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Conservation planning and informal institutions: heterogenous patterns in Italian cities*

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Abstract

Conservation planning solves an economic coordination problem by internalizing positive externalities, i.e. preserving urban heritage. Non-compliance undermines conservation effects, but little is known about how much harm it actually does. This paper exploits a novel data set of property prices for 55 Italian cities. Despite the stringent planning regulations in this context, the conditions of the urban environment vary widely throughout the country, including within protected areas. The first step of the paper explores the variation in price premiums across 933 Landscape Areas (LAs) and 236 Historic Centres (HCs), using a boundary discontinuity design (BDD). The second step uses an instrumental strategy to substantiate estimates and confirm that, at least partially, rates of *abusivismo* (AB) – illegal building and construction – reduce heritage price premiums, suggesting the influence of informal institutions. By examining discontinuities at the boundary, I find a capitalization effect of about 6.5% (€160 extra per square metre) for LAs, and an estimated average premium of 3.5% (€86 extra per square metre) for HCs. The second step of the analysis reveals that a 1% increase in AB is associated with an expected depreciation effect of 0.64 percentage points in HC price premiums, while a 1% increase in AB is associated with an expected depreciation effect of 0.14 percentage points in LA price premiums. The results confirm that, at least partially, illegal building and construction levels explain heterogeneous patterns in premiums across Italian cities.

Key words: conservation policy, informal institutions, boundary discontinuity, property prices, Italy
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1 A story of heterogeneity

Architectural beauty, whether historic or modern, can be considered a local public good and amenity. Urban heritage is the category of heritage that most directly concerns the environment of every person. Living within or in close proximity to urban heritage areas is thought to provide a number of welfare benefits. Similarly to other planning policies addressing local public goods, heritage preservation policies solve an economic coordination problem. Conservation planning corrects for market failures and internalizes positive externalities, by preserving spaces of particular heritage value or architectural beauty which might otherwise be subject to considerable urban change because of market pressures to exploit land in attractive places.

Italy is famously known for the richness of its urban heritage, which has been argued to be a valuable public asset throughout the country by countless experts (Albrecht & Magrin 2015; Bonfantini 2012; Bandarin & Oers 2012). Italy presents a longstanding conservation planning system, with well-developed policies and strict regulations. Article 9 of the Italian Constitution states the need to protect and enhance both the landscape and the historical and artistic heritage of the nation (Cosi 2008; Trentini 2016). Conservation policy takes three main forms in this context: individual architectural designations (Nasi Law n. 185/1902), Landscape Areas (LAs) (Law n.1497/1939) protecting landscapes in both natural and urban settings, and Historic Centres (HCs) embedded in Italian urban policy through zoning (Bonfantini 2012). These regulations impose considerable limitations on how the urban environment can be modified within these areas, in order to preserve the sociocultural and historic values of urban fabrics. It has in fact been argued that conservation planning is one of the contributions to have been made by Italian urbanism (Balducci & Gaeta 2015).[1]

Non-compliance with planning policy undermines its effects. Little is known, however, as to how much harm non-compliance actually does. Italy presents a context where, despite stringent planning regulation, the conditions of the urban environment vary widely throughout the country, including within protected areas (ISTAT 2015). The presence of such heterogeneity in conservation areas has not, to this author's knowledge, been empirically explored to date, and neither have hypotheses that this variation could stem from non-compliance embedded in informal institutions. *Abusivismo* (AB) – illegal or unauthorized building and construction – is often argued to be behind heterogeneity in urban environmental conditions (Zanfi 2013), potentially undermining planners' efforts to preserve heritage externalities. This paper will explore the heterogeneity in urban

[1] 'The Italian modern movement not only saw the historic city as unreplaceable part of the city to be preserved, but as a model of inspiration for the design of the modern city' Giuseppa Fera in Ernesti et al. (2015).

heritage effects, delimited through conservation planning, and attempt to show how, at least partially, AB levels explain this heterogeneity. Is *abusivismo* putting one of the major urban amenities of Italian cities at risk?

Illegal or informal building is present in many countries; however, the precise phenomenon of AB is quite specific to Italy. AB is widespread, to the extent that it has assumed social and political importance (Biffi, Ciafani, Dodaro & Muroni 2014; Trentini 2016). AB can be described as a type of informal institution, given that it goes beyond simply ad hoc informal building behaviour and refers to practices which are widely followed and embedded within Italian societies. This follows Helmke & Levitsky (2004) who define informal institutions as socially shared rules, usually unwritten, that are created, communicated and enforced outside of officially sanctioned channels.[2] Specifically, this paper identifies AB as a competing informal institution, as defined by Helmke & Levitsky (2004), given its coexistence with ineffective formal institutions and divergent outcomes. Competing informal institutions structure incentives which are incompatible with formal rules, creating alternative norms (Della Porta & Vannucci 1999).

As an outcome measure of economic value, I concentrate on property prices which reflect the value buyers attach to all property characteristics, including the architectural or heritage value of a property itself and the area. By using the economic value embedded in property prices as an outcome variable, this hedonic approach has the advantage of building on a tradition of research estimating the capitalization effect of a wide range of local public goods or policies (Cellini et al. 2010; Eriksen & Rosenthal 2010; Gibbons & Machin 2008; Gibbons et al. 2013). The paper is divided into two subsequent analyses. I first investigate whether heterogenous price premiums can be observed across the 55 cities and the 296 neighbourhoods under investigation, the underlying question being what this suggests about how urban heritage is valued across Italian regions. Robust evidence on potential benefits of conservation planning is scarce, and crucial for the economic justification of such planning policies. I then examine what drives the heterogeneity of heritage price premiums across cities, and attempt to assess whether heritage price premiums are reduced by rates of AB. This hypothesis can be substantiated empirically, the underlying premise being that places with higher AB are less compliant with urban policy and consequently experience lower external benefits. Conservation planning is a good example to examine because of the stringency of the policies attached to it. I hope this analysis will motivate other investigations of the relationship between restrictive zoning systems and citizen compliance. Despite recent efforts

[2] This definition borrows from Brinks (2003) and is consistent with Carey (2000), Lauth (2000) and Christiansen & Neuhold (2012).

and the political will to fight AB and other forms of widespread illegal attitudes in Italy over the last 20 years, AB rates, among other outcomes, have not substantially dropped (ISTAT 2015).

To assess the heterogeneity of heritage price premiums and thereafter the reasons behind such variation, I make use of a two-step strategy which recovers price premiums by city in the first step and regresses the recovered premiums on AB rates in the second step. This methodology can in theory be applied to other contexts with stringent policies and which present similar heterogeneities. To collect price premiums by city for both Italian conservation policies (LAs and HCs), I exploit the fine spatial nature of a novel Italian data set of house prices and draw on the regression discontinuity design literature, in particular work that has exploited discontinuous changes at spatial boundaries (Gibbons et al. 2013; Ahlfeldt & Holman 2018). I establish a boundary discontinuity-inspired design (BDD) which allows me to account for unobserved location characteristics that could confound the heritage effect. In the second step, I explore how AB and other covariates affect both LA and HC price premiums.

I face two possible estimation challenges in this city-level second step. On the one hand, returns to abusive behaviour could be larger in highly valued areas, presenting a possible reverse causality issue and a negative bias in the results. On the other hand, possible omitted variables could be affecting both the heritage premium and abusive behaviour: AB is likely correlated with unobserved city characteristics. I address these endogeneity concerns using an instrumental variable approach. The main instrument used is a legal attitudes index (LAI) created by Tabellini (JEEA 2010) in his longstanding work on informal institutions. This index incorporates measures of trust, respect, control and obedience. The instrument mechanically gets around a possible reverse causality problem since it is unlikely to be affected by price premiums. It also addresses the omitted variable problem as it measures a range of attitudes which are good predictors of AB but not of price premiums. As predicted, results using the LAI as an instrument have slightly larger magnitudes than the OLS estimates. The estimates are, however, consistent overall, suggesting that the OLS results are quite robust. Accordingly, I re-run the entire analysis at neighbourhood level, using an alternative measure of AB that I am able to construct at a smaller spatial scale using census data. This alternative measure of AB is an index of urban law compliance, constructed by exploiting differences in numbers of pre-1919 buildings between 2011 and 2001, which are strictly protected by law. Re-rerunning my analysis at neighbourhood level allows me to identify the effect of interest from a comparable source of variation at a finer spatial scale (within cities), and to include city fixed effects to confirm that heritage price premiums are, at least partially, significantly reduced by non-compliance.

Comparing the discontinuities in property prices at the boundaries of both HCs and LAs, I find an average capitalization of about 6.5% (€160 extra per square metre) for LAs, and an estimated average premium of 3.5% (€86 extra per square metre) for HCs. Results show significant variation in heritage price premiums across Italian cities, with some trends according to geographical location. The analysis also reveals different effects in terms of magnitude for HCs and LAs. LA premiums tend to be significant and positive at larger magnitudes in northern cities, and significant and negative at smaller magnitudes in central and southern cities, while HC premiums tend to be significant and positive in northern and central cities, but significant and negative at smaller magnitudes in southern cities and island cities. There are, however, many exceptions within these geographical trends. The second step of the analysis reveals that premiums are on average lower in regions with higher rates of AB, suggesting that places with higher *AB* are less compliant with conservation planning and consequently experience lower external benefits. More specifically, a 1% increase in AB is associated with an expected depreciation effect of 0.64 percentage points in HC price premiums, while a 1% increase in AB is associated with an expected depreciation effect of 0.14 percentage points in LA price premiums. The results therefore confirm that, at least partially, illegal building and construction levels explain this heterogeneity. The important implication from these findings is that planning policies capable of solving the free-market coordination problem related to the architectural externalities are undermined in the Italian context by illegal attitudes. This underlines the necessity to either re-address policies limiting AB or, and perhaps jointly, re-address cutting red tape to remove some of the administrative burdens within conservation areas. These findings can also have external policy implications in suggesting the magnitudes at which illegal attitudes can undermine urban policy effects.

This study generally follows two strands of literature. It contributes to literature that has assessed the amenity value of cities (Glaeser et al. 2005; Gyourko & Tracy 1999; Albouy 2009) and neighbourhoods within cities (Cheshire & Sheppard 2005; Coulson 2008). The study more specifically contributes to literature evaluating urban heritage and architectural amenity capitalization effects on property prices (Noonan 2007; van Duijn & Rouwendal 2015; van Duijn et al. 2016; Ahlfeldt & Holman 2018; Ahlfeldt et al. 2017; Hilber et al. 2017). In comparison with these studies, this analysis explores the heterogeneity of urban heritage effects across two conservation policies – 933 LAs and 236 HCs. The analysis is unique in terms of the number of cities compared, and in the spatial detail of the data set for the Italian territory. Lack of previous evidence for the Italian context can be attributed to the challenge of compiling large micro data sets for this territory. The analysis of capitalization effects of conservation policies is in itself interesting in the Italian context because of the particular stringency of the planning system, especially compared to other European systems such as the English one (Pietrostefani & Holman 2017).

Exploiting the Italian context also allows this study to investigate the relationship between a restrictive zoning system and informal institutions, creating a link between two literature strands. The paper generally inserts itself in a growing body of evidence suggesting that illegal behaviour within both formal and informal institutions is one of the major causes of the degradation of natural and built environments, diluting policy effects (Wilson & Damania 2005). Traditionally, economists have been reluctant to consider informal practices as possible determinants of economic outcomes. More recently, however, a growing body of empirical work has measured how socially shared rules and attitudes – sometimes denominated as 'culture' – matter for a variety of economic outcomes (Alesina & Giuliano 2015; Tabellini 2010; Guiso et al. 2006; Bisin & Verdier 2001). This paper specifically contributes to this literature, as well as building on empirical studies that have investigated the role of other illegal activities on house prices (Roy 2005; Krijnen & Fawaz 2010). Studies have found considerable discounts on homes in high crime areas (Pope & Pope 2012; Buonanno et al. 2013; Gibbons 2004; Lynch & Rasmussen 2001) and historical crime rates have also been shown to have persistent effects on the price of real estate (Frischtak & Mandel 2012). Studies have also only very recently analysed the effect of organized crime on choice of living location and house price behaviour (Maggio 2018).

The remainder of this paper is structured as follows. Section 2 presents the unique data set and its various sources as well as the institutional and policy setting of our analysis by giving a short overview of conservation planning and illegal building and construction in the Italian context. Section 3 presents the empirical strategy and econometric specifications for the analysis, followed by Section 4 which reveals and discusses the results. The final section present the conclusions.

2 Data and Institutional Setting

2.1 Property and Location Data

The empirical analysis relies on a novel data set constructed from a wide-range of sources. Over 60,000 geo-localised house sales advertisements with a wide range of attributes spanning from 2011 to 2018 were collected from *Immobiliare.it,* the largest online portal for real-estate services in Italy. Data sampling focused on residential units for sale monitored from the time they were created up to the time they were removed from the database.[3]

This paper is among the first to exploit this database, which presents various advantages to the data provided by the real estate market observatory of the Italian Tax Office (OMI data). The OMI

[3] In 2016 the number of housing transactions in provincial capitals on *Immobiliare.it* was 183,000 units (about one-third of all housing transactions in Italy). The majority of transactions in these cities is brokered by real estate agents – who are more likely to upload adds on Immobiliare.it than private citizens –, whereas in small towns sales are less likely to need brokerage and so representativeness is potentially a problem.

data is aggregated at neighbourhood level and is therefore insufficient for the study of localized phenomena. Moreover, it has limited information about the physical characteristics of the transacted housing units. The collected *Immobiliare* data has the advantage of including a long list of structural attributes including floor space (m2), date posted on website, year, month, type (building, villa, house, apartment, loft, attic, box), number of rooms and bathrooms, type of kitchen, floor, garage of parking facilities, presence of a lift, year built, state of property, type of heating, AC facilities, energy classification, presence of a balcony/terrace and optic fibre facilities. Loberto, Luciani and Pangallo (2018)'s recent comparison between the OMI zone data and the *Immobiliare.it* database found the latter broadly consistent with official sources with an approximate 12% discount to be interpreted between the *Immobiliare* data and the OMI data. The use of house price data from advertisements – as opposed to data from actual sales – is not problematic in this case given the paper's focus on large cities (the 3 most population capitals in each region). I do not need to worry about large quantities of properties not advertised on *Immobaliare.it* which is the case in smaller Italian cities. As demonstrated by Loberto et al (2018), who use a similar data-set, the advertised price is close to an unbiased forecast of actual sales prices that does not vary across the cities under consideration (and includes a constant premium). Details on the compilation of the hedonic data and city selection are illustrated in section 3 of the appendix.

A long list of locational controls in order to diminish omitted variable bias in the baseline regressions were collected from the Italian census (2011), the Italian National Geoportal of the Environment, various Italian open data regional geo-portals (when available), the Ministry of Education, the Ministry of Culture and Open Street Map. They include geo-localised micro-data such as building height and average typology of buildings on the street, a range of natural and commercial amenities, parking and transport controls, as well as the locations of schools. These were all matched to the hedonic data through GIS. The mid-point of the main commercial street of each city was also recorded to act as a proxy for the CBD of each city. The main road construct applies well to medium Italian cities and for larger cities such as Milan, Rome and Naples two or more points were recorded (Borruso & Porceddu 2009). Socio-economic variables such as population density, migrant percentages and level of education were obtained and joined to the hedonic data from the 2011 Italian census (please see section 3 of the appendix for a full list of covariates and further clarifications).

2.2 A very short summary of conservation planning in Italy

Conservation planning in Italy is made up of three highly restrictive legislative strands: individual architectural designations[4] and their relative perimeters, Landscape Areas (LAs)[5] and Historic Centres (HCs) (Carughi 2012; Bonfantini 2012; Olivetti et al. 2008; Giannini 1976). Conservation planning has a unique place in Italian urban policy; some have even argued that the principles and practises of conservation planning are one of Italian urbanism's few contributions in the field (Balducci & Gaeta 2015).

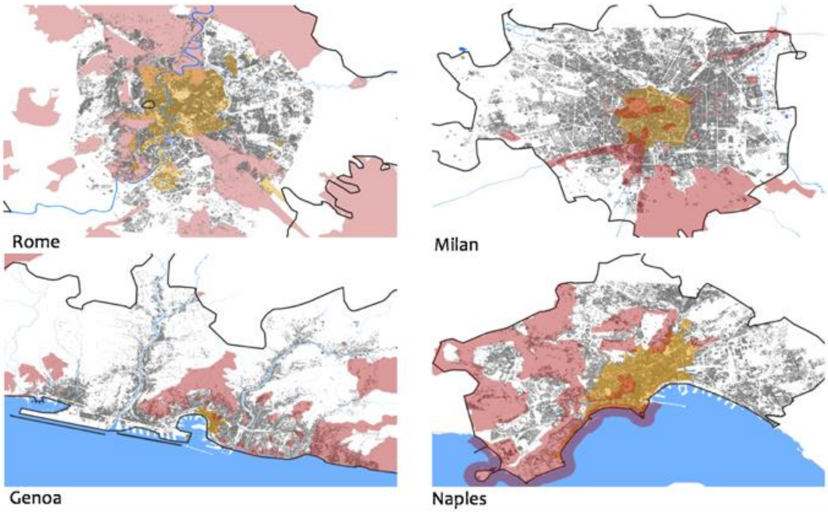
Individual architectural amenities are the most restrictive of the three legislative strands (Nasi Law n. 185/1902) (Carughi 2012). The Italian system differentiates between monuments – buildings with high levels of architectural significance – and buildings of 'minor' architectural value which nonetheless carry historic or socio-cultural significance (Ricci 2007).[6] In 2004, public buildings constructed before 1919 were also all automatically listed to avoid the loss of urban cultural values (Ministero dei beni culturali e delle attività culturali e del turismo 2017). This paper exploits the nature of this binding law and the availability of data from the Italian building census, to construct an index of urban law compliance $\Delta UBL_c = LB_{ct_2} - LB_{ct_1}$ by calculating the difference in pre-1919 buildings in a good or excellent state between 2011 (LB_{ct_2}) and 2001 (LB_{ct_1}) per 100 buildings by census tract, accounting for changes in census unit boundaries. The constructed index thus measures the respect of the law protecting all buildings built before 1919 and is indicative of places where changes have occurred in the historic urban environment at a very fine spatial level despite the national law. The index presents an alternative measure to the AB rates primarily used in this paper. Census data also allows me to construct an index estimating positive or negative variations of housing stock by census tract in the same manner ($\Delta Hstock_c = Hstock_{ct_2} - Hstock_{ct_1}$) to control for the development tendencies of each area (Cortese 2013).

