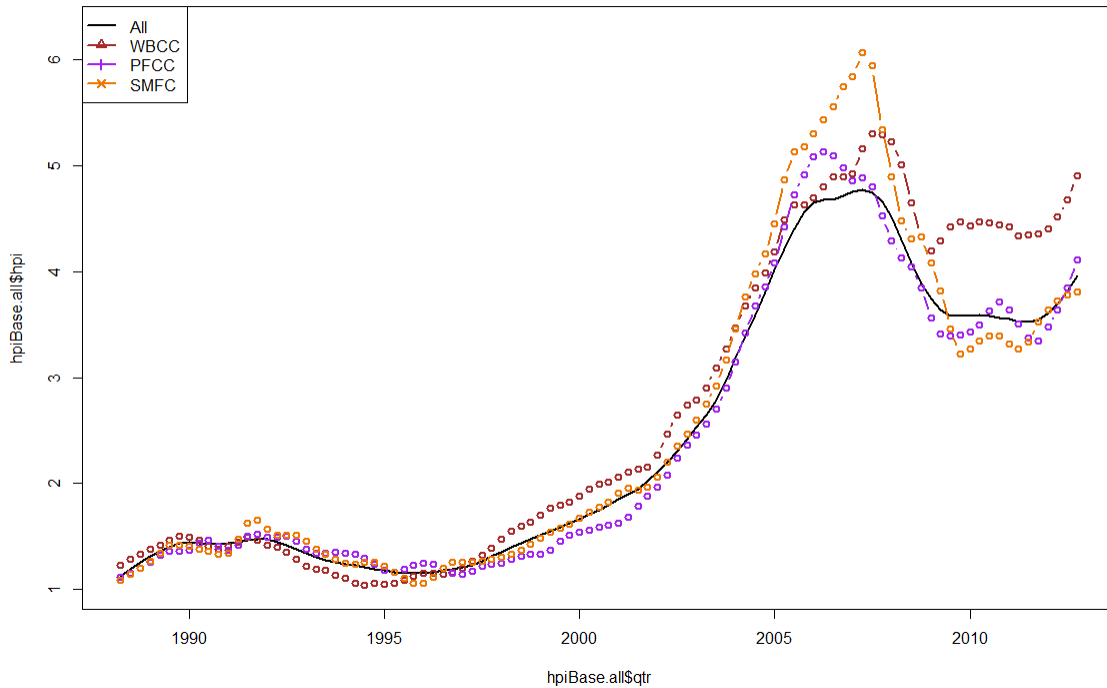


Figure 11: House Price Indexes by Market Type

or not the estimated coefficients will stay fixed when estimated across different subsamples. Rather, we are asking whether or not the average impact – as typically estimated – is useful for helping to find policy.

Researchers have gone to some length to explore nuances regarding architectural importance (Vandell and Lane 1989, Moorhouse and Smith 1994), the fame of the architect who designed the real estate (Ahlfeldt and Mastro 2012), and many different functional forms to capture age and depreciation (Coulson and McMillen 2008). These are relevant and interesting issues, but they are not the focus of this paper. Instead we are looking to examine the role of submarkets and the robustness of parameter estimates when the standard assumptions are relaxed. In the previous sections, we documented extensive variation both within and across the HPOZs, buffer, and control samples. We also demonstrated that the relative price appreciation within these many disparate groups vary markedly over our sample period. With these results in mind, we can turn to the standard regressions and then relax several of the imposed assumptions.

