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WORLD HERITAGE DESIGNATION AND PROPERTY: THE IMPACT OF PRESERVATION ON THE PRICE OF HISTORIC ASSETS

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Abstract. The restrictions and requirements imposed by historic preservation regulations bring about many changes to the rights of property owners. They might impose additional costs, most notably by prohibiting the demolition of designated buildings and thus decreasing property-development opportunities. The objective of this study is to examine what happens following world heritage designations; specifically, if and how such designations impact the property values of historic buildings. Using the hedonic price method, we measure the value of the option to demolish and rebuild that is denied to owners of designated buildings. We also measure the value of preservation regulations, expressed in the prices of apartments in designated buildings. The study area is the "White City" of Tel Aviv, which UNESCO designated as a world heritage site. The findings suggest that the market price of a designated building is on average 12.5% lower than its theoretical value if the building was not subject to historic preservation regulations. Moreover, a premium of approximately 14% was found in the price of apartment units in designated buildings if the building underwent preservation. These findings could have a direct impact on public policies designed to promote the preservation of historical buildings in world heritage sites.

Keywords: heritage, cultural property, valuation, property value, market price, historic preservation, UNESCO.

Introduction

When a site is designated as World Heritage by UNESCO (The United Nations Educational, Scientific and Cultural Organization), the designation can result in multiple benefits such as attracting investment opportunities, increasing tourism, and the regeneration of the surrounding urban environment. Alongside these benefits, this sought-after status also imposes certain responsibilities. Public officials at the local, regional and national levels of government must enact laws and adopt policies that make it possible to protect registered World Heritage properties according to the World Heritage Convention, also known as the Convention for the Protection of the World Cultural and Natural Heritage (World Heritage Committee, 1972).

In turn, these policy changes in local regulation may spur other changes in the city, resulting in conflicts and uncertainty. One such change that may be expected is the effect on the rights and privileges of property owners who suddenly find themselves bound by regulations and restrictions. This paper examines these issues by looking at the changes brought about by UNESCO's designation of Tel Aviv's "White City" as a World Heritage site.

To do this, we examine the market value of heritage properties in a district earmarked by UNESCO as World Heritage. Market value is defined as the price at which both buyers and sellers are willing to do business (Appraisal Institute, 1992). This price is assumed to reflect the most profitable use of the property – its highest and best use. From the perspective of owners, there are several feasible routes to handle heritage properties. For example, a non-designated building – i.e., a property not selected for preservation – can be renovated, expanded, or demolished, and in the latter case, a new building can be constructed in its place. While preservationists and World Heritage enthusiasts look at a variety of social and community values in pursuing heritage protection, property owners may adopt a different perspective. In particular, they may look to maximize their property's value in accordance with the principle of the highest present value yield. In such cases, demolition would be considered when the expected value gained from future streams of revenues would equal or be greater than the net revenue derived from simply renovating or expanding (Amin & Capozza, 1993; Brueckner, 1980).

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Moreover, some researchers find that the option to demolish and rebuild a new building along an infinite time horizon positively affects both its optimal development strategy and its value (Brueckner, 1981; Amin & Capozza, 1993; Williams, 1997).

The introduction of international norms onto the urban stage may compel public administrators, property owners, and stakeholders to rethink the way in which they handle the cityscape. In particular, norms that are voluntarily adopted by governments following World Heritage designations could make property owners uneasy about their ability to make use of their property as they see fit. In practice, this has caused vociferous conflicts in several cities between unhappy property owners and public officials who have embraced heritage preservation as part of the city's strategy for growth, urban branding, and renewal. The reason for these tensions is that heritage properties under the aegis of UNESCO's stipulations are often subject to preservation regulations, most importantly those prohibiting the demolition of such buildings. In some cases, the prohibition on the demolition of a designated building may inadvertently reduce its market value, implying that the building's market value would be higher if it could be demolished. Therefore, preservation regulations imposed on designated buildings might not necessarily reflect the highest and best use of the property (Leichenko et al., 2001).

To explore these possible impacts, we use the hedonic price method to measure the value of the option to demolish and rebuild which is denied to the owners of designated buildings. We also evaluate preservation regulations, expressed in the comparative prices of apartment units in designated and non-designated buildings.