Landscape Areas (LAs) (Law n.1497/1939) protect landscapes in both natural and urban settings, in the latter specifically 'complexes of immobile things (buildings) that hold aesthetic or traditional values' (Giannini 1976; Carughi 2012). This aspect of Italian conservation planning is included in the Cultural Heritage and Landscape Code (22 January 2004 n. 42) as Article 136, identifying buildings and areas of significant public interest[7] (Ministero dei Beni e della Attività Culturali e del Turismo

[4] Known in Italian as *vincoli architettonici*.
[5] Known in Italian as *vincoli paesaggistici*.
[6] The data-set used distinguishes between monuments, palaces, houses, portals, walls, courtyards and other types of architectural amenities (Ministero dei beni e delle attività culturali e del turismo 2016). The dataset also specifies whether the cultural value of the architectural good has been verified by the relevant governing body – in many cases, because of the limited resources, it has not been verified.
[7] These include a. good of specific administrative use b. 'immovable things', 'villas and gardens', 'parks' c. and d. 'complex of properties', 'areas of scenic beauty'.

2016). Most LAs were designated between 1950 and 1970, with fewer but constant inscriptions in the last 20 years, as well as boundary and extension updates of many of the earlier inscriptions (Pietrostefani & Holman 2017) (see section 2 in the appendix). There are over 6000 LAs of various sizes in the Italian territory, many of which are situated in urban areas. LAs go beyond the protection of built form, they designate and attribute value to streets, sidewalks, piazzas and minor elements of the urban fabric.

Figure 1 Examples of the Italian conservation planning system



Note: Historic Centres (HCs) are in denoted in orange. Landscape Areas (LAs) are in pink/red.

Historic Centres (HCs) are the third strand of Italian conservation planning and are imbedded in Italian urban policy through zoning (Bonfantini 2012). The 1967 *Legge Ponte* (Law n. 765) included historic centres as part of overall city planning, delimiting them by the Zone A in Italian Master plans which demarcates zoning areas, buildable exploitation and areas to be allocated to public services (Venuti & Oliva 1993).[8] The regulatory plans of each city protect HCs and impose a series of restrictions on them. HCs are delimited in a logic of historical consistency where there is a clear differentiation in building age between buildings inside Zone A and outside Zone A. As shown in Figure 1, in practice many historic centres are partially superimposed by LAs. Given fragmented historical geography of Italy, there are over 8,000 Italian cities, most of which, both large and small, have at least one historic centre (Ricci 2007). HCs often spatially overlap with the city centres of Italian metropolitan areas, thus hosting the large part of economic activity, however, larger cities have often switched to a more polycentric nature by adopting a second economic hub.

8 PRCs (*Piano Regolatore Comunale*) or PRGs (*Piano Regolatore Generale*) are general regulatory plans for the city.

This paper explores 55 provincial capitals which include 933 Landscape Areas, more than 236 Historic Centres and over 43,000 individual architectural designations. Geo-localised data on listed architectural amenities was provided by the *Istituto Superiore per la conservazione ed il restauro* in the Ministry of Culture. The Landscape Area shapes were traced through the *Direzione generale archeologia, belle art e paesaggio* WMS services on ArcGIS. This last data is known to present a series of spatial errors and in order to avoid the definition of incorrect boundaries, the data was checked with regional datasets when available. The Historic Centres for each of the 55 cities were drawn from the metropolitan zoning plans on ArcGIS by geo-referencing each zoning plan.

The restrictions imposed on these areas are characterised by the role played by the *soprintendenza* – the regional cultural heritage authority. The *soprintendenza,* with recommendations from the regional authority, have absolute control over individual architectural amenities and their ad-hoc perimeters. They approve building modifications, reserve the right to order suspension of works and can impose work on private buildings. They also generally determine many elements of urban design, and in practice new developments and building modifications are heavily controlled. The regional authority also leads the enforcement of restrictions related to LAs. Constraints are itemised in the plan attached to each designated area and are subject to inspection by the *soprintendenza*. Local municipalities cannot grant building permits without the approval of the *soprintendenza*. Permits are typically difficult to obtain in light of extensive red-tape and are a source of common complaint among citizens. It is well-known that residents often opt to illegally modify their homes or buildings instead of facing the administrative labyrinth of gaining permission for possible alterations as this comes with monetary costs and long delays (Grignetti 2017). The Italian conservation planning system is thus characterised by a top-down approach and too much restriction, typically associated with the role of the *soprintendenza*. Recent research (Pietrostefani & Holman, 2017) has remarked on the system's traditionalist nature, where the potential of both urban heritage areas and buildings is not exploited because too much restriction is imposed.

2.3 Informal attitudes and behaviours

Despite the presence of identical policies and similar budgets and human resources available between Italian regions, the conditions of the urban environment vary widely throughout the country, including within protected areas (ISTAT 2015). Several important strands of social science research suggest that real world institutions seldom function according to formal institutional rules alone, but are shaped by powerful informal rules and norms (Beers 2010; Ostrom 2005; North 1991). Pioneered by Friedman (1975), the legal culture literature clearly acknowledges the role of informal rules and norms—both within legal institutions ("internal" legal culture) and in the broader society ("external" legal culture). Informal building practices are present in many contexts, and in Italy *abusivism* is engrained in society to the extent that it has assumed

considerable social and political importance (Zanfi 2013; Biffi et al. 2014). It is often argued that AB is behind this heterogeneity in urban environment conditions (Zanfi 2013), potentially undermining planners' efforts to preserve positive heritage externalities.

The term informal institutions has been applied to wide-ranging phenomena. This paper follows Helmke and Levitsky (2004) in delimiting informal institutions as capturing as much of the universe of informal rules as possible, but narrow enough to distinguish informal rules from other, non-institutional informal phenomena (Christiansen & Neuhold 2012; Brinks 2003). By contrast, formal institutions are rules and procedures that are created, communicated, and enforced through channels widely accepted as official. Within Helmke and Levitsky's (2004) typology of informal institutions, AB most closely identifies with what are defined as competing informal institutions. In such cases, formal rules and procedures are not systematically enforced, which enables actors to ignore or violate them. Competing informal institution structures coexist but are incompatible with formal rules, creating alternative norms (Della Porta & Vannucci 1999). Clientelism, clan politics, and corruption are a few examples of such informal institutions.

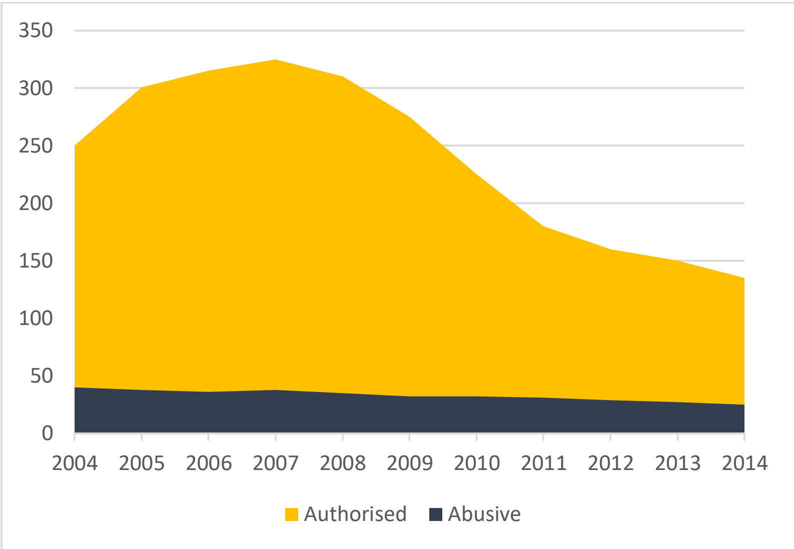
2.3.1 Widespread self-building practices and policies responding to *AB*

Approximately a quarter of the buildings constructed in Italy between the 1960s and the 1980s were unauthorised (CER & Ministero dei Lavori Pubblici 1986). Since 2008, Italy has witnessed a sharp downsizing of construction as illustrated in Figure 2. However, while legal construction shrank by over 60%, the illegal component did so by less than 30% (ISTAT 2016b). This pattern continued and since 2014 the number of authorized new constructions dropped by 16.3% with unauthorized construction falling by only by 6.1%. The recession also created a favourable climate for AB, leading the number of illegal buildings to rise in specific years, for example from 15.2% to 17.6% in 2014 (ANAC 2013; Grignetti 2017). These numbers suggest a lack of control over the process of urbanisation, aggravated by informal development both in the form of building extensions and new constructions. Furthermore, this is taking place not only in buildable areas but also in areas subject to protective regulations, including landscape and archaeological areas (ISTAT 2014).

Before the reinforcement of the landscape area law (Galasso law 1985), there were on average 437 buildings per square kilometre along coastlines. Twenty years later, building density reached 540 per square kilometre (+23,6%) (ISTAT 2015; Legambiente 2014), with particularly large increases in the regions of Calabria, Sicily and Marche. The stringent urban planning system is thus opposed in many cases by a tacit laissez faire attitude where individuals work on their own solutions taking advantage of weak formal institutions despite strict national policies. This suggests that the heterogeneity in the conditions of the urban environment in both Landscape and Historic Areas across the Italian territory may be inversely correlated with AB. The principle measure of AB used

in this paper are the *abusivism* rates created by CRESME – the Italian Centre for Social and Economic Research of the Construction and Real-estate market, which measure number of illegal dwellings constructed for every 100 dwellings in a given year. Estimates are available from 2004 to 2017. Cities with high scores on the CRESME index sometimes present values as high as 70 percent of buildings constructed abusively in a given year, while cities with low values range at approximately 5 percent of buildings constructed illegally in a given year.

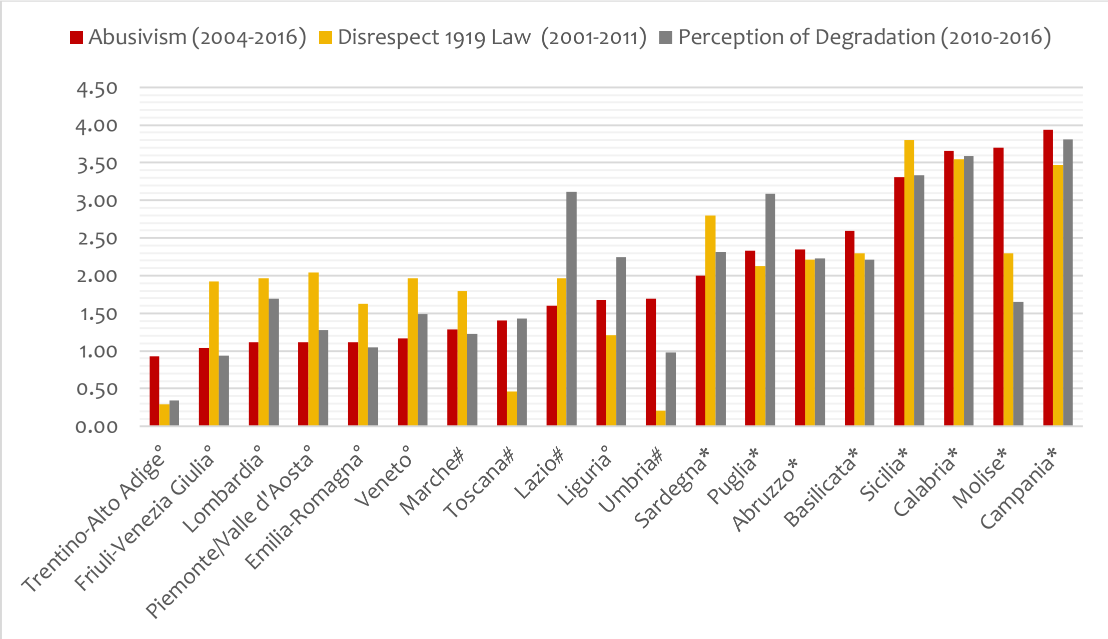
Figure 2 Evolution of un-authorised vs. authorised building



Note: Authorised and abusive constructions in Italy, thousands of new construction for residential use. Years 2004-2014.

There has been a general North-South polarization in AB trends as shown in Figure 3. AB has maintained higher levels in southern regions compared to the rest of the Italy. In Calabria, unauthorised construction accounted for no less than 70 percent of total buildings in the 1970s (Zanfi 2013). Although these estimates have dropped since, AB indices are still very high: 45-60% of authorised buildings between 2012-2014 in Molise, Campania, Calabria and Sicily. In the same period, the average values of AB also doubled compared to the previous three years in the central regions of Umbria and Marche (from 9 to 17.6% and from 5.1 to 10.6% respectively). Significant increases were also recorded in Tuscany (from 7.9% to 11.5%), Lazio (from 9.7% to 15.1%) and Liguria (from 12.4% to 15.6%) (ISTAT 2013). Figure 3 also illustrates similar trends in people's perception of degradation of the urban environment. There is more perceived degradation in regions with high rates of AB, and higher disrespect of the 1919 historic building law (UBL index) in regions also exhibiting higher values of AB (ISTAT 2013). Section 2.2 of the appendix provides further information on the evolution of illegal building trends.

Figure 3 North-South divide in non-compliance



Note: Data standardized for comparability – x* = (x-m)/sd + 2. °Northern Regions #Central Regions *Southern and Island Regions. Abusiveness: Average rate of *abusivism 2004-2016* – number of new abusive constructions of residential use for every 100 legal constructions. Perception of Degradation: Average 2010-2016 – Individuals of 14 or more years that consider the urban environment in the place which they live in to be affected by evident degradation (for every 100 people). Disrespect of 1919 Law (2001-2011) – difference in pre-1919 buildings in good or excellent state between 2011 and 2001 per 100 buildings. Figure A3 in appendix shows how abusiveness does not substantially diminish over recent years. Source: author's elaboration of CRESME and ISTAT Data.

Informal and illegal building practices in Italy are principally motivated by local necessity driven by the will to bypass administrative red-tape and difficulties obtaining permission to build or modify structures (Zanfi 2013). It is also more generally part of a Do It Yourself (DIY) culture aimed at avoiding monetary and time costs (Schneider & Williams 2013). The literature thus principally ties AB to local attitudes and preferences. Studies have, however, also linked AB to local building collusion both to provide work to unemployed and unskilled population, and to consolidate the power base of local mafia groups. Out of the 19.1 billion euros part of the Italian eco-mafia market in 2016, 16.4% were linked to illegal building (Legambiente 2017).[9] In addition to marking the landscape, AB feeds the illegal cement industry (from quarries, to concrete plants, to construction companies). I construct a mafia-crime index as a covariate for the second step of the empirical strategy to account for this. The index is constructed from ISTAT province capitals crime data and accounts for rates of mass casualty crimes (usually linked to bombs or similar), voluntary mafia homicides and kidnappings.

The best deterrent to AB has been argued to be the restoration of legality through the demolition of outlawed buildings. Recurrent building amnesties, 1985, 1994 and 2003 have, however, not

[9] The term eco-mafia, in the Italian language, is a neologism coined by the environmental association Legambiente (2014) to indicate the illegal activities of criminal organizations, mostly mafia, which cause damage to the environment.

helped metropolitan administrations to remember that demolishing illegal buildings is not optional, but an obligation according to Presidential Decree 380/2001 (Biffi et al. 2014). A more recent Law 68/2018 on environmental crimes has seen better outcomes with an increase of arrests by 20% and a decrease in illegality by 7% (Marra 2017). AB continues, however, given the ineffectiveness of demolitions. Of the 46,700 demolitions ordered by the state judiciary in 2012, only 14% have been carried out to date (see section 2 of the appendix for a breakdown). Between 2004-2018, Campania only followed through on 496 (2.9%) of its 16,596 demolition injunctions, while other regions with much lower rates have carried out much higher numbers of demolitions, Lombardy and Piedmont 37% and 30% of their 4,895 and 3,456 injunctions respectively (Biffi et al. 2018). Moreover, even though lack of funds for demolition costs is used to justify the inaction of the public administration, the law clearly states that costs associated with demolitions are the responsibility of building owners.

3 Empirical Framework

The starting point of my empirical strategy is the assumption that in spatial equilibrium all costs and benefits associated with residing in a property of a certain type and at a certain location capitalise into property prices. This assumption follows a long tradition of hedonic research, which assumes that residents are fully mobile and there is perfect spatial competition (Rosen 1974; Tolley & Diamond 1982). As argued by Ahlfeldt & Holman (2018), Cheshire et al. (2017) and Levkovich et al. (2018) among others, this assumption is plausible when identifying spatial variation at a very fine scale which our novel Italian data-set allows. Market price P_i is fully described by vectors of structural S', locational L' components and regulatory components H' making a property more of less attractive (zoning, height restriction or other). In this case, the regulatory components are Historic Centres and Landscape Areas. When denoting whether a property i is sold within the boundaries of a historic centre HC, or within the boundaries of Landscape Area LA, the respective coefficients indicate the different effects of the heritage areas. Following exploratory regressions (see section 5.1 of the appendix), estimates suggest there is enough variation between LAs and HCs to separately identify the effects of these two policies.