In Table 6, we begin with the universe of observations –just over 118,000 sales. The four columns

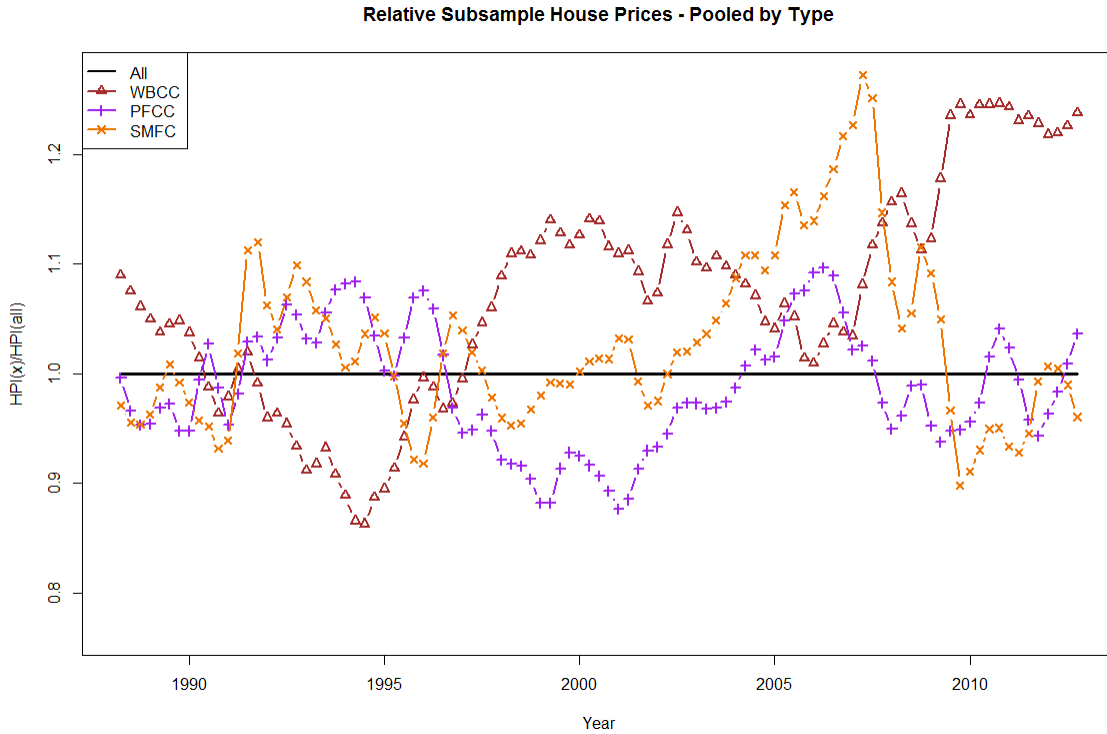


Figure 12: Relative House Price Indexes by Market Type (vs Universe)

reflect four different parameterizations of the same data using ordinary least squares. The variables of interest here are *distance*, *HPOZever*, *HPOZpost*, *contEver*, and *contPost*. “HPOZ” refers to a sale is in a historic preservation zone, “cont” refers to whether a dwelling has been defined as contributing to the character of the HPOZ. “ever” and “post” indicates the difference between sales that occur before and after the HPOZ designation. The typical approach involves looking at the coefficient on “HPOZpost,” this coefficient would capture affect of introducing a new district on the dwellings within it.

The first thing to note from this table is that the historic variables add no more explanatory power to data. There are historic variables variables that are significant within that, but the adjusted R-squared remains 76 percent across all four models. All four columns could be interpreted as support for a basic theoretical approach to historic preservation. For example, one unambiguous theoretical margin of historic preservation is the loss of the redevelopment option, and the results in Table 7 report a consistent pattern of there being a penalty following the introduction of historic preservation zone. But that conclusion would be premature.

Table 6: Global Regressions: Baseline Models

	<i>Dependent variable:</i>			
	log(price)			
	(1)	(2)	(3)	(4)
log(livSF)	0.499*** (0.006)	0.498*** (0.006)	0.497*** (0.006)	0.497*** (0.006)
log(lotSize)	0.212*** (0.004)	0.212*** (0.004)	0.212*** (0.004)	0.212*** (0.004)
bedrooms	-0.026*** (0.002)	-0.026*** (0.002)	-0.026*** (0.002)	-0.026*** (0.002)
baths	0.033*** (0.002)	0.034*** (0.002)	0.034*** (0.002)	0.034*** (0.002)
age	0.012*** (0.0002)	0.012*** (0.0002)	0.012*** (0.0002)	0.012*** (0.0002)
age2	-0.0001*** (0.00000)	-0.0001*** (0.00000)	-0.0001*** (0.00000)	-0.0001*** (0.00000)
log(distance + 1)	-0.007*** (0.001)	-0.002 (0.002)	-0.002 (0.001)	-0.002 (0.002)
hpozEver		0.063*** (0.013)		0.036* (0.021)
hpozPost		-0.053*** (0.011)		-0.081*** (0.024)
contEver			0.073*** (0.012)	0.034* (0.020)
contPost			-0.044*** (0.012)	0.036 (0.027)
Observations	118,381	118,381	118,381	118,381
Adjusted R ²	0.760	0.760	0.760	0.760