1. Review of the literature

1.1. World Heritage and conflicts

Existing literature investigates built heritage policies as well as heritage protection challenges and conflicts (Avrami, 2016; Page, 2016; Mualam & Alterman, 2018). Some scholars have identified a range of heritage protection policies (Pickard, 2001, 2009) that respond to or exacerbate the challenges of World Heritage provisions (Khirfan, 2014). Although the World Heritage Convention is a supra-national document, it has inspired change, and also some conflicts, at the local level (Zhang et al., 2015). The convention, which is applied locally, is in fact voluntarily adopted by countries (and cities, following site designation) yet it has also been criticized for imposing ideas such as integrity, authenticity, Outstanding Universal Values, monitoring, and Historic Urban Landscapes, which may not correspond with local needs, traditions, and policies (Yang, 2014; Losson, 2017). Provisions in the World Heritage List have also instigated a range of conflicts over expropriations of property, betterment levies, land use, structural modifications, management issues, and more (Mualam & Sybblis, 2016). Local policies adopted in light of the Convention have been variously criticized for being politicized (Keough, 2011; Meskell, 2013), difficult to implement (Vigneron, 2016), inappropriately internationalizing heritage norms (Khirfan, 2014; Sande, 2015), and for imposing undue burdens and harming stakeholders (Frey & Steiner, 2011).

Property-related challenges arising from World Heritage policies are not fully recognized or adequately addressed in the literature (Mualam & Alterman, 2020). These challenges relate to accusations that local regulation which protects World Heritage (henceforth WH) places heavy burdens on property owners by reducing market prices, raising upkeep costs, and delimiting the ability to alter, demolish, or use World Heritage. However, it remains unclear how (and if) policies associated with WH affect property owners in this way. These issues will be explored in this paper.

1.2. Historic designations and property value

Studies of the impact of a historic designation on property values tend to compare the price of designated and non-designated properties (Ahlfeldt & Maennig, 2010). The market value of designated historic structures reflects any restrictions that may be imposed on the structure due to its historic qualities (Ryberg-Webster & Kinahan, 2014; Gabrielli & Farinelli, 2017). As a result, the price of a historic asset may reflect the inability to demolish or alter the structure (Bogaards, 2008). When it comes to undesignated buildings, their market value may represent the ability to add building rights to existing structures, but it may also reflect the ability to demolish the entire structure and rebuild it. As a result, the market for non-designated buildings differs from the market for heritage buildings. They are not completely comparable (Ahlfeldt & Maennig, 2010). To compare these two types of structures, appraisers focus on a variety of building characteristics and calculate a price that reflects the ability to demolish and rebuild a given structure (or alternatively, the lost opportunity to demolish, as result of restrictive heritage regulation).

A growing group of studies explored the price of lost opportunity to alter or demolish historic properties. For example, to measure the impact of the option to demolish and rebuild, Been et al. (2016) used variables that capture the degree to which developers could build new residential space in the absence of historic designation. In New York City, they found that as more regulation limited the height of the buildings in question, the value of the lost option to redevelop was greater. Thus, the impact of historic district designation could be negative where developers typically seek to build tall buildings, as in areas like Manhattan. Respectively, they also found that historic designation increases property value in the conservation area but only outside of Manhattan (Been et al., 2016).

However, several studies report that a historic designation, most often in the form of historic district designation, tends to have a positive impact on property values (Mason, 2005; see also Ford, 1989; Asabere & Huffman, 1994; Clark & Herrin, 1997; Leichenko et al., 2001; Coulson &

Leichenko, 2001; Coulson & Lahr, 2005; Ruijgrok, 2006; Noonan, 2007; Rickman, 2009 (in some districts); Zahirovic-Herbert & Gibler, 2014). Mixed and neutral impact was found by Asabere et al. (1989), Schaeffer and Millerick (1991), Ahlfeldt and Maening (2010), while Asabere et al. (1994) found a negative impact.

Some studies investigated external effects on property value generated by adjacent designated historic districts/properties (e.g. Hicks & Queen, 2016). Some found a "critical mass" effect, that is, a cumulative effect of historic districts on pricing because of a range of possible characteristics and spillovers. For instance, in the case of Greater London, Holman and Ahlfeldt (2015) found that a premium on property prices exists just outside the conservation area, but begins to diminish at a distance of approximately 600 meters from it. Been et al. (2016) found that in New York City, the status of historic districts increases the price of properties just outside their limits. Likewise, Coulson and Leichenko (2001), Noonan (2007), and Ahlfeldt and Maennig (2010) found this external effect to be positive.