My first fundamental identification problem arises because of possible unobserved amenities inside or near HCs or LAs. I draw on the regression discontinuity design literature, in particular recent literature utilising property price discontinuities at spatial boundaries (BDD), a special case of the more general RDD (Gibbons et al. 2013; Ahlfeldt & Holman 2018). This allows me to account for unobserved location characteristics that could confound the heritage effect. I exploit the precise knowledge of the rules determining treatment of two border zones $z = (1, 2)$ across the boundaries of HCs and LAs, where the border x_0 is the known cut-off, and where $z = 1$ and $z = 2$

are geographically close, whilst ensuring they are on different sides of the regulation boundary (Angrist & Pischke 2009). The difference in prices between $z = 1$ and $z = 2$ is fully described by the differences in structural and locational attributes, as well as regulatory features. I further assume that the two areas immediately inside and outside of LAs and HCs are the same in terms of locational attributes such as accessibility to the city centre, transport infrastructures, natural amenities, schools or other unobserved variables, i.e. $L_{z=1} = L_{z=2}$. I therefore assume that the variation in the areas immediately inside and outside of LAs and HCs is primarily related to heritage or architectural characteristics, and that the areas at both sides of the boundary are similar in most other respects. As stipulated in Ahlfeldt & Holman (2018) this assumption is easily accurate at the boundary that separates two zones.

Given the precise policy intervention, where areas are purposefully drawn to protect coherent areas of urban fabric presenting valued architectural styles, we can expect abrupt changes between $z = 1$ and $z = 2$. The critical restrictive differences between buildings inside and outside urban heritage areas, as described in section 2.2, further supports this argument. It is therefore sensible to expect, as argued by Ahlfeldt & Holman (2018), a sharp discontinuity in the appearance of buildings at the boundary of LAs and HCs in cities presenting low levels of AB where I anticipate conservation planning to be respected. A smaller or lack-of discontinuity is on the other hand expected in cities presenting high levels of AB, given that policy restrictions would not necessarily be followed. It is fair to acknowledge, however, that there could also be very localised spill-over effects from heritage areas to nearby areas.

The empirical strategy relies on the estimation of two econometric specifications. In the first step, I use the spatial nature of the policies under investigation to graphically explore discontinuities at the boundaries of both Landscape Areas and Historic Centres. I then estimate average boundary price premiums across the 55 cities in my sample controlling as comprehensively as possible for other factors. This allows me to explore the heterogeneity of heritage effects. Throughout the econometric specifications, my approach to control for unobserved locational factors is inspired by the spatial boundary discontinuity design (BDD). In the second step, I explore variables driving the heterogeneity in price premiums and regress the recovered premiums on a series of city-level controls, notably *abusivism* rates. I address endogeneity concerns in the second step by using an instrumental variable approach. As a robustness test, I then re-run the entire analysis at neighbourhood level using an alternative measure of AB.

3.1 Price premiums at the boundary

3.1.1 Exploring Heterogeneity

In identifying heritage capitalisation effects by city, I concentrate on property prices that fall within a 200-metre buffer inside and outside LA and HC boundaries. I create dummies of the buffer areas around LA and HC borders, specifically $LAbuffer_{ia}$ takes the value of one if $DIST\_LA_i > -200$ & $DIST\_LA_i < 200$, and $HCbuffer_{ia}$ takes the value of one if $DIST\_HC_i > -200$ & $DIST\_HC_i < 200$. I also create dummies of the area immediately inside both LA and HC borders, specifically $LAin_{ia}$ takes the value of one if $DIST\_LA_i$ < 0 and $DIST\_LA_i > -200$, and $HCin_{ia}$ takes the value of one if $DIST\_HC_i$ < 0 & $DIST\_HC_i > -200$. The inclusion of both these dummies within my equation allows me to recover the coefficients of $LAin_{ia}$ and $HCin_{ia}$ as the boundary effects.[10] I thus mitigate the problem of unobserved area effects by differencing the data between close-neighbouring properties to eliminate area-specific unobservable. By interacting $LAin_{ia}$ and $HCin_{ia}$ with city dummies, I then easily collect average boundary effects by city. This strategy achieves the collection of lower bound estimate price premiums given it considers small areas on each side of the policy border: estimates are thus less-likely to be influenced by locational spill-over which might be present if wider areas on each side of the boundary were considered (Koster & Rouwendal 2017; Koster et al. 2012). For example, if considering wider areas on each side of the policy demarcation, a greater variety of heritage amenities would in many cases be present within inner areas of the spatial policies, possibly inflating the estimates.

To estimate the boundary effect first step, I therefore use the following specification:

$$lnP_{iat} = \alpha_{at} + \beta HCin_{ia} \times City_a + \rho LAin_{ia} \times City_a + \lambda HCbuffer_{ia} \times City_a + \gamma LAbuffer_{ia} \times City_a + \delta S_{ia} + \theta L_{ia} + \epsilon_{iat} \quad (1)$$

, where P_{iat} is the price per square metre of floor space of a property *i* advertised in year *t* in city *a*. S_i and L_i are typical structural and locational amenities controls and α_{at} are year effects. *a* can be substituted by *n* for neighbourhoods in an alternative version of the model. $HCin_{ia}$ and $LAin_{ia}$ are the boundary effect dummies and my two key variables of interest, with $HCbuffer_{ia}$ and $LAbuffer_{ia}$ are limited areas on both side of the boundary respectively controlling for un-observables. The model thus accounts for unobserved amenities and heterogeneity of preferences among households. For convenience, I assume a semi-log relationship as it infers a premium in percentage terms and has proven to suit data in many hedonic house price studies (Halvorsen & Palmquist 1980).

[10] This is equivalent to taking the difference of coefficients $HCin_{ia}$ and $HCout_{ia}$ if $HCout_{ia}$ took the value of one if $DIST\_HC_i$ > 0 & $DIST\_HC_i < 200$.

3.2 How does *abusivisim* affect both LA and HC price premiums?

The second step concentrates on how city variation influences border price premiums. It specifically focuses on how *abusivism* affects both LA and HC heritage premiums as hypothesised in section 2 of the paper. The specification takes the following form:

$$\hat{\beta}_a = AB_a\delta + B_a f + \epsilon_a \tag{2a}$$

$$\hat{\rho}_a = AB_a\theta + B_a g + \kappa_a \tag{2b}$$

, where $\hat{\beta}_{ac}$ and $\hat{\rho}_{ac}$ are the boundary effects for city *a* recovered in (2). $AB_a\delta$ and $AB_a\theta$ are measures of *abusivism* and $B_a f$ and $B_a g$ are other city *a* characteristics which could be theoretical influencing price premiums. The latter include covariates such as level of education, number of buildings in bad condition, building height, new building growth and an environmental degradation index focusing on natural amenities such as water and air quality. A mafia-crime index is also tested as a covariate (as defined in section 2.3.1) given the theoretical basis that *AB* might be partially motivated by informal organizations (Helmke & Levitsky 2004). A number of variations of the equation are run to arrive to a preferred model. These equations allow me to assess whether heritage price premiums are reduced by *AB* rates, the underlining premise being that places with higher *AB* are less-compliant to urban policy and consequently experience lower external benefits.

3.2.1 Instrumental variable (IV) estimation

I face two possible estimation challenges in this city-level second step. To address these issues, I use an instrumental variable approach to substantiate my results.

On one hand, returns to abusive behaviour could be larger in highly valued areas, presenting a possible reverse causality issue. Developers might want to build in high premium areas, because the larger the premium the more the motivation to extend development for larger gains. Higher heritage premiums could thus cause more abusiveness. If this is the case, a negative bias in the results would be expected, and a suitable instrument would slightly increase the magnitude of relative coefficients. On the other hand, an omitted variable problem is also possible, affecting both the heritage premium and abusive behaviour. There may well be unobserved factors determining both preference for heritage (heritage appreciation) (a) and preference for abusive behaviour (legal attitudes) (b), resulting in the effect of unknown attitudes influencing both price premiums and abusive behaviour. In this case, a negative bias in the results would also be expected, and a suitable instrument is needed to separate out (a) from (a)+(b).

Both sources of endogeneity can be addressed through instrumental variables. The main instrument used to address these challenges is a legal attitudes index (LAI) conceptually created by Tabellini (JEEA, 2010). Drawing on a large sociological (Bisin & Verdier 2001; Benabou & Tirole 2006) and economic (North 1991) literature that addresses informal institutional questions, Tabellini (2010) refers to this measure as a 'cultural' index. However, the index actually focuses on

four related but distinct measures of preference and attitudes where measurable counterparts can be found: trust, respect, control and obedience. Trust and respect encourage welfare-enhancing social interactions such as participation in the provision of public goods and are likely to improve the functioning of government institutions. Both trust and respect thus motivate strong negative relationships with *abusivism*, given how AB is linked to mis-trust in local administration and is essentially a form of illegality (marking lack of respect). Control and obedience measure confidence in the virtues of individualism and are symptomatic of an entrepreneurial environment where individuals seek to take advantage of economic opportunities. They also strongly influence AB given its rootedness in DYI culture (Tabellini 2010, p.683). The selection of the traits which compose LAI has some unavoidable arbitrariness, but hopefully it does not matter too much. The traits are all highly relevant to AB given they measure factors which necessarily influence attitudes towards law enforcement.

The instrument thus mechanically gets around a possible reverse causality problem since it is unlikely to be affected by price premiums. In measuring a range of attitudes which are good predictors of AB, but probably less so of price premiums (heritage preferences), LAI also addresses the omitted variable problem. Indeed, preferences for urban heritage are traditionally highly correlated with education, income-level and place of origin (Dalmas et al. 2015), and not with attitudes influencing illegal practices. Measures of trust, respect, control and obedience very similar to the ones used by Tabellini (JEEA, 2010) are obtained from the Aspects of Daily Life Survey (2013-2016) at province level. This survey is chosen, instead of the World Value Surveys as it has much larger sampling for the Italian territory (20,000 observations per year) and data at province level is available. I also report an alternative, notably an instrument measuring early political institutions in 15-17th century Italy in the spirit of Guiso, Sapienza and Zingales (2016). Such instruments have been argued to be effective predictors of tendency towards illegal attitudes as they embody the institutional cultural transmitted from generation to generation, and are in this case, evidently not correlated with price premiums (Alesina & Giuliano 2015; Putnam et al. 1993).

3.2.2 Robustness Checks and Neighbourhood Level Analysis

Given estimates using the LAI instrument suggest the OLS results are quite conservative and robust, I re-run equation (1) substituting *a* by *n* for neighbourhoods to recover price premiums at neighbourhood level. Equations (2a) and (2b) are then estimated at neighbourhood level using the urban compliance (UBL) index, described in section 2.2 of this paper, as an alternative measure of *abusivism*. This approach allows me to include city fixed effects to my analysis and confirm my results at neighbourhood level. I also discuss a range of supplementary estimations, notably how other more disaggregated neighbourhood level characteristics across LA and HC borders could be affecting price premiums at a smaller spatial level.

4 Estimation Results

4.1 Descriptive statistics and overall average effects

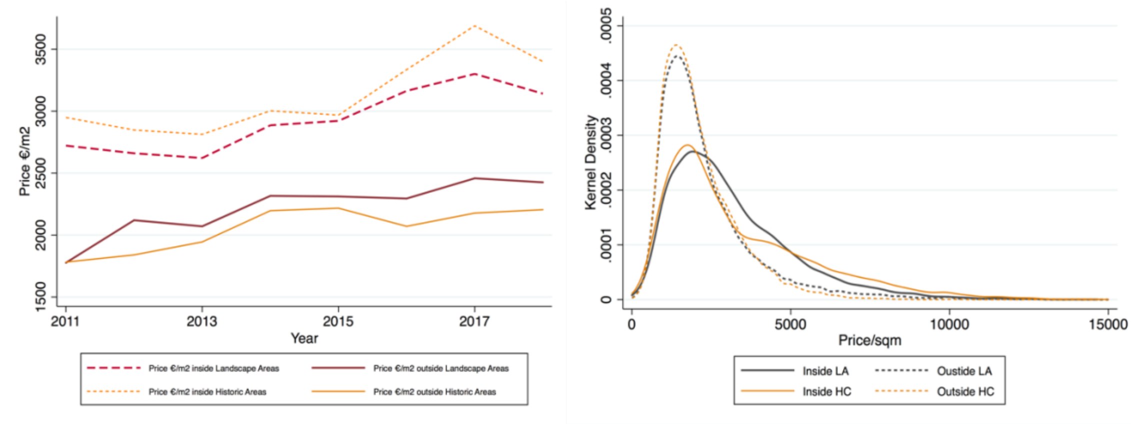
Table 1 presents some key descriptive statistics. The first four columns summarise key variables of the full data set, while the four following columns summarise the sample within HC and LA boundaries. The average price per square meter of the full data is €2,463, inside HC and LA the mean price is respectively about €950 (38%) and €690 (28%) higher. Tables A2 in section 3.3 of the appendix provides a full overview of the descriptive statistics of the data-set. Panel 1 of Figure 4 presents an easy comparison of house sales advertisements between control groups (outside Landscape and Historic Areas) and treatment groups (inside Landscape and Historic Areas). In line with previous research on conservation areas (Ahlfeldt et al. 2012) the price trends reveal a relative premium for properties inside both HCs and LAs compared to the control groups. I observe rather stable trends in mean prices per square metre for both LAs and HCs, which corresponds to Italian real-estate trends during the considered period (Banca D'Italia 2017). More specific comparisons of variables between treatment and control areas are analysed in Tab A3 of the appendix. Panel 2 of Figure 4 compares the distribution of transactions by price per square metres for properties located inside and outside LAs and HCs. The figure indicates a larger proportion of relatively more valuable properties inside LAs and HCs compared to the control groups, and this is slightly more pronounced for LAs than HCs.

Table 1 Descriptive Statistics

First Step								
	Full data set				Inside HC		Inside LA	
	mean	sd	min	max	mean	sd	mean	sd
Price	315,420	500,869	1,000	3.00e+07	475,898	796,277	463,857	693,100
Price SQM	2,463	1,726	.54	20,000	3,414	2,444	3,158	2,002
Ln price SQM	7.61	0.63	-.60	9.90	7.89	0.73	7.87	0.65
Year built [a]	3.85	0.99	1	5	3.15	1.17	3.55	1.15
Height building [b]	14.04	8.04	1	89.3	16.60	7.61	13.12	7.18
Distance to Arch[c]	346	734	.10	42,276.65	90	199	245	547
Distance to CBD[d]	2,338	2,026	1.94	45,821.32	1,121	982	2,377	2,135
N	53,572				14,334		8,320	
Second Step								
	mean	sd	min	max	N			
AB rate [e]	20.08	15.56	3.68	52.52	55			
ΔUBL [f]	-2.32	2.38	-11.84	3.79	296			

Notes: N refers to the number of observations, in the First step these refer to property prices, in the Second step to 55 Cities and 296 neighbourhoods within these cities. [a] Year built is defined as follows: 1 -1700 and before, 2 – 1700 to 1919, 3 – 1920 to 1950, 4 – 1951-1980, 5 1980 to now. [b] Building height is in metres. [c] Distance to architectural designations is in metres [d] Distance to CBD is in metres. [e] *Abusivism* rates (AB) created by CRESME - number of illegal dwellings constructed for every 100 dwellings in a given year, average of estimates between 2004 and 2017. [f] UBL Index - the difference in pre-1919 buildings in good or excellent state between 2011 and 2001 per 100 buildings by census tract.

Figure 4 Distribution of house prices offers by price



Notes: Kernel density estimates. To improve visibility, the figure focuses on the price segment below €15,000/sqm.

I begin by evaluating differences in price premiums by simply denoting properties inside HCs and LAs with a dummy. These exploratory regressions, which can be found in section 5.1 of the appendix, suggest there is enough variation between HCs and LAs to separately identify effects. I then more precisely identify differences in premium between LAs and HC. In Table 2 I report estimates of a simplified version of equation 1 where I do not interact inside and buffer variables by city a, in order to estimate the average effect across all 55 Italian cities for each type of heritage area. Dummies of the buffer areas around LA and HC borders, as well as dummies of the area immediately inside both LA and HC borders are created as explained in section 3.1.1. The inclusion of both these dummies within my equation allows me to recover the coefficients of $LAin_{ia}$ and $HCin_{ia}$ as the boundary effects.

Results are consistent in columns 1-4, where I progressively add neighbourhood fixed effects, building and amenity controls. Overall, the regression results suggest a positive effect of being within a heritage area. The different magnitudes of the coefficients suggest slightly different premiums for properties depending on the type of policy. Results also suggest that policy effects do not substantially influence each other as coefficients maintain similar magnitudes whether I include them together or separately in the equation (columns 7 and 8). I also observe that areas inscribed for a longer number of years have higher premiums as explored in Table A5 of the appendix. I test the sensitivity of my sample by limiting observations to 1km and 2km from LA and HC boundaries to ensure I am getting relevant local estimates. As expected, I observe very minor changes in my results, the trends observed hold throughout the estimations. On average for the whole of Italy, properties just inside a Landscape Area are about 6.5% (€160 extra per square metre) more expensive than properties just outside, while the estimated premium for Historic Centre is on average 3.5% (€86 extra per square metre).