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 7: Global Regressions: Base + HPOZ Fixed Effects

	<i>Dependent variable:</i>			
	log(price)			
	(1)	(2)	(3)	(4)
log(livSF)	0.500*** (0.006)	0.500*** (0.006)	0.500*** (0.006)	0.500*** (0.006)
log(lotSize)	0.212*** (0.004)	0.212*** (0.004)	0.212*** (0.004)	0.212*** (0.004)
bedrooms	-0.026*** (0.002)	-0.026*** (0.002)	-0.026*** (0.002)	-0.026*** (0.002)
baths	0.033*** (0.002)	0.033*** (0.002)	0.033*** (0.002)	0.033*** (0.002)
age	0.012*** (0.0002)	0.012*** (0.0002)	0.012*** (0.0002)	0.012*** (0.0002)
age2	-0.0001*** (0.00000)	-0.0001*** (0.00000)	-0.0001*** (0.00000)	-0.0001*** (0.00000)
log(distance + 1)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
hpozPost		0.009 (0.013)		-0.036 (0.025)
contEver			-0.012 (0.016)	-0.031 (0.020)
contPost			0.023* (0.013)	0.056** (0.027)
Observations	118,381	118,381	118,381	118,381
Adjusted R ²	0.762	0.762	0.762	0.762

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 7 reports estimates of identical covariates save one. In these four models, we replaced the single fixed effect of being in any HPOZ, with an indicator variable for each HPOZ cluster.⁷ With the introduction of fixed effects for each of historic preservation zones much of the story about the loss of the redevelopment option – that was compelling in Table 6 – is no longer significant. In column one, the distance variable that was significant is now gone. In column two, there is no post-designation penalty for being an HPOZ. Only some moderate significance remains to support the story the contributing dwellings are more valuable after designation. These two tables reflect very small changes in the regression set up, but do much to undermine the story about preservation.

The heterogeneity in the summary statistics and house price indexes suggest perhaps that pooling the data may be problematic. In Table 8, we report a regression for each of the three clusters and a fourth regression by combining those three datasets. In these regressions we get much more variation in the coefficients, and in many cases the variation is sensible. For example, the lot size variable across these three clusters should vary. The Pasadena Freeway cluster and the Santa Monica Freeway cluster are both lower price housing markets in which the land is less valuable than that in the Wilshire Boulevard corridor. It is not surprising then that the marginal price of additional square foot in the Wilshire Boulevard corridor is significantly higher than in the Pasadena Freeway and Santa Monica clusters.

With regard to historic preservation, we explore a common specification that would allow for the premium for being in historic preservation zone to vary over different housing epochs. In short, *hpoz99* indicates the sale occurred from the beginning of the data through 1999. This was a slow period for housing in California as the economy recovered from the end of the Cold War and overexposure to aerospace. *hpoz06*, indicates housing sales during the bubble years, from 2000 to 2006. *hpoz10*, then captures those sales occur in a challenging market from 2007 to 2010. The remaining dummy captures house price sales that occurred as the recovery took hold from 2012 on.

In all four regressions, the HPOZ dummies for the early years are highly significant, both statistically and economically. But, by the bubble years only two of the three clusters offer significance. By 2010, only Pasadena Freeway cluster is significant and only at a marginal level. By the final

⁷The HPOZ fixed effects are not reported.