The available literature on the subject has thus far focused on two main issues: (1) endogeneity and unobservable variables in standard hedonic analysis; and (2) external effects of historic designation inside the designated district (Noonan & Krupka, 2011; Moro et al., 2013; Ahlfeldt et al., 2012; Lazrak et al., 2014; Heintzelman & Altieri, 2013; Rudokas et al., 2019; Nakagawa & Tanaka, 2021). These scholarly contributions are based on the assertion that the location choice for historic designation is most likely not a random process (Lazrak et al., 2014). Endogeneity is manifested in higher-value homes that are more likely to be located in a historic district (Heintzelman & Altieri, 2013). As for external effects, policy makers "tend to pick winners"; i.e., to designate higher-quality historic properties (and districts) (Noonan & Krupka, 2011). The challenge, thus, is to separate the effect of policy from potentially correlated internal property and external location characteristics, which are both partially unobservable (Ahlfeldt et al., 2012). The historic quality of the property should be distinct from its designation status (internal attribute) (Noonan & Krupka, 2011), and other neighborhood and location attributes of the district should be distinct from the district's own designation status. The question, then, is whether the positive impact found in most studies is attributed to the designation policy itself, or rather to the historical/architectural quality of the property and/or the location of the designated district?

Controlling for location and neighborhood characteristics, Heintzelman and Altieri (2013), and Noonan and Krupka (2011) found a negative impact. Heintzelman and Altieri (2013) looked at properties before and after historic district designation in the Boston-Cambridge-Quincy area, thus controlling for endogeneity bias. The evidence suggested that the creation of a local historic district reduced home prices in that area between 11.6% and 15.5% on average. Noonan and Krupka (2011), controlling for historical quality, found that in Chicago the district effect resulted in a negative effect which was significant only at the 10% level. In general, results suggest that properties included in a designated historic district owing to their own historical quality are negatively affected by the designation policy, whereas properties included in a district because of the historic quality of their neighboring structures enjoy a premium in sales price (Noonan & Krupka, 2011).

Our study area, the White City of Tel Aviv, is a conservation area that features specific buildings earmarked as historically valuable, together with non-historic buildings (Tel Aviv-Jaffa Conservation Team, 2002). This ensemble, however, was treated by UNESCO as a continuous historic fabric worth preserving. In this area, the impact of neighborhood characteristics is the same on designated and non-designated buildings. Moreover, we control for property location characteristics, such as negative location externalities (e.g. buildings located on a main transportation artery), positive location externalities (e.g. attractive location on a boulevard or on a pedestrian street), and corner buildings. We also control for the historical/architectural quality of the building, as well as the restrictions imposed on the building (according to local policy, some historic buildings in Tel Aviv's White City are classified as "grade 2" therefore enjoying certain flexibility in their manner of preservation, while others are placed under "severe restrictions" ("grade 1") because of their unique historical/architectural quality.

2. The study area – The White City of Tel Aviv

In July 2003, UNESCO inducted the "White City" of Tel Aviv into the World Heritage List of the Convention for the Protection of the World Cultural and Natural Heritage (UNESCO, 2003). As a heritage district of Tel Aviv, the White City was mostly built from the early 1930s up until 1948. This conservation area is characterized by a series of separate buildings three to five stories high, each containing 10 apartment units on average, and surrounded by trees and gardens (Figure 1). Today, it contains the world's largest number of buildings that are part of the "modern movement" in architecture (Mann, 2006; Alfasi & Fabian, 2012): that is, buildings built in the International Style including Bauhaus (Figure 2). The White City is also home to buildings built in the Eclectic Style (Figure 3) which includes more ornamentation and detailing (Lerer, 2013). Out of thousands of buildings built in Tel Aviv during that period, about 1,000 were designated for preservation (Municipality of Tel Aviv – Jaffa, 2004). To do so, in 2008 the city adopted a statutory plan which internalized the World Heritage framework and 'translates' it into local law (henceforth, "the Preservation Plan")[1]. The Preservation Plan contains a list of 981 buildings designated for preservation, of which

[1] The drafting of the preservation plan started in 1992. City planners placed several restrictions on 1,200 buildings until the plan was approved. They denied owners the ability to demolish their heritage assets without the city's approval.