Table 2 Overall average effects

Ln price m2	(1) FULL	(2) FULL	(3) FULL	(4) FULL	(5) 2km	(6) 1km	(7) FULL	(8) FULL
L in 200m	0.0868**	0.0705***	0.0688***	0.0660***	0.0646***	0.0624***		0.0669***
	(0.0421)	(0.0215)	(0.0214)	(0.0202)	(0.0198)	(0.0192)		(0.0214)
H in 200m	0.0619†	0.0440***	0.0429***	0.0355**	0.0339**	0.0327**	0.0406*	
	(0.0323)	(0.0164)	(0.0165)	(0.0163)	(0.0163)	(0.0104)	(0.0188)	
Observations	53,572	53,572	53,572	53,572	50,259	44,493	53,572	53,572
R-squared	0.378	0.703	0.704	0.707	0.710	0.713	0.705	0.706
S controls[a]	YES	YES	YES	YES	YES	YES	YES	YES
B controls[b]	NO	NO	YES	YES	YES	YES	YES	YES
A controls[c]	NO	NO	NO	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
N FE	NO	YES	YES	YES	YES	YES	YES	YES

Notes: [a] Structural controls [b] Building controls [c] Amenity Controls. Outliers in the sample were dropped. Standard errors clustered at neighbourhood level for all regression. Columns (5) and (6) kept observations 2km and 1km from the border respectively. Neighbourhoods are defined as the sub-municipal areas identified by the Italian Census (sub-municipal areas or neighbourhoods) (ISTAT 2016a). Neighbourhood Fixed effects (N FE) affect Landscape Area estimates less because these areas are usually much smaller than neighbourhood within cities, whereas Historic Centres can in some cases comprise more than one Neighbourhood. *** p<0.01, ** p<0.05, * p<0.1, † p < 0.15

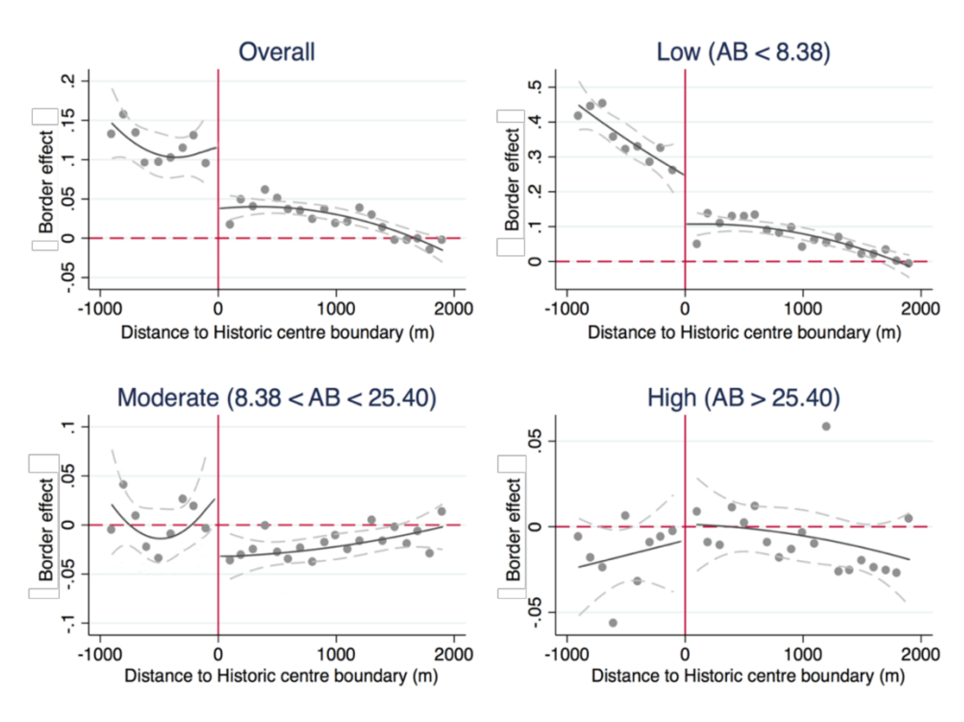
4.2 Boundary discontinuities: Graphical Illustrations

By exploiting discontinuous variation in property prices at the boundaries of LAs and HC, where the architectural character of the area changes abruptly, I am able to control for unobserved locational characteristics and achieve a robust identification of the heritage effect. Figure 5 and 6 illustrate the variation in prices and boundary discontinuities for Historic Centres and Landscape Areas respectively. The four panels plot coefficients which control for observable structural and locational characteristics, against distance from the HC and LA boundaries and differentiating between trends inside and outside policy boundaries. The grey dots plot the point estimates of 50-metre-bin effects. The dashed lines show 95% confidence intervals based on standard errors clustered at neighbourhood level. The plots are restricted to 1km inside and 2km outside heritage areas for clarity. I allow for quadratic distance trends and semi-non-parametric specifications in an attempt to find the best fit for the distance bin effects. The equation is estimated for all cities, and then subsequently between cities with high, medium and low levels of AB scores.

Figures 5 and 6 quickly show that although discontinuities are observed at distance zero for both HCs and LAs, the distance price decays present different trends. The key insight that emerges from Figure 5 is the existence of a much larger jump (price discontinuity) at the boundary of cities with low AB rates, with the jump becoming progressively smaller in average and high AB rate cities. While the overall estimated boundary effect is 5%, it is close to zero for cities where the reported *AB* rates are large (AB rate > 25.40). The boundary effect is 4% for cities with moderate AB rates (8.38 < AB rate < 25.40) but increases to 10% for cities with low AB rates (AB rate < 8.38). Given the fluctuation of the price premium according to type of city, and as hypothesized, Figure 5 suggests there is negative relationship between differences in prices across HC boundaries and respective

AB rates. It also more generally suggests, that in cities where *abusiveness* is high I observe no jump because high AB entails that urban heritage amenities are either badly preserved, severely modified or may no longer exist, resulting in a lack of or even a negative price premium effect.

Figure 5 Discontinuities in Prices at Historic Centres boundaries by AB rates

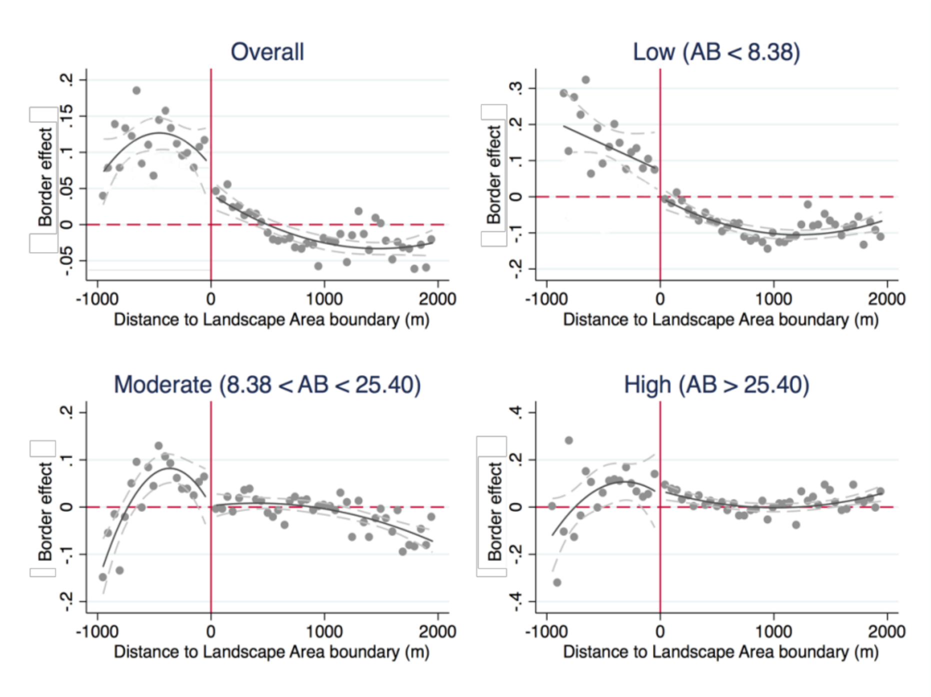


Note: Coefficients are from regression (1) - natural log of price per square metre against structural and locational controls, year fixed effects and neighbourhood-fixed effects. Grey dots plot the point estimates of '100 metre bins from the boundary' effects. The solid lines are illustrations of the parametric estimates and the dashed lines show 95% confidence intervals based on standard errors clustered at neighbourhood level. a) represents overall equation estimated b), c) and d) are the same equation estimated for cities with Low, Average and High AB *rates*. AB rates range from 3.24 abusive buildings per 100 buildings (on average for a city) to 52.52 abusive buildings per 100 buildings (on average for a city). Cities are equally divided between cities with low AB rates (AB < 8.38), moderate AB rates (8.38 < AB < 25.40) and high AB rates (AB > 25.40).

Figures 5 suggests that discontinuities in prices at LA boundaries also decrease as AB rates increase. A capitalisation effect at the boundary of cities with low AB rates is about 9%, this effect becomes much smaller already for cities with moderate AB rates at 1.5%, and close to zero for cities with high AB rates. Overall, Figures 5 and 6 show that the benefits from designation decay smoothly across heritage area boundaries, as expected, since these are based on the preservation of a visual amenity. In the overall panels of Figures 5 and 6 (top-left), the designation effect becomes zero after about 1.5 kilometres for HCs owing to the large size of these areas, and becomes zero after about 500 metres for LAs, which is close to existing evidence relative to the decay in heritage externalities (Lazrak et al. 2014). In cities with low AB rate (top-right of both Figure 5 and 6), I am also able to detect positive effects of greater magnitude towards the centre

of LAs and HCs suggesting greater urban heritage densities, which is also in line with existing evidence (Ahlfeldt et al. 2017).

Figure 6 Discontinuities in Prices at Landscape Area boundaries

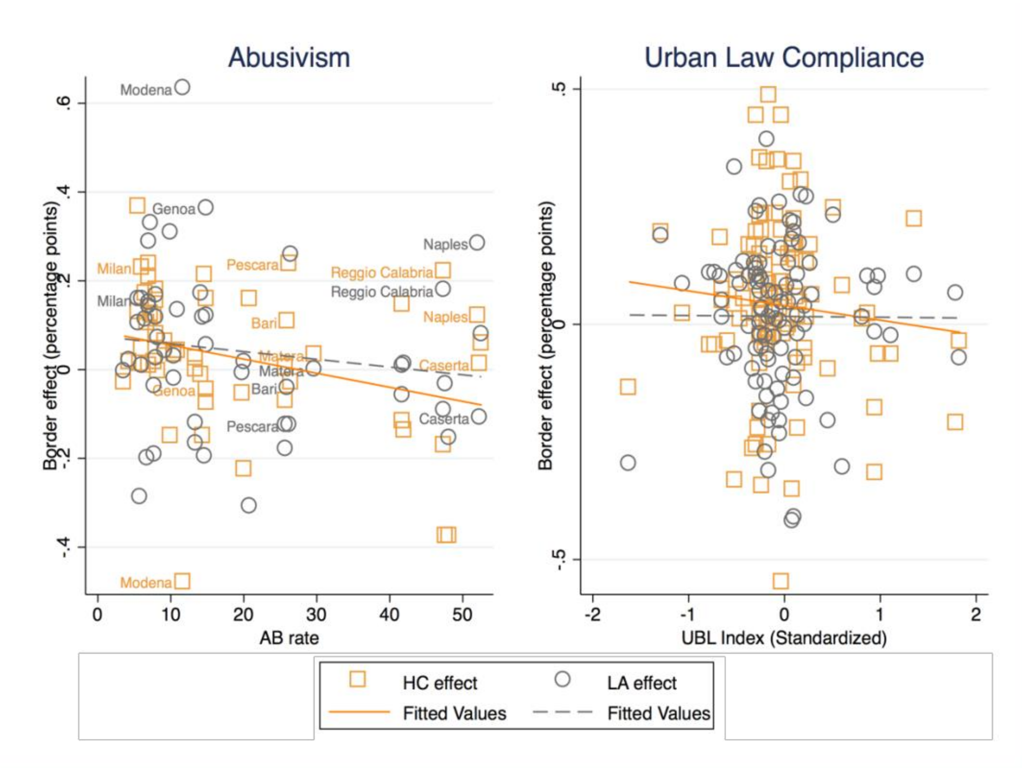


Note: Coefficients are from regression (1) - natural log of price per square metre against structural and locational controls, year fixed effects and neighbourhood-fixed effects. Grey dots plot the point estimates of '50 metre bins from the boundary' effects. The solid lines are illustrations of the parametric estimates and the dashed lines show 95% confidence intervals based on standard errors clustered at neighbourhood level. a) represents overall equation estimated b), c) and d) are the same equation estimated for cities with Low, Average and High AB *rates*. AB rates range from 3.24 abusive buildings per 100 buildings (on average for a city) to 52.52 abusive buildings per 100 buildings (on average for a city). Cities are equally divided between cities with low AB rates (AB < 8.38), moderate AB rates (8.38 < AB < 25.40) and high AB rates (AB > 25.40).

In the left panel of Figure 7, I specifically plot the negative relationship between differences in prices across HC and LA boundaries and respective AB rates by city. This corresponds to using estimates of the border effects by city from specification (1) and plotting them against AB rates. Despite a few outliers, notably Naples and Reggio Calabria, the negative correlation, although moderate, is reasonably defined. In the right panel of Figure 7, I plot the similar negative relationship between differences in prices across HC and LA boundaries and respective UBL rates by neighbourhood used as an alternative measure to AB in the last section of this paper. While more robust estimates are discussed in section 4.4 of this paper following specifications (2a) and (2b), these simple and transparent scatterplots provide some interesting insights. There is a positive intercept, implicating that in cities with the lowest rates of non-compliance heritage areas appreciate the value of a property by about 8.7% or €27.4k and by about 7.5% or €23.8k for HCs and LAs respectively. A 10-percentage point increase in AB, so from having no AB to 10% of abusive buildings, all else equal, decreases heritage price premiums by about 3.2 and 1.7 percentage points

for HCs and LAs respectively. In standard deviation terms, a one unit increase in AB decreases prices by about 4.9 and 2.7 percentage points for HCs and LAs respectively. There is a similar positive intercept in the right panel, plotting the relationship with UBL, implicating that in neighbourhoods with the lowest UBL rates heritage areas appreciate the value of a property by about 3.9% or €12.5k for HCs and 1.6% or €5.3k for LAs. A one standard deviation in the UBL index is associated with a depreciation effect of about 3.1 and 0.18 percentage points for HCs and LAs respectively. The negative effect increases when weighting the border effects although I do not report this in Figure 7 to improve clarity.

Figure 7 Border Price Premium versus Non-Compliance Measures



Notes: Left Panel - Unit of observation is city. Border effect (unweighted) is obtained by regressing log of price against structural and location controls, dummies delineating limited areas on both side of the boundary, boundary effect dummies and year effects (specification 2). Standard errors clustered at neighbourhood level. Right Panel – Unit of observation is neighbourhood. Same approach is employed to calculate border effects but at neighbourhood level.

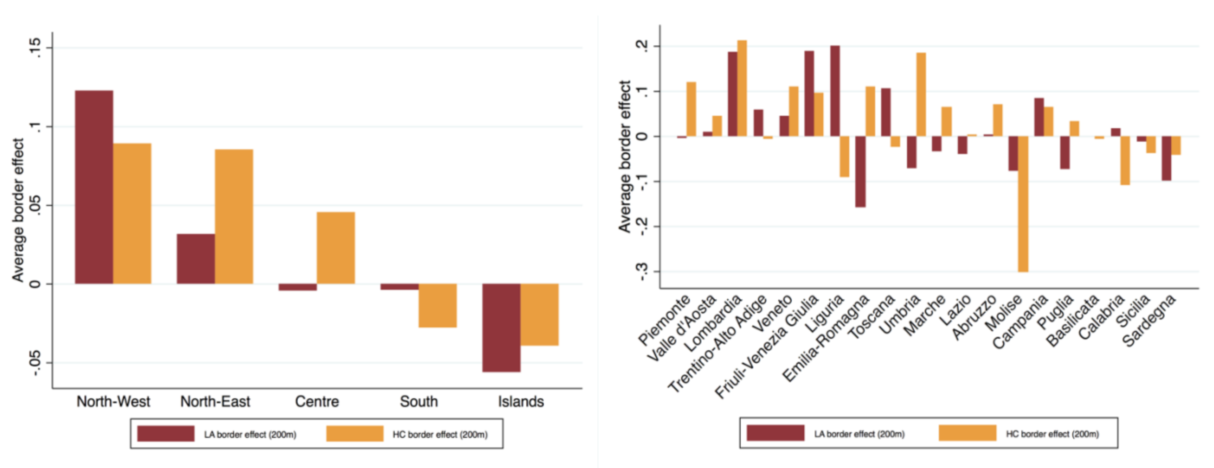
4.3 Heterogeneous heritage effects

Before further analysing the relationship between price premiums and non-compliance measures, I explore the variation in differences in prices across LA and HC boundaries in more depth, estimated according to specification (1) by city. 37 out of 55 cities achieve a positive premium for Historic Centres, 18 of which are significant estimates, while 18 out of 55 cities achieve a negative premium, 11 of which are significant estimates. 30 out of 55 cities achieve a positive premium for Landscape Areas, 18 of which are significant estimates, while 22 out of 55 cities achieve a negative

premium, 8 of which are significant estimates. There is therefore significant variation in the price premiums of the two conservation policies under consideration, with a noteworthy variation in premium magnitudes. The comprehensive list of estimates by city are reported in Tab A7 of the appendix. I can tentatively suggest that the price effect is at least partially driven by architectural externalities, but the estimates also suggests there are contextual differences between both landscape and historic areas resulting in negative or positive price premiums.