Table 8: Local Regressions by Cluster

	<i>Dependent variable:</i>			
	log(price)			
	PFCC	SMFC	WBCC	All
	(1)	(2)	(3)	(4)
log(livSF)	0.421*** (0.014)	0.442*** (0.021)	0.391*** (0.023)	0.449*** (0.010)
log(lotSize)	0.123*** (0.008)	0.345*** (0.018)	0.472*** (0.019)	0.221*** (0.007)
bedrooms	-0.016*** (0.005)	-0.018*** (0.006)	-0.014** (0.006)	-0.021*** (0.003)
baths	-0.009 (0.006)	0.010 (0.006)	0.027*** (0.006)	0.030*** (0.003)
vintage	0.095*** (0.012)	-0.075*** (0.016)	-0.270*** (0.018)	-0.054*** (0.008)
age	0.011*** (0.001)	0.007*** (0.001)	0.008*** (0.001)	0.010*** (0.0004)
age2	-0.0001*** (0.00000)	-0.00004*** (0.00001)	-0.0001*** (0.00001)	-0.0001*** (0.00000)
hpoz99	0.184*** (0.047)	0.692*** (0.091)	0.228*** (0.066)	0.397*** (0.035)
hpoz06	0.005 (0.050)	0.567*** (0.100)	0.084 (0.081)	0.200*** (0.039)
hpoz10	-0.158* (0.094)	0.120 (0.183)	0.125 (0.127)	0.025 (0.070)
hpoz15	-0.175 (0.108)	0.641*** (0.226)	0.350** (0.173)	0.145* (0.086)
contributing	-0.041** (0.019)	0.006 (0.034)	0.106*** (0.029)	0.012 (0.015)
dist99	0.025*** (0.006)	0.070*** (0.011)	0.015 (0.009)	0.023*** (0.005)
dist06	-0.005 (0.006)	0.054*** (0.013)	-0.001 (0.012)	-0.007 (0.005)
dist10	-0.033*** (0.013)	-0.013 (0.025)	0.012 (0.019)	-0.031*** (0.010)
dist15	-0.051*** (0.015)	0.059* (0.032)	0.039 (0.025)	-0.024** (0.012)
Observations	17,185	8,837	10,669	36,691
Adjusted R ²	0.649	0.711	0.706	0.767

Note:

*p<0.1; **p<0.05; ***p<0.01

time period, there was again mixed results. Together, this variation over time and across clusters, allowed a single fixed average effect of historic preservation to be rejected.

Though we report only one table here as an example of the spatial and temporal variation across many of the the parameters, we found hints of a more robust interpretation of the historic preservation in the externality that motivated the regulation in the first place. The distance variables measure closest distance to another HPOZ dwelling. If there were a positive externality, we should see dwelling closer to the historic homes trade at a premium. We see some evidence of this: in the earliest period, all four regressions estimate that houses would trade at higher prices if they were further away from the HPOZ. This pattern reverses somewhat such that the historic districts were either neutral or an amenity.

5 Using House Prices in Complex Urban Areas

The literature on historic preservation is unsettled. There is a large number of articles and papers that might be described as advocacy in favor of more preservation. Much of it is convincing in providing compelling, but anecdotal evidence of the benefits of preservation. In Los Angeles, the Angelino Heights historic preservation overlay zone stands out as an obvious example of irreproducible real estate that suggests market intervention might be socially enhancing. The neighborhood is historically significant as the “first suburb” of Los Angeles and the houses are stunning examples of a kind of craftsmanship that is hard to find today. Indeed, it is difficult to argue that such craftsmanship could ever be viewed as a disamenity. But designing appropriate public policy regarding historic preservation requires more than this.

Holding all else constant, Victorian era craftsmanship might earn a premium. But it is important to note that all else is not held constant. And it is crucial to recognize that when one buys a house in Angelino Heights he or she is buying not only for the architecture but also for the neighborhood bundle with many other margins to consider.