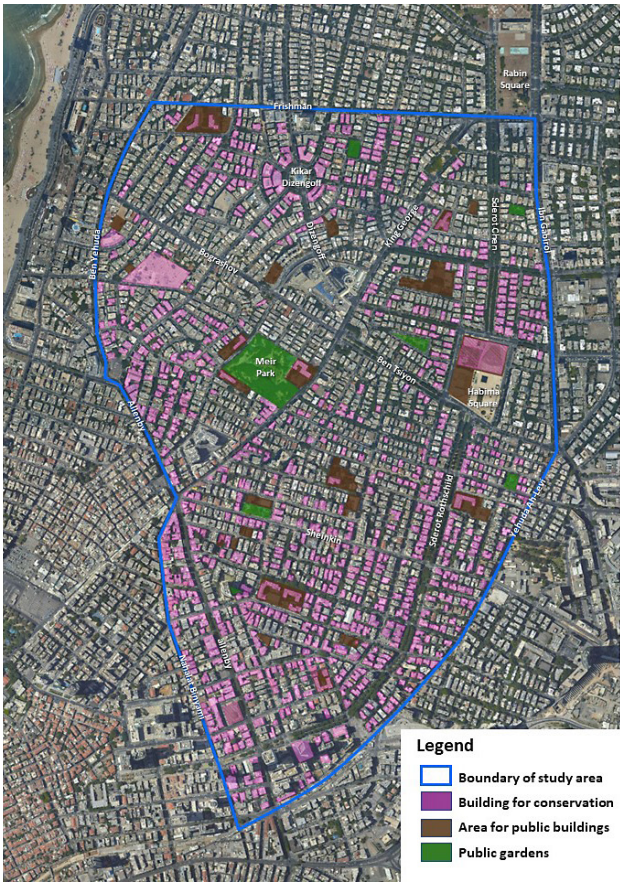

Figure 1. Map of the White City of Tel Aviv (heritage district) (source: the authors)

Figure 2. Example of an International Style building in the White City (source: the authors)

Figure 3. Example of an Eclectic Style building in the White City (source: the authors)

188 possess unique architectural value and were therefore placed under severe regulatory restrictions that forbade demolition or alterations. The remainder (793 buildings) were not placed under severe restrictions, thus permitting alterations and additional construction on site.

The Preservation Plan asserts that the demolition of buildings designated for preservation is forbidden, and any repair work on these structures requires renovation permits, which are issued by the city preservation administration. To ensure the preservation of the balconies, a prominent feature of the International Style, the local planning authority requires keeping the front balconies of the buildings open. With regard to buildings under severe restrictions, the plan allows transferring development rights (TDR) to a different plot, subject to a commitment by the owner to completely renovate and preserve the historic building (Marx, 2014). The development rights to be transferred include remainder development rights not used in the plot and additional development rights as an incentive granted to owners per Tel Aviv's Preservation Plan. To facilitate speedy TDR, the municipality of Tel Aviv has established a mechanism to coordinate between sellers and buyers of the development rights to be transferred. Moreover, the local planning authority grants economic support to apartment owners of heritage properties that are not under severe management restrictions; this support includes loans at preferable rates as well as grants in order to finance the preservation of the building. Thus, the regulatory and policy framework pertaining to historic properties in Tel Aviv brings about many challenges and restrictions, along with some financial aid.

3. Methodology

For our study, the hedonic price method was applied – Equation (1) (see Rosen, 1974; Sheppard, 1999; Freeman, 2003). The model takes the double-log form (explanatory variables are dummy variables or ordinal scale variables).

$$P_{hj} = P_h\left(L,S,R,T\right), \tag{1}$$

where: P_{hj} – the natural logarithm of house price h unit j; L – a vector of the location characteristics of a housing unit (such as proximity to public facilities, neighborhood parks, schools, etc.); S – a vector of the structural characteristics of the housing unit (such as the size and physical condition of the unit); R – a vector of planning regulations that apply to the plot (such as a building designated for preservation or

additional development rights on the plot); T – a vector of time (year of transaction; economic indices for the transaction year, such as rate of unemployment).