Taking the average of coefficients by region and geographical area reveals some trends. The left panel of Figure 8 illustrates how per geographical area (north-west, north-east, centre, south and islands) LA premiums are on average consistently significant and positive at larger magnitudes in northern cities than in central and southern cities. It also illustrates how HC premiums are on average consistently significant and positive in northern and central cities but on average significant and negative in southern and island cities. The right panel of Figure 8 breaks these trends down, revealing that at regional level there are many exceptions within these trends. Although the effects suggest that less value is attributed to heritage areas in southern rather than in northern regions, cities such as Savona and Livorno present negative significant estimates in the north (Table A7 in the appendix) while cities such as Bari and Messina present positive and significant estimates in the south (Table A7 in the appendix). I hypothesise that these differences stem from informal building behaviour, which although generally more present in southern regions, has risen in other cities over Italy.

Figure 8 Summary of border effects



Notes: The left panel of Figure 8 illustrates the mean by geographical area of coefficients of specification (2) at city level. The right panel of Figure 8 repeats the same exercise but illustrates the mean by the 20 Italian regions, going from the most northern regions on the left side to the more southern at the right side, and the islands of Sardinia and Sicily at the end.

4.4 Does *abusivism* drive heritage price premiums ?

Once recovered, the boundary coefficients are then run in the two second steps regressions (2a) and (2b) to evaluate the forces driving the heterogeneity in price premiums. Price premiums are weighted by the inverse of their relative standard errors to account for the significance of estimated effects. In Table 3 I report estimates of specification (2a) and (2b) in columns (1) – (7) and (8) – (14) respectively. The first 7 columns show a consistent and significant negative effect of AB on price premiums for HCs. A 1% increase in AB is associated with an expected depreciation effect of 0.51 percentage points in HC price premiums, given the average premium is 3.5% this is a considerable depreciation. The OLS results remain relatively consistent after controlling for education, population density, building height and environmental quality, which progressively increase the magnitude of the effect. Given that AB, as motivated earlier in the paper, is influenced both by informal institutions and mafia influences, I control for mafia from column (4), which allows me to isolate the effect that runs from AB to heritage premiums because of informal institutions and not because of mafia. The addition of a mafia-crime index contributes to increasing the magnitude of the effect of AB but is not in itself significant.

In columns (5) to (7), I address endogeneity. To repeat, I expect the main sources of endogeneity to be reverse causality, returns to abusive behaviour could be larger in highly valued areas, or an omitted variable problem affecting both the heritage premium and abusive behaviour thus decreasing the magnitude of my coefficients. Column 5 duplicates column 4 but uses an instrument for AB exploiting the legal attitudes index (LAI) conceptually created by Tabellini (JEEA, 2010) as explained earlier in the paper. This allows me to isolate attitudes affecting abusive behaviour from ones affecting price premiums. The results for the IV estimation in column (5) increases the magnitude of the coefficient of AB but does not appear to affect the rest of the regression, suggesting the presence of a slight negative bias in the OLS results, likely driven by the possible reverse causality where higher heritage premiums could cause more abusiveness. An instrument measuring early political institutions in 15-17th century Italy in the spirit of Guiso, Sapienza and Zingales (2016), is used in column 6 yielding similar results. Finally, column 7 uses both LAI and historical instruments to estimate a coefficient of 0.59 percentage points, further confirming the relative magnitude of the results. I test for weak-instruments using the Kleibergen-Paap rk Wald F statistic. In all cases, the F-statics imply that our instruments are strongly correlated with the variable of interest. To test for overidentification, I report Hansen's J-statistic in column 7, the null-Hypothesis is not rejected indicating that the instruments are valid and therefore uncorrelated with the error term. Overall, the results indicate that the OLS estimates are quite conservative and robust.

Columns (8) – (14) show a consistent negative effect of AB on price premiums in Landscape Areas, however, not only is AB weakly associated with premiums in this case, the association is only very weakly significant. The results remain consistent after controlling for education, population density, building height and environmental quality, but the identification is only improved after AB is instrumented suggested some omitted variable bias most likely linked to the specific nature of LAs which comprehend areas of both natural and architectural value. The effect remains just shy of significance in the OLS estimations. Unlike in the HC results, the mafia index variable is negative and significant. This is driven by the mafia-led *abusivism* happening in costal LAs present in my sample, as the significance of the effect disappears when coastal cities are dropped. My preferred estimate in the case of LAs is that a 1% increase in AB is associated with an expected depreciation effect of 0.42 percentage points in LA price premiums. Although this is a slightly smaller effect than the effect of AB on HC premiums, it is still a considerable depreciation given the average premium is 6.5% .

Collateral findings to my analysis include observations about the effect of education and population density on price premiums. Share of population holding a university degree has a consistent positive effect on price premiums in HC, which is consistent with other findings that more educated people value heritage amenities more and confirms amenity-based sorting (Ahlfeldt & Holman 2018) . This effect is on the other hand insignificant for LAs. Population density also has a small but significantly positive effect on both HC and LA price premiums, suggesting that heritage price premiums are positively associated with the presence of higher densities, possibly alluding to the importance of intangible heritage present in such areas. Building height also has a consistently negative effect on HC price premiums suggesting that taller buildings are not valued in historic centres. See Table A9 in the appendix for a full tabulation of estimates.

Table 3 AB effect on price premiums

	Historic Centre price premiums (weighted)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	OLS	OLS	IV LAI	IV HIST	IV
AB rate a	-0.00273**	-0.00236*	-0.00445***	-0.00505***	-0.00689***	-0.00580**	-0.00596***
	(0.00126)	(0.00132)	(0.00155)	(0.00164)	(0.00180)	(0.00205)	(0.00158)
Mafia Index b				-9.10e-05	-8.77e-05	-9.41e-05	-9.08e-05*
				(5.68e-05)	(5.77e-05)	(5.91e-05)	(5.39e-05)
First-stage	–	–	–	–	46.35	41.80	45.26
Hansen J p-value	–	–	–	–	–	–	0.88
Observations	55	55	55	55	55	55	55
R-squared	0.364	0.367	0.437	0.438	–	–	–
Education c	YES	YES	YES	YES	YES	YES	YES
Pop density d	YES	YES	YES	YES	YES	YES	YES
Build. Height e	–	YES	YES	YES	YES	YES	YES

Env. Qual. [f]	–	–	YES	YES	YES	YES	YES
	Landscape Areas price premiums (weighted)						
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	OLS	OLS	OLS	OLS	IV LAI	IV HIST	IV
AB rate	-0.00122	-0.00144	-0.00142	-0.00257†	-0.00635**	-0.00427*	-0.00535**
	(0.00116)	(0.00132)	(0.00197)	(0.00112)	(0.00270)	(0.00234)	(0.00220)
Mafia Index				-0.000162	-0.000231**	-0.000193*	-0.000213**
				(0.000108)	(0.000104)	(9.96e-05)	(9.91e-05)
First-stage	–	–	–	–	42.87	35.25	45.7
Hansen J p-value	–	–	–	–	–	–	0.43
Observations	52	52	52	52	52	52	52
R-squared	0.304	0.307	0.307	0.345	–	–	–
Education	YES	YES	YES	YES	YES	YES	YES
Pop density	YES	YES	YES	YES	YES	YES	YES
Build. Height	–	YES	YES	YES	YES	YES	YES
Env. Qual.	–	–	YES	YES	YES	YES	YES

Notes: Price premiums are obtained by regressing log of price against structural and location controls, dummies delineating limited areas on both side of the boundary, boundary effect dummies and year effects (specification 2). The coefficients are then weighted by the inverse of their relative standard errors to account for the significance of estimated effects. [a] AB rates range from 3.24 abusive buildings per 100 buildings (on average for a city) to 52.52 abusive buildings per 100 buildings (on average for a city). [b] The index is constructed from ISTAT province capitals crime data and accounts for rates of mass casualty crimes (usually linked to bombs or similar), voluntary mafia homicides and kidnappings. [c] Share of population holding a university degree. [d] Population density by neighbourhood. [e] Building height is in metres. [f] Quality of the environment index evaluating air, water and other natural variables (mean=2.83 std=.16, higher numbers indicate better environmental quality). The first-stage statistics is the Kleibergen-Paap rk Wald F. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 † p < 0.15

4.5 Neighbourhood Level Analysis and Robustness Checks

Given estimates using the LAI instrument suggest the OLS results are quite conservative and robust, I re-run the entire analysis at neighbourhood level according to specification (1), and subsequently (2a) and (2b) using the urban compliance (UBL) index as an alternative measure of illegal and informal building behaviour, as described in section 2.2 of this paper. This approach allows me to include city fixed effects to my analysis and confirm my results at neighbourhood level. It also allows me to focus on how other neighbourhood level characteristics across LA and HC borders could be affecting price premiums.

Results in Table 4 confirm a consistent and significant negative effect of non-compliance (in this case ΔUBL) on price premiums for Historic Centres, and a negative and weakly significant effect of ΔUBL on price premiums in Landscape Areas. The magnitudes of the coefficients are, given the smaller neighbourhoods under consideration, larger but generally in line with city estimates in Table 3. The addition of city fixed effects in columns (3) increase the magnitude of the effect of ΔUBL on HC price premiums, similarly to the city level regressions including instruments, while in column (6) fixed effects bring the effect of ΔUBL on LA price premiums to significance. Overall, the results support the estimates in Table 3, confirming a consistent negative effect of non-

compliance especially in the case of HCs. A one standard deviation in UBL is associated with a depreciation effect of up to 7 percentage points for HCs price premiums. The insignificant effect on LA price premiums, is most likely linked to the nature of the UBL index (change in number of pre-1919 buildings which by law should not be demolished). LA policy (Law n.1497/1939) protects landscapes in both urban and natural settings, specifically complexes of immobile things with aesthetic or traditional values, it is therefore consistent with the nature of the policy that a change in the historicism of buildings would affect LAs less than HCs, given the former policy is not as tied to historical buildings specifically, but to the value of urban and natural settings as a whole.

The neighbourhood level analysis also allows me to explore other variables driving heterogeneity at a smaller spatial scale. In Italy, buildings inscribed for their architectural value are not just historical monuments, but all buildings of architectural significance, often referred to as 'minor architectural goods' (Cosi 2008). My results show, as anticipated, that density of these architectural goods positively and significantly influence price premiums across LA borders. The disaggregated results also confirm that higher levels of education positively affect HC premiums, as suggested in the city-level results, although the effect is insignificant. Buildings in bad condition negatively affect both HC and LA price premiums, and while building height is negative, as in the city-level results, coefficients remain insignificant throughout. The same is observed for population density, although coefficients are positive, they remain insignificant in all estimation unlike the city-level regressions. New building growth has a small negative effect on price premiums, which is significant for LAs, which is in line with the spatial nature of the policy as LA are much smaller than HC, and new building growth would thus much more significantly affect their appreciation.

Table 4 Neighbourhood Level estimates

Price premium	(1) HC	(2) HC	(3) HC	(4) LA	(5) LA	(6) LA
ΔUBL a	-0.0519**	-0.0508**	-0.0795***	-0.0106	-0.0211	-0.0377*
	(0.0202)	(0.0207)	(0.0277)	(0.0224)	(0.0211)	(0.0175)
Arch. density b		0.00938	0.0119		0.0273**	0.0412**
		(0.0108)	(0.0290)		(0.0134)	(0.0197)
Higher Edu c	0.0212	0.0561	0.0180	0.0319	0.226	0.256
	(0.140)	(0.149)	(0.226)	(0.178)	(0.210)	(0.288)
Pop Density d	4.30e-06	4.50e-06	3.36e-06	2.45e-06	1.02e-06	1.31e-07
	(3.41e-06)	(3.50e-06)	(5.08e-06)	(3.19e-06)	(3.42e-06)	(3.44e-06)
Build. Bad e	-0.241*	-0.226*	- 0.0179†	-0.0642	-0.0928	-0.287
	(0.123)	(0.115)	(0.0187)	(0.148)	(0.143)	(0.206)
Build. Height f	-0.00403	-0.00355	-0.0103	-0.00303	-0.00294	-0.00126
	(0.00654)	(0.00647)	(0.0119)	(0.00617)	(0.00625)	(0.00736)
Δ NBG g	-0.000872	-0.00278	-0.00123	-0.00818***	-0.00568*	-0.00650†
	(0.00650)	(0.00690)	(0.0136)	(0.00306)	(0.00308)	(0.00424)
Δ empty build h	-0.00163	-0.00181*	-0.00315	-0.000488	-0.000283	-0.00360***
	(0.00102)	(0.000965)	(0.00254)	(0.00106)	(0.00105)	(0.00135)
Year Built i	0.0250	0.0231	0.00734	-0.0142	-0.00499	0.0391
	(0.0220)	(0.0220)	(0.0424)	(0.0195)	(0.0199)	(0.0284)
Observations	311	311	311	311	311	311

R-squared	0.098	0.102	0.479	0.035	0.055	0.526
City FE	NO	NO	YES	NO	NO	YES
Cities	55	55	55	55	55	55

Notes: Price Premiums are obtained by regressing log of price against structural and location controls, dummies delineating limited areas on both side of the boundary, boundary effect dummies and year effects (specification 2). The coefficients are weighted by the inverse of their relative standard errors to account for the significance of estimated effects. [a]UBL Index (standardized) - the difference in pre-1919 buildings in good or excellent state between 2011 and 2001 per 100 buildings by census tract. [b]K-density (quantiles) of buildings with recognised architectural value. [c]Share of population holding a university degree. [d]Population density by neighbourhood. [e]Percentage of buildings in fair or bad state. [f]Building height is in metres. [g]New Build Growth - change in number of residential buildings after 1991. [h]Change in number of empty units. [i]Year built is defined as follows: 1 -1700 and before, 2 – 1700 to 1919, 3 – 1920 to 1950, 4 – 1951-1980, 5 1980 to now. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ † $p < 0.15$

5 Conclusion

Italy is famously known for the richness of its urban heritage, which is a valuable public asset throughout the country. This paper exploits the Italian context to examine the heterogeneity of urban heritage value through two conservation policies - Landscape Areas and Historic Centres. To then examine the extent to which non-compliance undermines conservation effects.

This paper presented a two-step strategy which recovers price premiums by city or neighbourhood in the first step and regresses the recovered premiums on AB among other variables in the second step. Comparing the differences in property prices along the boundaries of both HCs and LAs, I find an overall average capitalisation of about 6.5% (€160 extra per metre square) for Landscape Areas, and as estimated average premium of 3.5% (€86 extra per metre square) for Historic Centres. Results also indicate substantial heterogeneity in heritage price premiums, suggesting that despite nationally imposed stringent planning regulations there are other forces driving a disparity in values. In the second step and by using an instrumental strategy to substantiate estimates, results confirm that at least partially *abusivism* levels explain the heterogeneity of price premiums, limiting the capitalisation of architectural public goods and putting one of the major urban amenities of Italian cities at risk. A one percent increase in AB is associated with an expected depreciation effect of 0.64 percentage points in HC price premiums, which is considerable given the magnitude of the capitalisation effect. Furthermore, a one percent increase in AB is associated with a depreciation of 0.14 percentage points in LA price premiums. Within my analysis, I further control for mafia effects, which allows me to separate out the effect that runs from AB to heritage premiums because of informal institutions from the effect that runs from AB to heritage premiums because of mafia.

Results imply that informal institutions tied to illegal attitudes and behaviour undermine the positive economic outcomes of these heritage areas, and places with higher AB thus experience lower external benefits of urban heritage. The evidence we provide is particularly relevant for internal policy. The results suggest an impoverishment of the physical appearance of heritage

areas in many cities, which in turn assumes other negative outcomes such as fewer economic benefits from tourist industries in locations with high AB, or losses of intangible socio-cultural customs and values which are often tied to the preservation of historic areas (Tweed & Sutherland 2007; Lazrak et al. 2014). Results are also relevant to the recent governmental push to limit *abusivism*. The evidence suggests that given past building amnesties, people still rely on the possibility of future measures granting legal status to unauthorised buildings, and implies efforts limiting AB have evidently not been localised enough. This underlines the necessity to re-address policies limiting AB, in order to provide stronger motivations towards the compliance of construction regulations, and to re-address red-tape and high-costs to obtain permissions within conservation areas, in order to better protect areas where public goods such as heritage buildings and landscapes are found. Without administrative burden reduction policies the costs from greater compliance will most likely be too high for average residents. This paper contributes more generally to furthering understanding of urban illegalities , which exist in many contexts, and how they can affect the urban policy outcomes. I hope this study will motivate other investigations of the relationship between restrictive zoning systems and citizen compliance.

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Conservation planning and informal institutions: heterogenous patterns in Italian cities
Appendix

1. Introduction

This appendix complements the main paper by providing additional detail not included in the main paper for brevity. To facilitate comprehension, it partially duplicates parts of the prose in the main text. Section 2 provides further details regarding the institutional setting presented in the main paper. Section 3 comprises additional material on data collection and collation as well as the presentation of some descriptive statistics. Section 4 includes additional detail on the empirical strategy, with the presentation of maps that illustrate the spatial setting of the study. Section 5 presents complementary results that are not essential for the message of the main paper but may be of interest to some readers, as well as several robustness checks. The appendix is designed to complement arguments and specifications in the main paper, it is not designed to stand alone or replace the reading of the main paper.