In this paper our focus has been the role of submarkets; we have explored their impacts on estimated effects of historic preservation in Los Angeles. Though we spent some time laying the groundwork for the mechanics of the policy and the theoretical rationale for it, the paper does not genuinely address how best to give policy advice on this issue. Rather, these historic districts are good examples of how important it is for researchers to be thoughtful about implicit assumptions.

We found several regularities that call into question the completeness of asking about average effects. First, we documented extensive evidence about the presence of submarket and their idiosyncratic house price movements. These are highly problematic for the common-trend assumption for differences-in-differences approaches. Second, we provided compelling regression results that varied markedly when the submarkets were estimated separately. Both suggest that average effects are only useful as a first step – they may provide evidence of some benefit, but not evidence of where or how they contribute to house prices. With regards to historic preservation, the empirical challenges are already numerous, but this work suggests more will be needed to inform policy makers.

More robust results will be needed soon. After a century or more of spreading out, American metropolitan areas are experiencing more demand to live in urban areas. Among all the challenges

that comes with redevelopment is what to preserve. There will be more conversations about intervening to preserve historic homes and districts, even as policy makers are pressed to “solve the affordability crisis.” With this as a backdrop, more robust research on the costs and benefits of historic preservation is needed.

The primary contribution in the paper, however, is the documentation of submarkets, of their presence even in small areas, of how sensitive historic estimates are to small changes in functional form and sample. While we did not provide a clear path forward, we feel that understanding the underlying dynamics is an important step forward.

References

- AHLFELDT, G., AND A. MASTRO (2012): “Valuing iconic design: Frank lloyd wright architecture in oak park, illinois,” *Housing studies*, 27(8), 1079–1099.
- AHLFELDT, G. M., K. MOELLER, S. WAIGHTS, AND N. WENDLAND (2013): “Game of zones: The economics of conservation areas,” .
- ASABERE, P., G. HACKEY, AND S. GRUBAUGH (1989): “Architecture, Historic Zoning and the Value of Homes,” *Journal of Real Estate Economics*, 2(3), 181–195.
- ASABERE, P., AND F. HUFFMAN (1994): “Historic Designation and Residential Market Values,” *The Appraisal Journal*, 62(3), 396–401.
- BARTIK, T. J., AND V. K. SMITH (1987): “Urban amenities and public policy,” in *Handbook of regional and urban economics*, vol. 2, pp. 1207–1254. Elsevier.
- BEEN, V., B. C. D. S. E. I. I. J. M. S. W. M. W. M. (2011): “State of New York City’s Housing and Neighborhoods,” *Furman Center for Real Estate & Urban Policy, New York University*.
- BEEN, V., I. G. ELLEN, M. GEDAL, E. GLAESER, AND B. J. MCCABE (2016): “Preserving history or restricting development? The heterogeneous effects of historic districts on local housing markets in New York City,” *Journal of Urban Economics*, 92, 16–30.
- BERTRAND, M., E. DUFLO, AND S. MULLAINATHAN (2004): “How much should we trust differences-in-differences estimates?,” *The Quarterly journal of economics*, 119(1), 249–275.