2. Institutional Setting

2.1. The evolution of the Italian conservation planning system

Conservation planning in Italy is made up of three highly restrictive legislative strands: individual architectural designations[1] and their relative perimeters, Landscape Areas (LAs)[2] and historic centres (HCs) (Bonfantini, 2012; Carughi, 2012; Giannini, 1976; Olivetti et al., 2008). There are almost 200,000 architectural restrictions in Italy, the listed buildings are divided between verified buildings, others that are under consideration, and others that are not yet verified (Ministero dei beni e delle attività culturali e del turismo, 2016). There are over 6000 *vincoli paesaggistici* of various sizes many of which are situated in urban areas (Ministero dei Beni e della Attività Culturali e del Turismo, 2016). Given fragmented historical geography of Italy, there are over 8,000 Italian cities, 90% of which have fewer than 15,000 inhabitants; just about all of them, both large and small, have a least one historic centre (Ricci, 2007). This results in a phenomenal 22,698 historic centres (Ministero dei Beni e le Attività Culturali, 2016).

Conservation planning has a unique place in Italian urban policy; some have even argued that the principles and practises of conservation planning are one of Italian urbanism's main contributions in the field (Balducci & Gaeta, 2015). The Italian architect Gustavo Giovannoni coined the term

[1] Known in Italian as *vincoli architettonici*.
[2] Known in Italian as *vincoli paesaggistici*.

'urban heritage' in the 1930s as obtaining its value not as an individual and autonomous object but as part of the overall character of urbanism (Choay, 1992). Article 9 of the Italian Constitution states the need to protect and enhance both the landscape, historical and artistic heritage of the nation (Cosi, 2008).

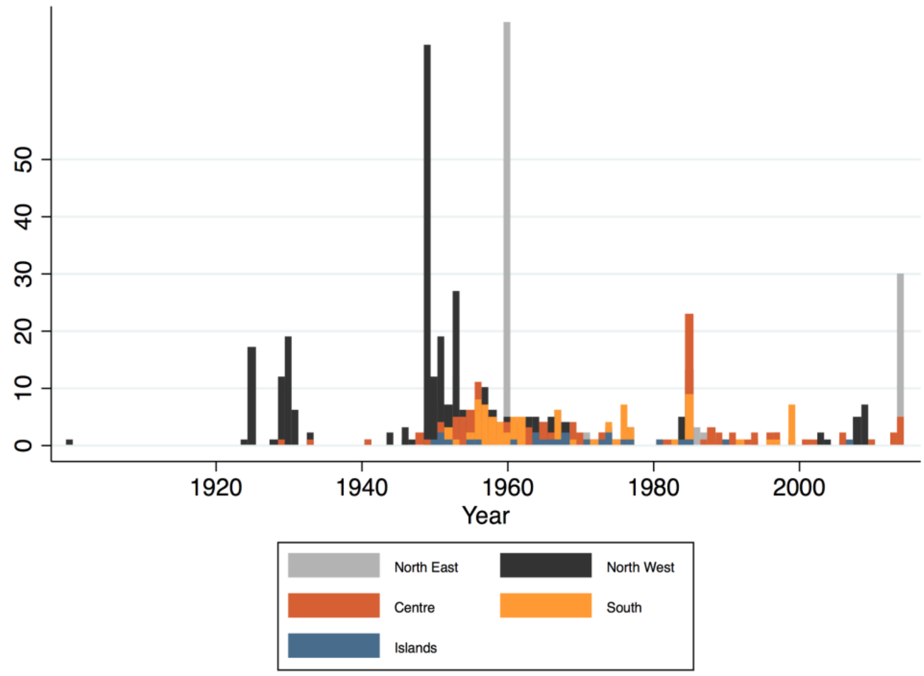
From its inception, up and to the introduction of modern town planning in Italy (1942), conservation policy grew slowly but progressively. Although urban heritage areas were not identified within urban codes, they were recognised from an environmental perspective. Indeed, the Landscape Areas are derived solely from the 1939 environmental law, which later received modifications in the 1980s (n. 431/1985 "Aree tutelate per legge") and in 1999 (n. 490/99 'Testo Unico') (Ministero dei Beni e della Attività Culturali e del Turismo, 2016). This law (n.1497/1939) refers to 'natural goods' including 'beautiful ensembles'[3] which are 'complexes of immobile things (buildings) that hold aesthetic or traditional values (Carughi, 2012; Giannini, 1976). The Cultural Heritage and Landscape code later (22 January 2004 n. 42) integrated these previous norms in an attempt to simplify legislation. Within this code, Article 136 and Article 142 apply to landscapes. Article 136 identifies buildings and areas of significant public interest[4] while Article 142 identifies the areas having natural interest. Even though this construct is tied initially to environmental rather than socio-cultural historical values, it includes restrictions linked to heritage more holistically. For example, the neighbourhood of Brera, one of Milan's historic quarters, is protected by a *vincoli paesaggistico* and within its specifications it considers the preservation of its historic character by controlling things like the appearance and décor of buildings (Gazzetta Ufficiale, 2009).

There is, moreover, a clear distinction to be made between the *vincoli paessagistici* and historic centres. While the former presents elements both of valorisation and safeguarding, the latter are almost solely about promotion and valorisation (art. 117, comma 3, of the Italian Constitution) (Fantini, 2014). The 1967 *Legge Ponte* (Law n. 765) included historic centres as part of overall city planning, delimiting them by the Zone A in Italian Master plans which demarcates zoning areas, buildable exploitation and areas to be allocated to public services (Venuti & Oliva, 1993).[5] The regulatory plans of each city protect HCs and impose a series of restrictions on them. HCs are delimited in a logic of historical consistency where there is a clear differentiation in building age between buildings inside Zone A and outside Zone A. In practice, many historic centres are partially superimposed by *vincoli paessagistici* (Figure 1 of main paper).

3 Denominated in Italian legislation as 'bellezze d'insieme'.
4 These include a. good of specific administrative use b. 'immovable things', 'villas and gardens', 'parks' c. and d. 'complex of properties', 'areas of scenic beauty'
5 PRCs (*Piano Regolatore Comunale*) or PRGs (*Piano Regolatore Generale*) are general regulatory plans for the city.

Figure A1 shows the evolution of LA listings throughout Italy by geographical area. I observe a peak of designations after the introduction of modern town planning, and notably after the end of the Second World War. As noted, by Pietrostefani & Holman (2017) this is closely tied to post-war demolition and rebuilding, which spurred communities and nations to strengthen conservation planning. There is an overall decreasing trend in designations after 1960, with a few peaks just before the 1990s and in recent years. Figure A1 thus demarcates the historicism of the LA system in Italy. In some exploratory regressions, presented in Table A5 of the appendix, we consider how the years since designation of a LA affect price premiums.

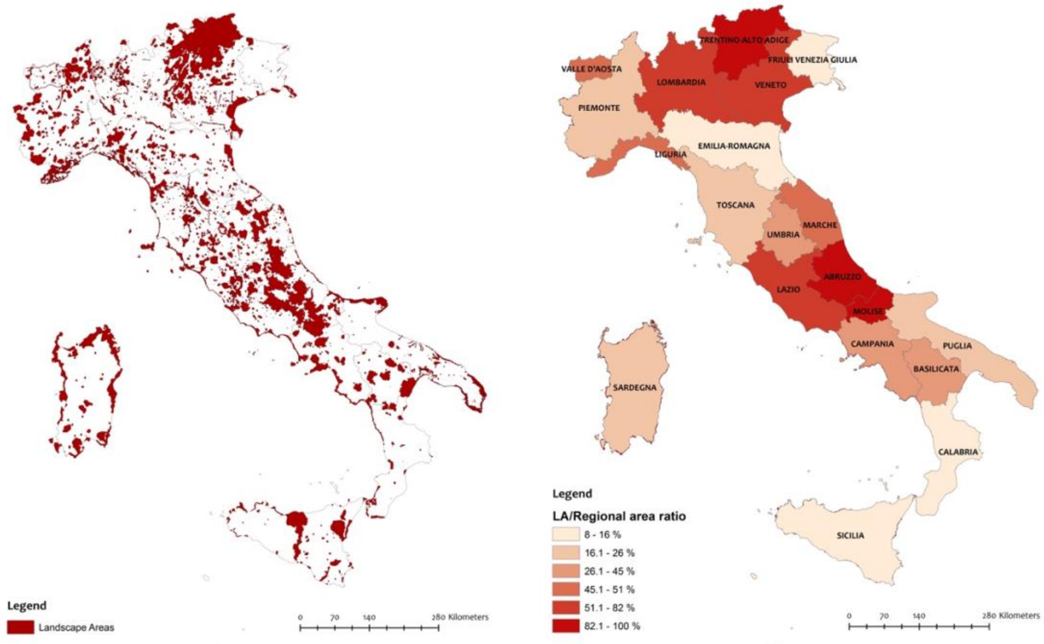
Fig A1. Evolution of Landscape Area designation by year



Notes: Presents the distribution of conservation areas by year of designation by geographical area of Italy.

Fig A2 presents the geographical distribution of Landscape Areas per region and percentage of area LA cover per total regional area. I observe some heterogeneity in terms of percentage of land covered by LAs, however there is no distinct pattern by geographical location.

Fig A2. Landscape areas per Region



2.2. *Abusivism* and policies addressing it

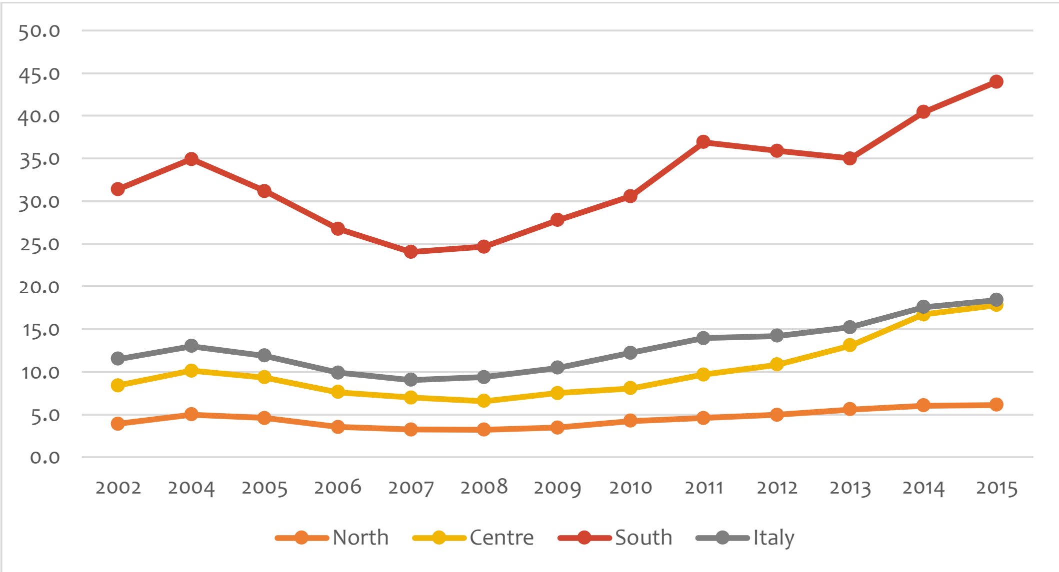
There is, on the other hand, a clear North-South polarization in AB trends as shown in Figure 3 in the main paper. Figure A3 further illustrates the rates of AB in southern regions, and much lower rates in Central and Northern regions. From 2008, as shown in Figure 2 there is a sharp reduction in building production, but a much more contained decline in *abusive* construction, in line with a slight rise of AB not only in southern regions but central ones as well as shown in Figure A3. The rise is particularly marked in the south, specifically in Campania, Calabria and Sicily (where between 2012-2014 the number of illegally constructed buildings was estimated as varying from 45 and 60% of authorized ones). A worrying trend characterises Umbria, where average AB rates have doubled compared to the previous three-year period and, in 2015, reached more than 28% (+3.8 points). Significant increases are also recorded in Lazio (from 19.6% to 22.4%) and in Liguria (from 16.5% to 18.5%).

The best deterrent to *AB* has been argued to be the restoration of legality through the demolition of outlawed buildings. *AB* continues, however, given the ineffectiveness of demolitions in many regions. Figure A4 illustrates the percentage of demolitions per region which have yet to be carried out.

These numbers are especially high in Campania and Calabria at 97% and 94% respectively. Throughout Italy, of the 46,700 demolitions ordered by the state judiciary in 2012, only 14% have been carried out to date (see section 2 of the appendix for breakdown). Between 2004-2018,

Campania only carried out 496 (2.9%) of its 16.596 demolition injunctions, while other regions with much lower *AB* rates have carried out much higher numbers of demolitions, Lombardy and Piedmont 37% and 30% of their 4.895 and 3456 injunctions respectively (Biffi, Dodaro, Morabito, & Pergolizzi, 2018).

Fig A3. Evolution of Illegal Building by Geographical location



Notes: Index of abusiveness by geographical region. Years 2002-2015. Number of new abusive constructions of residential use for every 100 legal constructions. Source: Author's elaboration of CRESME data

Fig A4. *Abusivism* Policy map and comments

Region	Demolitions Ordered	Demolitions Done
Valle d'Aosta/Vallée d'Aoste	140	42
Molise	441	148
Friuli-Venezia Giulia	823	536
Marche	896	234
Basilicata	946	224
Abruzzo	983	259
Trentino-Alto Adige/Südtirol	1919	238
Puglia	2252	366
Sardegna	2538	491
Umbria	2538	774
Calabria	2816	168
Liguria	2863	888
Emilia-Romagna	3360	1076
Piemonte	3465	1060
Lombardia	4895	1827
Toscana	5098	1262
Lazio	5604	689
Sicilia	6637	1089
Veneto	6820	2151
Campania	16596	496

Notes: Source: Author's elaboration of Legambiente (2017) data

3. Data and Descriptive Statistics

This section of the appendix provides detail on data collection and collation not included in the main paper.

3.1. Examples of Posts and Location

The empirical analysis relies on a novel data set constructed from a wide-range of sources. Over 60,000 geo-localised house sales advertisements with a wide range of attributes spanning from 2011 to 2018 were collected from *Immobiliare.it,* the largest online portal for real-estate services in Italy. Data sampling focused on residential units for sale monitored from the time they were created up to the time they were removed from the database. In 2016 the number of housing transactions in provincial capitals on *Immobiliare.it* was 183,000 units (about one-third of all housing transactions in Italy). The majority of transactions in these cities is brokered by real estate agents, who are more likely to upload adds on *Immobiliare.it* than private citizens, whereas in small towns sales are less likely to need brokerage and so representativeness is potentially a problem. Given this website's coverage and the paper's focus on large cities (the 3 most population capitals in each region), I do not need to worry about representativeness of the sample of properties advertised on *Immobaliare.it*. Figure A5 presents examples of posts from *Immobiliare.it* and the attributes scraped from the HTML code of these adds.

Fig A5. Examples of posts

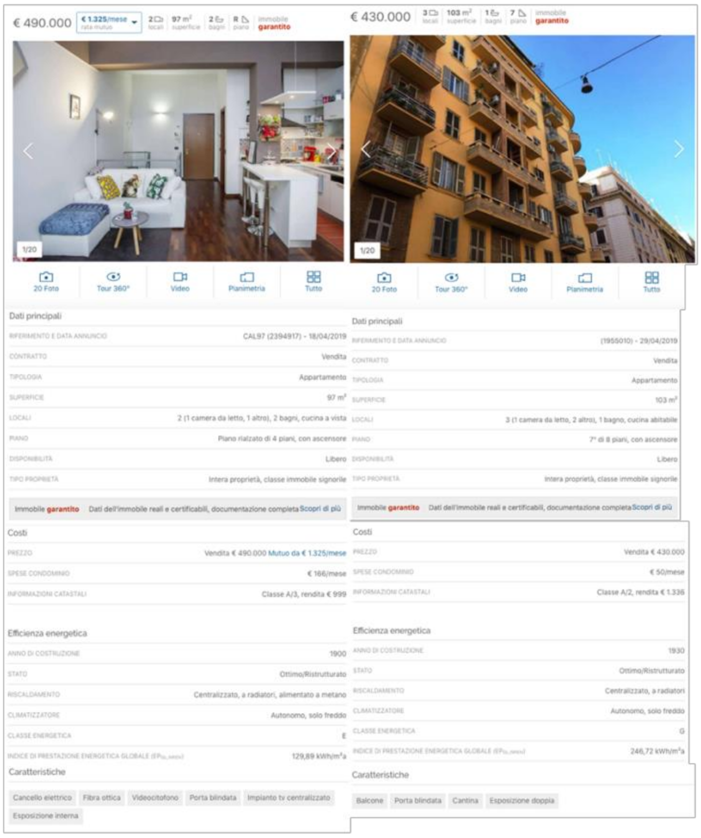


Figure A6 present an example of the geo-localisation of an advert on the *Immobiliare.it* website. Figure A7 presents two examples of post locations, Milan on the left panel and Naples on the right panel. As we can see properties are evenly spread out across space.

Fig A6. Example of geo-localised location of one advert

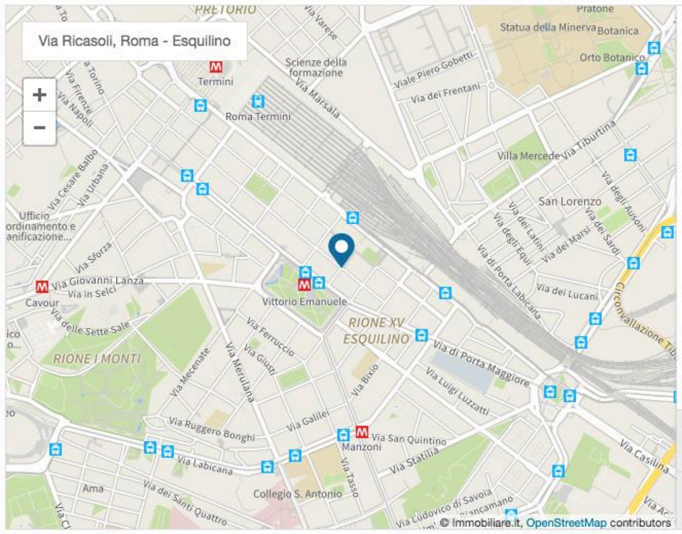
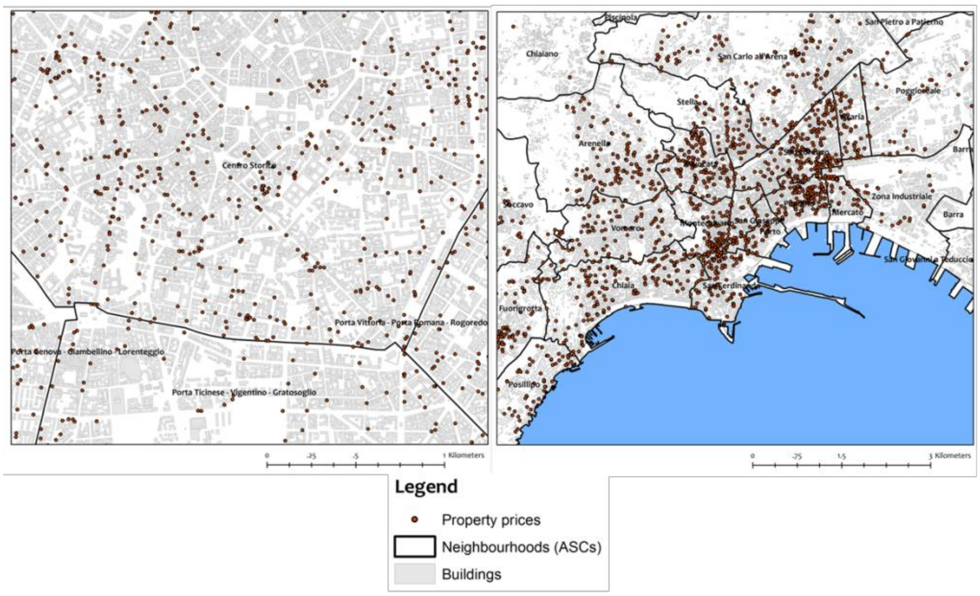


Fig A7. Insert Image of location of posts



3.2. Property data collection and description

Until recently, micro-geo-localised house price data was not available for the Italian territory. *Immobiliare.it* was used given it is the largest online portal for real-estate services in Italy to get access to the biggest source of geo-localised sale advert data. Each post has a unique identifier, a short text describing the sale and various standardized tables presenting the most important characteristics of each property. A first table presents the principle characteristic of each property, the surface area, the number of rooms, the price, the floor number and type of building (Figure

A5). A second table presents the price and cadastral information and a third lists year of construction, general state of property, type of heating, availability of air conditioning as well as energy class (Figure A5). The next section presents internal amenities the property has been tagged with, which can be used as key words in order to find additional information such as the presence of a balcony or terrace, WIFI, window exposure among other facilities. Finally, the geo-localisation of the property is shown on a map enabled by OpenStreetMap (Figure A6).

To get the data from the website, I use Python to create programs that mimic a web browser request. First, I randomly select URL's of posts by city, to them extract Hypertext Markup Language (HTML) of each page from the server, including the coordinates of the property in order to later geo-localise it on ArcGIS. The data is immediately collected into an excel file with set columns, however, a great deal of cleaning and restructuring is still needed to get an analysable format for each post. The source data obtained from *Immobiliare.it* is contained in yearly files. The database is then saved and imported into STATA. Overall the scraping operation takes between an hour and a day depending on the period of time and the internet connection. Initially the process was carried out with a google plug-in called *Webscraper* twice a year from 2013 to 2015, and then using the Python from 2015 to 2018 every 3 months.

The files were then compiled, cleaned and checked for duplicates through the website's unique identifier for each add. When a change of price was tracked, the final most conservative price was recorded. A recent by Loberto, Luciani and Pangallo (2018) which focused on the comparison between *Immobiliare* data and the OMI data provided by the real estate market observatory of the Italian Tax Office, found the *Immobiliare* data providing a picture of the housing market broadly consistent with official sources, with an approximate 12% discount to be interpreted between the *Immobiliare* data and the OMI data. Although this paper uses a different sample from the same source, both datasets overlap in timing and in the methodology followed for their collection. I am thus confident that the advertised price data is close to an unbiased forecast of actual sales prices that does not vary across the cities under consideration and includes a constant premium.

Table A1 provides an overview of the variables, some of the missing values were filled by using the textual description of the ads. For example, over 1,000 properties were geo-localised from their addresses given latitudes and longitudes were missing.

Tab A1. Content of the ads dataset

Type of data	Variables
Identifiers	Unique ad identifier, date in which the ad was created in the database, date in which the ad was removed from the database, date in which one of the characteristics of the ad was modified for the last time
Numerical	Price, floor area, *rooms, bathrooms*, year built

Categorical	Property type, kitchen type, heating type, *maintenance status, floor,* air conditioning, energy class
Type of building	*Elevator, garage/parking spot,* building category
Geographical	*Longitude, Latitude*, address
Temporal	Ad posted, ad removed, ad modified
Contractual	Foreclosure auction
Textual	Description

Notes: Variables in italic are complemented using semantic analysis on the textual description of the ad.

3.3. Choice of 55 cities

This paper focuses on a subset of the Italian province capitals. Within the 118 provincial capitals, the 3 most populated capitals in each region were selected, always including the regional capital, resulting in 55 cities. Better data is available within this list of cities, which is not to be overlooked as data availability in Italy is extremely heterogeneous and there are over 8000 urban areas (Ricci, 2007). For Umbria, Trentino-AltoAdige, Valle d'Aosta, Basilicata and Molise there were less than 3 provincial capitals, they were thus all selected. In Lombardia, the city of Monza was only recently separated from Milan as a provincial capital (declared in 2004, in practice in 2009), and was therefore added as a 4th urban area for the region. Figure A8 illustrates the 55 selected urban areas. The geographical area of study is the municipal area, rather than the whole province territory.

Fig A8. 55 provincial capitals

3.4. Creating an exhaustive set of controls

Before using instruments or relying on the temporal dimension of the data, my first strategy is to collect and consider an exhaustive set of control variables, which has not to do been done as such

a fine spatial scale for such a large part of cities in the Italian territory. A long list of locational controls in order to diminish omitted variable bias in the baseline regressions were collected from the Italian census (2011), the Italian National Geoportal of the Environment, various Italian open data regional geo-portals (when available), the Ministry of Education, the Ministry of Culture and Open Street Map. They include geo-localised micro-data such as building height and typology of buildings on the street, a range of natural and commercial amenities, parking and transport controls, as well as the locations of schools. These were all matched to the hedonic data in ArcGIS.

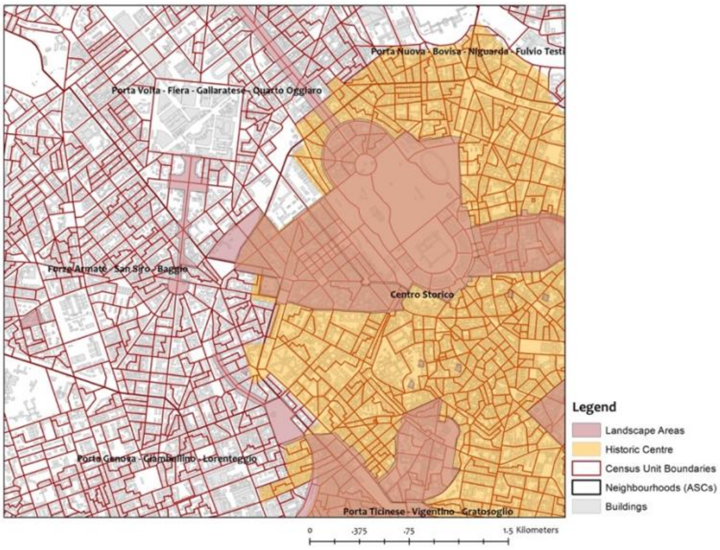
The mid-point of the main commercial street of each city was also recorded to act as a proxy for the CBD of each city. The main road construct applies well to medium Italian cities and for larger cities such as Milan, Rome and Naples two or more points were recorded (Borruso & Porceddu, 2009). Socio-economic variables such as population density, migrant percentages and level of education were obtained and joined to the hedonic data from the 2011 Italian census. Table A2 presents the summary statistics for all the main structural and location variables used as controls.

Table A3 presents summary statistics of property prices, structural, social and urban environment variables inside and outside HCs and LAs (mean, standard deviation [S.D.], min. and max.), to compare the two groups. Table A4 compares prices between different areas of Italy and illustrates a gap between average prices between the north and south of Italy. Largest standard deviations are exhibited in the Central regions, for example for transactions outside LAs the average price is €5,900 with a standard deviation of €81,737. This is most likely because of the presence of the capital city, Rome, has much higher prices than the other provincial capitals of the area.

3.4.1. Matching census data

To assess whether urban heritage areas attract certain types of households more than others and to partially control for the effects associated with such sorting, I spatially match neighbourhood characteristics to the hedonic data. This data refers to census spatial statistical units whose boundaries are typically much smaller than LAs or HC and are also smaller than city neighbourhoods. Figure A9 illustrates how LA and HC boundaries are much larger than the census units, I can therefore expect than even the smaller LAs comprehend at least a few census areas and am therefore able to test differences across boundaries. To merge the data, I spatially match the hedonic data to the census unit it falls within.

Fig A9. LAs, HCs and Census Unit Boundaries



Tab A2. Summary Statistics

Variable	mean	sd	min	max
Price €	320,049	760,617	1,000	130,000,000
Price SQM	3,543	52,030	1	7,200,000
Ln Price	12.25	0.85	6.91	18.68
Ln Price SQM	7.62	0.67	-0.60	15.79
Year	2016	1.81	2011	2018
SQM	123.18	136.35	1.00	7,344.00
Property type	4.02	0.71	1	7
# of rooms	2.80	1.30	1	5
# of bathrooms	1.51	0.69	0	3
Kitchen type	1.46	0.70	0	2
Floor	2.01	2.61	-1.00	12.00
Parking dummy	0.33	0.47	0	1
Lift Dummy	0.41	0.49	0	1
Property condition	2.19	1.08	0	4
Heating type	0.93	0.73	0	2
AC dummy	0.27	0.44	0	1
Energy band	0.87	0.83	0	3
Year built	2.49	2.01	0	5
Height building	14.52	8.36	1.00	89.30
HC dummy	0.27	0.44	0.00	1.00
LA dummy	0.16	0.36	0.00	1.00
Distance to HC	968	1,674	-2,893	44,986
Distance to LA	1,338	4,457	-4,791	53,794
Distance to Arch.	346	734	0	42,277
K-density arch.	0.00007	0.00019	0.00000	0.00649
Island	0.01	0.10	0	1
Distance to Green	4,305	6,647	0	46,513
Distance to Water	1,537	1,865	0	12,928
Distance to Beach	334,734	172,189	13	659,975
Distance to View	10,812	19,965	3	114,766
distance to Uni.	27,782	50,316	7	204,310
Distance to transport	756	3,082	1	48,682
Distance to out. Trans.	1,751	6,018	1	65,272
Distance to Airport	17,174	17,594	0	84,399
Distance to CC	14,489	25,858	0	137,379
Distance to Churches	407	730	0	38,624
Distance to public schools	994	6,897	0	76,705
Motorway buffer dummy	0.06	0.23	0	1
Industrial area dummy	0.03	0.16	0	1
Distance to construction	9,126	19,821	0	94,979
K-density car amenities	0.00000	0.00001	0.00000	0.00007
K-density financial amenities	0.00000	0.00001	0.00000	0.00005
K-density bars & rest.	0.00003	0.00005	0.00000	0.00060
K-density health amenities	0.00000	0.00001	0.00000	0.00006
Distance to CBD	2,340	2,027	2	45,821
N	**53,728**			

Notes: 1. Box, 2. Attic, 3. Loft 4. Apartment, 5. House, 6. Villa, 7. Building. 1. Needs refurbishment, 2. Good, 3. Refurbished. 4. New. 1. 700 and before, 2. 800 until 1919, 3. 1920-1950, 4. 1951-1980, 5. 1980-Now. Distances are in metres

Tab A3. Summary of variables by LA and HC: price, structural, social and urban environment tendencies.

Transaction inside LA	mean	sd	min	max	Transaction outside LA	mean	sd	min	max	T-test diff.	
Price SQM	5,745	93,871	1	6,500,000	Price SQM	3,138	39,784	3	7,200,000	-2607.5***	(-4.21)
Property type	4.07	0.78	1	7	Property type	4.01	0.70	1	7	-0.0607***	(-7.17)
# of rooms	3.00	1.37	0	5	# of rooms	2.76	1.28	0	5	-0.238***	(-15.45)
# of bathrooms	1.67	0.77	0	3	# of bathrooms	1.49	0.68	0	3	-0.186***	(-22.63)
Year built	2.28	1.94	0	5	Year built	2.53	2.02	0	5	0.251***	-10.51
Height building	13.72	7.70	1	57.8	Height building	14.65	8.46	1	89.3	0.939***	-8.68
Distance to Arch.	246	548	0	10,081	Distance to Arch.	364	761	0	42,277	118.8***	-13.62
Parking dummy	0.33	0.47	0	1	Parking dummy	0.33	0.47	0	1	0.00103	-0.18
Δ empty build	3.78	24.07	-470	226	Δ empty build	3.55	20.21	-476	351	-0.228	(-0.87)
Δ new build	1.14	5.61	-54	172	Δ new build	1.24	6.21	-56	158	0.104	-1.35
Pop. density	10,258	9,422	0	114,381	Pop. density	15,351	14,464	0	643,273	5092.9***	-30.79
Migrants	0.08	0.09	0	1	Migrants	0.10	0.11	0	1	0.0140***	-10.59
Build. Bad	0.11	0.18	0	1	Build. Bad	0.12	0.20	0	1	0.0121***	-5.11
Higher Edu.	0.57	0.14	0	1	Higher Edu.	0.51	0.15	0	1	-0.0641***	(-34.74)
inside HC	mean	sd	min	max	outside HC	mean	sd	min	max	diff.	
Price SQM	5,842	87,850	3	7,200,000	Price SQM	2,702	29,514	1	4,700,000	-3140.7***	(-6.20)
Property type	3.94	0.63	1	7	Property type	4.05	0.74	1	7	0.111***	-16.01
# of rooms	2.76	1.32	0	5	# of rooms	2.81	1.29	0	5	0.0499***	-3.95
# of bathrooms	1.56	0.72	0	3	# of bathrooms	1.50	0.68	0	3	-0.0632***	(-9.34)
Year built	1.93	1.79	0	5	Year built	2.70	2.04	0	5	0.770***	-39.94
Height building	16.92	7.64	1	61.6	Height building	13.56	8.45	1	89.3	-3.360***	(-40.47)
Distance to Arch.	90	199	0	7,799	Distance to Arch.	440	829	0	42,277	349.2***	-50
Parking dummy	0.18	0.39	0	1	Parking dummy	0.39	0.49	0	1	0.207***	-45.93
Δ empty build	3.71	21.20	-470	210	Δ empty build	3.54	20.69	-476	351	-0.168	(-0.80)
Δ new build	0.39	3.19	-40	62	Δ new build	1.54	6.89	-56	172	1.150***	-18.76
Pop. density	17,636	17,114	0	643,273	Pop. density	13,445	12,383	0	148,424	-4191.0***	(-30.93)
Migrants	0.10	0.11	0	1	Migrants	0.09	0.11	0	1	0.00697***	(-6.43)
Build. Bad	0.15	0.24	0	1	Build. Bad	0.11	0.18	0	1	-0.0489***	(-25.45)
Higher Edu.	0.57	0.17	0	1	Higher Edu.	0.50	0.14	0	1	-0.0745***	(-49.80)

Notes: T statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Tab A4. Comparison of mean sales between by urban heritage areas and geographical location

Transaction			Price (€/m2)				Transaction			Price (€/m2)				Difference	
inside LA	count	%	Mean	S.D	Min	Max	outside LA	count	%	Mean	S.D	Min	Max	€/m2	%
Centre	2490	19.66	7,551	109,080	1	4,700,000	Centre	10176	80.34	5,900	81,737	5	7,200,000	1650	21.86
Islands	646	11.03	1,853	883	88	12,957	Islands	5212	88.97	1,588	1,521	55	59,800	264	14.27
North-east	1390	14.25	9,755	176,264	100	6,500,000	North-east	8364	85.75	2,156	3,319	3	283,333	7599	77.90
Nord-west	2754	18.57	3,915	5,798	125	230,000	Nord-west	12077	81.43	3,150	16,052	5	1,050,000	765	19.54
South	1069	10.08	3,403	24,836	4	812,500	South	9532	89.92	1,884	7,328	3	690,000	1519	44.62