- BOURASSA, S. C., F. HAMELINK, M. HOESLI, AND B. D. MACGREGOR (1999): “Defining housing submarkets,” *Journal of Housing Economics*, 8(2), 160–183.
- BOURASSA, S. C., M. HOESLI, AND V. S. PENG (2003): “Do housing submarkets really matter?,” *Journal of Housing Economics*, 12(1), 12–28.
- CHAY, K. Y., AND M. GREENSTONE (2005): “Does air quality matter? Evidence from the housing market,” *Journal of political Economy*, 113(2), 376–424.
- CHESHIRE, P., AND S. SHEPPARD (1995): “On the price of land and the value of amenities,” *Economica*, pp. 247–267.
- CLARK, D. E., AND W. E. HERRIN (1997): “Historical Preservation Districts and Home Sale Prices: Evidence from the Sacramento Housing Market,” *Review of Regional Studies*, 27(1), 29–48.
- COULSON, N. E., AND M. L. LAHR (2005): “Gracing the Land of Elvis and Beale Street: Historic Designation and Property Values in Memphis,” *Real Estate Economics*, 33(3), 487–508.
- COULSON, N. E., AND R. M. LEICHENKO (2001): “The Internal and External Effects of Historical Designation on Property Values,” *Journal of Real Estate Finance and Economics*, pp. 113–124.
- COULSON, N. E., AND D. P. MCMILLEN (2008): “Estimating time, age and vintage effects in housing prices,” *Journal of Housing Economics*, 17(2), 138–151.
- FORD, D. A. (1989): “The Effect of Historic District Designation on Single-Family Home Prices,” *American Real Estate and Urban Economics Association Journal*, 17(3), 353–362.
- GLAESER, E. (2010): “Preservation follies: excessive landmarking threatens to make Manhattan a refuge for the rich,” *City Journal*, 20(2).
- GLAESER, E. L., AND J. D. GOTTLIEB (2008): “The economics of place-making policies,” Discussion paper, National Bureau of Economic Research.
- GOODMAN, A. C. (1981): “Housing submarkets within urban areas: definitions and evidence,” *Journal of regional science*, 21(2), 175–185.
- GOODMAN, A. C., AND T. G. THIBODEAU (2003): “Housing market segmentation and hedonic prediction accuracy,” *Journal of Housing Economics*, 12(3), 181–201.

- HAURIN, D. R., AND D. BRASINGTON (1996): “School quality and real house prices: Inter-and intrametropolitan effects,” *Journal of Housing economics*, 5(4), 351–368.
- HEINTZELMAN, M. D., AND J. A. ALTIERI (2013): “Historic preservation: Preserving value?,” *The Journal of Real Estate Finance and Economics*, 46(3), 543–563.
- IMBENS, G. W., AND J. M. WOOLDRIDGE (2009): “Recent developments in the econometrics of program evaluation,” *Journal of economic literature*, 47(1), 5–86.
- LANDIS, J. D. (2016): “Tracking and explaining neighborhood socioeconomic change in US metropolitan areas between 1990 and 2010,” *Housing Policy Debate*, 26(1), 2–52.
- (2017): “The end of sprawl? Not so fast,” *Housing Policy Debate*, 27(5), 659–697.
- LEICHENKO, R. M., N. E. COULSON, AND D. LISTOKIN (2001): “Historic Preservation and Residential Property Values: An Analysis of Texas Cities,” *Urban Studies*, 38(11), 1973–87.
- LOS ANGELES DEPARTMENT OF CITY PLANNING OFFICE OF HISTORIC RESOURCES (Accessed January 24th, 2018): “Historic Preservation Overlay Zones (HPOZs),” <https://preservation.lacity.org/hpoz>.
- MASON, R. (2005): “Economics and historic preservation,” *Washington, DC: The Brookings Institution*, pp. 35–100.
- MOORHOUSE, J. C., AND M. S. SMITH (1994): “The Market for Residential Architecture: 19th Century Row Houses in Boston’s South End,” *Journal of Urban Economics*, 35(3), 267–277.
- NOONAN, D. S. (2007): “Finding an impact of preservation policies: price effects of historic landmarks on attached homes in Chicago, 1990-1999,” *Economic development quarterly*, 21(1), 17–33.
- NOONAN, D. S., AND D. J. KRUPKA (2011): “Making - or picking - winners: Evidence of internal and external price effects in historic preservation policies,” *Real Estate Economics*, 39(2), 379–407.
- TREFFEISEN, A. (2003): “The Impact of Historic Districts on Residential Property Values,” *New York City Independent Budget Office Background Paper*, pp. 1–10.
- VANDELL, K. D., AND J. S. LANE (1989): “The economics of architecture and urban design: some preliminary findings,” *Real Estate Economics*, 17(2), 235–260.

WAIGHTS, S. (2016): “The preservation of historic districts - is it worth it?,” *Journal of Economic Geography*.

ZAHIROVIC-HERBERT, V., AND S. CHATTERJEE (2012): “Historic preservation and residential property values: evidence from quantile regression,” *Urban Studies*, 49(2), 369–382.