Transaction			Price (€/m2)				Transaction			Price (€/m2)				Difference	
inside HC	count	%	Mean	S.D	Min	Max	outside HC	count	%	Mean	S.D	Min	Max	€/m2	%
Centre	3,961	31.27	9,878	128,146	4.76	7,200,000	Centre	8,707	68.73	4,561	61,092	0.54	4,700,000	5318	53.83
Islands	608	10.36	1,641	1,208	234.63	19,666	Islands	5,260	89.64	1,614	1,492	55.15	59,800	27	1.64
North-east	2,613	26.79	6,441	128,587	2.66	6,500,000	North-east	7,142	73.21	2,066	3,558	6.21	283,333	4375	67.92
Nord-west	3,208	21.63	5,492	25,247	125	1,050,000	Nord-west	11,625	78.37	2,684	9,909	5.38	700,000	2809	51.13
South	4,004	37.76	2,375	13,144	3.33	812,500	South	6,600	62.24	1,832	8,532	3.73	690,000	544	22.88

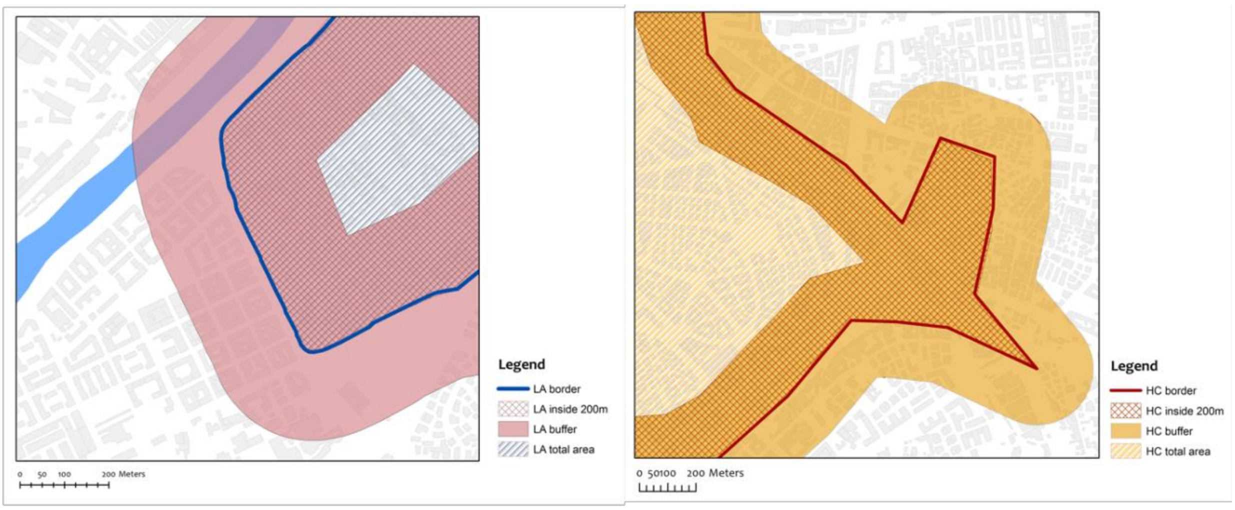
4. Empirical Strategy

Section 4 includes additional detail on the empirical strategy, with the presentation of maps that illustrate the spatial setting of the study.

4.1. Spatial illustrations of data

In identifying heritage capitalisation effects by city, I then concentrate on property prices that fall within a 200-metre buffer inside and outside LA and HC boundaries as specified in section 3.2.2 of the main paper. I create dummies of the buffer areas around LA and HC borders, specifically $LAbuffer_{ia}$ takes the value of one if $DIST\_LA_i > -200$ & $DIST\_LA_i < 200$, and $HCbuffer_{ia}$ takes the value of one if $DIST\_HC_i > -200$ & $DIST\_HC_i < 200$. I also create dummies of the area immediately inside both LA and HC borders, specifically $LAin_{ia}$ takes the value of one if $DIST\_LA_i <$ 0 and $DIST\_LA_i > -200$, and $HCin_{ia}$ takes the value of one if $DIST\_HC_i <$ 0 & $DIST\_HC_i > -200$. These buffers and inside variables are illustrated in Figure A10, showing that a 200m distance from the boundary typically does not include more than three to five aligned buildings from HC or LA border and therefore indicates a small restricted area, which is suitable to Regression Discontinuity Design strategies.

Fig A10. Visualising border discontinuities



Notes: LA and HC borders mark the delimitations of Landscape and Historic Areas. LA and HC inside 200m denote the areas 200m inside the border, and LA and HC buffers denotes 200m both inside and outside the borders.

5. Estimation Results

This section of the appendix presents complementary results that are not essential for the message of the main paper but may be of interest to some readers, as well as several robustness checks.

5.1. Baseline regression – just dummies

Before establishing establish a boundary discontinuity inspired design (BDD), I first explore if there is enough variation between LA and HC premiums to suggest that these effects are separately identifiable. In Table A5 I present results of exploratory regressions where I simply create dummies (LA=1 and HC=1) when property prices are inside each of these heritage areas. I then include a large set of control variables including structural and amenity variables, characteristics of the built environment and socio-economics variables. Neighbourhood and city fixed effect are added in alternative version of the specification to account for unobserved across-neighbourhood or across-city differences.

A variable accounting for LA years since inscription is also included in the specification to evaluate the effect of time passed since designation given the historicism of the policy as illustrated in Figure A1. Although the results are not significant before the inclusion of neighbourhood fixed effect, results in columns (9) to (11) of Table A5 suggest that it Is fact years since inscription which are driving the positive price premium in LAs when accounting for unobserved across-place differences. Older LAs are characterised by higher price marks, suggesting that the effect of inscription may be almost null at first inscription and rises with time. These findings are consistent with the logic of cumulative effect of designation over time (Ahlfeldt, Holman, & Wendland, 2012).

Tab A5. Baseline results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Ln price m2	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Inside LA	0.223***	0.212***	0.361***	0.257***	0.237***	0.243***	0.245***	0.193***	-0.0140	-0.0429*	-0.0179
	(0.0500)	(0.0484)	(0.110)	(0.0827)	(0.0797)	(0.0797)	(0.0766)	(0.0696)	(0.0308)	(0.0349)	(0.0293)
Inside HC	0.253***	0.290***	0.286***	0.234***	0.211***	0.190***	0.199***	0.182***	0.0430***	0.102***	0.0433***
	(0.0740)	(0.0730)	(0.0715)	(0.0706)	(0.0677)	(0.0732)	(0.0713)	(0.0633)	(0.0137)	(0.0285)	(0.0134)
K-density arch.	0.0118	0.0234**	0.0240**	0.0118	0.00147	-0.000342	0.00184	-0.00216	0.00966***	0.0133***	0.00949***
	(0.00997)	(0.0113)	(0.0113)	(0.00842)	(0.00831)	(0.00792)	(0.00800)	(0.00772)	(0.00237)	(0.00270)	(0.00235)
LA years since inscription			-0.00311	-0.00251	-0.00179	-0.00189	-0.00209	-0.00217	0.00172***	0.00323***	0.00173***
			(0.00195)	(0.00154)	(0.00151)	(0.00151)	(0.00147)	(0.00138)	(0.000639)	(0.000888)	(0.000613)
UNESCO site [a]						0.209	0.240	0.273*	-0.0236	0.0558	-0.0259
						(0.192)	(0.182)	(0.161)	(0.0335)	(0.0695)	(0.0327)
Build. Bad [b]							-0.326***	-0.195***	-0.0873***	-0.122***	-0.0852***
							(0.0495)	(0.0398)	(0.0131)	(0.0195)	(0.0131)
∆ empty build [c]							-0.000742**	-0.000742**	-9.03e-05	-0.000315**	-8.99e-05
							(0.000346)	(0.000332)	(0.000130)	(0.000159)	(0.000128)
NBG [d]							-7.07e-05	-0.00105	0.000530	0.000210	0.000487
							(0.000729)	(0.000665)	(0.000347)	(0.000361)	(0.000343)
Higher Edu. [e]								0.693***	0.326***	0.509***	0.322***
								(0.0596)	(0.0252)	(0.0341)	(0.0251)
Migrant % [f]								-0.310***	-0.341***	-0.449***	-0.338***
								(0.0829)	(0.0410)	(0.0386)	(0.0404)
Pop. Density [g]								-2.89e-06***	-2.42e-06***	-3.13e-06***	-2.35e-06***
								(6.09e-07)	(4.23e-07)	(5.25e-07)	(4.11e-07)
Observations	53,572	53,572	53,572	53,572	53,572	53,572	53,572	53,572	53,572	53,572	53,572
R-squared	0.335	0.348	0.350	0.480	0.492	0.496	0.507	0.543	0.720	0.682	0.723
CBD control	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
A controls	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
Amenity densities	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
City FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO
N FE	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES

Notes: Inside LA and HC are simply dummies if a property is found within the respective heritage areas. [a] UNESCO site is a dummy if a property is found within a UNESCO heritage site. [b] Percentage of buildings in fair or bad state. [c] Change in number of empty units. [d] New Build Growth - change in number of residential buildings after 1991. [e] Share of population holding a university degree. [f] Share of migrant population . [g] Population density by neighbourhood. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 † p < 0.15

Table A6 reports the estimates of distance from HCs and LAs boundariesboth separately and jointly, results also include second and third order polynomials to evaluate the linearity of best fit lines. I simply estimate distance trends allowing for quadratic and semi-non-parametric specifications. The equation is estimated including both LA and HC distances variables first, then evaluating the distance trends for each policy separately, and then including them jointly with quadratic specifications. Only modest differences are found that do not significantly alter the results.

Tab A6. Distances

Ln price m2	(1)	(2)	(3)	(4)
Distance HC	-2.88e-05*		-6.40e-05***	-5.96e-05***
	(1.66e-05)		(1.88e-05)	(1.85e-05)
Distance LA	-1.52e-05*	-3.35e-05***		-2.45e-05**
	(8.59e-06)	(1.12e-05)		(1.12e-05)
LA 2nd order poly		2.71e-09**		5.34e-10
		(1.17e-09)		(1.22e-09)
LA 3rd order poly		-2.76e-14		8.55e-16*
		(2.28e-14)		(2.21e-14)
HC 2nd order poly			6.45e-09***	6.77e-09***
			(1.24e-09)	(1.39e-09)
HC 3rd order poly			-1.30e-13***	--1.25e-13***
			(2.64e-14)	(2.74e-14)
Observations	53,572	53,572	53,572	53,572
R-squared	0.705	0.705	0.706	0.706
S controls	YES	YES	YES	YES
A controls	YES	YES	YES	YES
Amenity densities	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
N FE	YES	YES	YES	YES

Notes: Standard Errors clustered at Neighbourhood level. *** p<0.01, ** p<0.05, * p<0.1

5.2. First Step full estimates

Tab A7.

	TORINO (1)	**Novara** (2)	**Alessandria** (3)	**AOSTA** (4)	**Savona** (5)	**GENOVA** (6)	**La Spezia** (7)	**MILANO** (8)	**Bergamo** (9)	**Brescia** (10)	**Bolzano** (11)
	0.172***	0.177***	0.012	0.045	-0.149***	-0.045	-0.077**	0.230***	0.124***	0.128***	-0.029
HC 200m in	(0.0321)	(0.0435)	(0.0387)	(0.0500)	(0.0397)	(0.0347)	(0.0345)	(0.0194)	(0.0261)	(0.0376)	(0.0566)
	0.111***	0.166***	-0.287***	0.009	0.116**	0.364***	0.122***	0.156***	0.328***	0.158***	-0.003
LA 200m in	(0.0228)	(0.0334)	(0.0832)	(0.0598)	(0.0518)	(0.0229)	(0.0414)	(0.0145)	(0.0251)	(0.0355)	(0.0787)

	TRENTO (12)	**Verona** (13)	**VENEZIA** (14)	**Padova** (15)	**Udine** (16)	**TRIESTE** (17)	**Parma** (18)	**Modena** (19)	**BOLOGNA** (20)	**Pesaro** (21)	**ANCONA** (22)
	0.017	0.207***	0.017	0.106	0.009	0.042	0.152***	0.117***	0.062**	0.078	-0.005
HC 200m in	(0.0675)	(0.0473)	(0.0463)	(0.0887)	(0.0359)	(0.0365)	(0.0246)	(0.0439)	(0.0301)	(0.0478)	(0.0504)
	0.019	0.142***	-0.039	-0.200	0.149	0.134***	0.117	-0.632***	0.042	0.024	0.069**
LA 200m in	(0.0930)	(0.0378)	(0.0544)	(0.1502)	(0.2108)	(0.0383)	(0.1104)	(0.1642)	(0.0361)	(0.0571)	(0.0340)

	Ascoli (23)	**FIRENZE** (24)	**Livorno** (25)	**PERUGIA** (26)	**Terni** (27)	**Viterbo** (28)	**ROMA** (29)	**Latina** (30)	**Caserta** (31)	**NAPOLI** (32)	**Salerno** (33)
	0.119***	0.040	-0.149***	0.159***	0.211***	0.001	0.023	-0.015	0.011	0.121***	0.059
HC 200m in	(0.0411)	(0.0372)	(0.0315)	(0.0311)	(0.0658)	(0.0439)	(0.0245)	(0.0541)	(0.0466)	(0.0198)	(0.0464)
	-0.193***	-0.021	0.307***	0.054**	-0.197**	-0.165***	-0.122***	0.169**	-0.109	0.285***	0.078
LA 200m in	(0.0548)	(0.0223)	(0.0384)	(0.0257)	(0.0931)	(0.0504)	(0.0238)	(0.0793)	(0.0750)	(0.0203)	(0.0515)

	L'AQUILA (34)	**Teramo** (35)	**Pescara** (36)	**CAMPOBAS** (37)	**Foggia** (38)	**BARI** (39)	**Taranto** (40)	**POTENZA** (41)	**Matera** (42)	**Cosenza** (43)	**CATANZAR** (44)
	0.006	-0.031	0.239***	-0.325***	0.061	0.106***	-0.071**	-0.045	0.033	-0.376***	-0.173***
HC 200m in	(0.0528)	(0.0398)	(0.0332)	(0.0797)	(0.0434)	(0.0225)	(0.0347)	(0.0745)	(0.0564)	(0.1123)	(0.0424)
	-0.126	0.260	-0.126***	-0.154***		-0.042	-0.179		-0.001	-0.033	-0.092
LA 200m in	(0.0780)	(0.2150)	(0.0428)	(0.0514)	x	(0.0919)	(0.1250)	x	(0.0604)	(0.1502)	(0.2580)

	Reggio (45)	**PALERMO** (46)	**Messina** (47)	**Catania** (48)	**Sassari** (49)	**Nuoro** (50)	**CAGLIARI** (51)	**Pordenone** (52)	**Isernia** (53)	**Prato** (54)	**Monza** (55)
	0.221***	-0.118***	0.144**	-0.139***	-0.227***	0.156	-0.053	0.238**	-0.278***	0.035	0.365***
HC 200m in	(0.0311)	(0.0358)	(0.0607)	(0.0391)	(0.0535)	(0.1640)	(0.0600)	(0.0930)	(0.0676)	(0.0402)	(0.0543)
	0.178***	0.007	-0.059	0.014	0.015	-0.307*	-0.008	0.286***		0.030	0.104**
LA 200m in	(0.0511)	(0.0699)	(0.0888)	(0.0313)	(0.0962)	(0.1763)	(0.0400)	(0.0990)	x	(0.0402)	(0.0492)

HC 500m in		LA 100m in			
Lin100m	0.101*** (0.0066)	Hin500m	0.054*** (0.0071)	Year FE	YES
Observations	50409	Observations	50409	Structural, Amenity and Amenity density controls	YES
R-squared	0.677	R-squared	0.665	Robust st. errors. *** p<0.01, ** p<0.05, * p<0.1	

Outside boundary controls: YES

5.2.1. City-level additional estimates

Tab A8. *Abusivism*'s effect on price premiums – full regression unweighted

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Price premiums	HC	HC	HC	HC	HC	LA	LA	LA	LA	LA
AB rate	-0.00403**	-0.00409***	-0.00358**	-0.00594***	-0.00644***	-0.000961	-0.000981	-0.000930	-0.000436	-0.000859†
	(0.00157)	(0.00141)	(0.00150)	(0.00157)	(0.00165)	(0.000972)	(0.00110)	(0.00119)	(0.00163)	(0.00072)
Education	0.404	0.450*	0.383*	0.436*	0.572*	0.0990	0.0361	0.0429	0.0541	0.0598
	(0.290)	(0.243)	(0.147)	(0.248)	(0.292)	(0.414)	(0.366)	(0.358)	(0.359)	(0.417)
Pop. density		2.53e-05***	3.05e-05***	2.68e-05***	3.80e-05***		3.45e-05***	3.51e-05***	3.58e-05***	4.53e-05***
		(8.04e-06)	(8.73e-06)	(8.58e-06)	(1.18e-05)		(9.57e-06)	(1.06e-05)	(1.08e-05)	(1.68e-05)
Build. Height			-0.00871	-0.0171***	-0.0145**			-0.000889	-0.000860	-0.00302
			(0.00611)	(0.00613)	(0.00618)			(0.00847)	(0.00865)	(0.00933)
Env. Qual.				-0.427***	-0.511***				0.0892	0.0178
				(0.118)	(0.133)				(0.151)	(0.170)
Mafia Index					-0.000100					-8.48e-05
					(6.37e-05)					(9.39e-05)
Constant	-0.0910	-0.156	-0.0283	1.312***	1.475***	0.0850	-0.00362	0.00941	-0.271	-0.132
	(0.149)	(0.130)	(0.149)	(0.427)	(0.431)	(0.213)	(0.198)	(0.213)	(0.507)	(0.516)
Observations	55	55	55	55	55	55	55	55	55	55
R-squared	0.194	0.277	0.296	0.405	0.419	0.008	0.114	0.114	0.117	0.124

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