We used the "stepwise regression model" in order to test for explanatory variables controlling for the same characteristics, and the "enter regression method" in order to test for designation impact. In the "stepwise regression model" variables are introduced until the regression equation is acceptable (based on a predetermined, marginal, explanatory, critical value). A partial correlation coefficient determines the importance of the variables not yet inserted (Draper & Smith, 1981). The "enter regression method" simply performs the regression equation, inserting all variables in the order in which they appear. It is usually used to test for a theory: for example, the impact of historic designation on property values.

The hedonic price method was employed for all buildings, comparing the price of designated and non-designated properties. To measure the value of the option to demolish and rebuild (which is denied to owners of designated buildings), the hedonic price method was also employed separately for non-designated buildings. An out-of-sample prediction was made, whereby we calculated the values of designated buildings as if the buildings were not designated. We then compared these values to their actual sale price. This allowed us to compare buildings with identical characteristics – a designated building (subject to preservation regulations), and a theoretical, undesignated building with the same characteristics (which is not subject to preservation regulations). The implicit prices for designated buildings are expected to have different coefficients than those of non-designated buildings, as the former type represents buildings that cannot be demolished, and the latter represents buildings that can be demolished.

Notably, we used variables commonly used in hedonic price analyses (Jim & Chen, 2006; Kee, 2019). We specifically included locational and structural factors that may influence the prices of heritage properties as well as non-designated assets in heritage districts (Coulson & Leichenko, 2001; Coulson & Lahr, 2005).

Several locational variables were included because they depict both site-specific characteristics of the building and its surroundings. This is why a BUFFER variable was created to account for the potential impact of a critical mass of designated buildings in the nearby urban fabric. Existing scholarship (e.g., Noonan, 2007; Kee, 2019) obviously relies on a wide range of locational variables that vary depending on the data available and the research arena (such as proximity to urban amenities, to the Central Business District, as well as site-specific characteristics). In this regard, we chose major variables in our study area that relate to the location of the property in relation to a major road, or alternatively, less busy and less polluted pedestrian streets.

As for variables controlling for time, we used dummy variables for each year, and key macro-economic variables (unemployment) that could have an impact on price.

In terms of variables related to planning regulations, as previously stated, the UNESCO designation of the White City as a World Heritage site prompted the implementation of a slew of local regulations affecting the ability to use historic property in the conservation area. First and foremost, the new Tel Aviv Preservation Plan includes a series of conditions, each of which may have an impact on price. These key prescriptions are introduced into the model as independent variables, each with the potential to influence price. As a result, the model includes variables such as the type of regulatory restrictions (severe versus "regular" restrictions) as well as variables that account for the building rights granted (and used) by specific plots. We also used variables that matched the architectural style of the building that was designated for preservation in existing local regulations. This is because it is possible that a particular style (for example, Eclectic architecture, according to some experts) is more difficult, and thus more expensive, to preserve than other styles included in the historic area (International style, such as Bauhaus).

In terms of the variables included in the model pertaining to apartment transactions, we used the same variables as previously explained. In addition, in accordance with existing research on heritage property prices, it is customary to consider variables denoting the type and condition of buildings (Ahlfeldt & Maennig, 2010; Gabrielli & Farinelli, 2017). As a result, we included some independent variables that reflect the potential preferences of those purchasing a single flat to live in. These preferences may (or may not) influence the price of the apartment. The model's additional environmental and structural features concern the size of the flat, whether it is accessible by elevator, and its maintenance condition (whether in a refurbished building). The underlying assumption here is that buyers of flats are likely to consider these variables when making a purchase decision.

4. Data sources

Data on real estate transactions involving designated and non-designated buildings from 1998–2009 was collected from three main sources: (1) the transactions database of the Israel Tax Authority; (2) information provided by a real estate appraisal firm; (3) an online database used by real estate appraisers. Because the Israel Tax Authority database contains data on transactions from 1998, and the planning process for the preservation plan started in 1992, we were unable to perform a before-and-after analysis.

Data on the characteristics of the properties sold was collected from various sources: a field survey we conducted to record the physical attributes of the buildings, the municipality of Tel Aviv archives, land registration documents, geographic information system (GIS) data, and the Israel Central Bureau of Statistics. We collected data on sales of entire buildings as well as on sales of single apartments within buildings in the study area. Overall, the database we created contains detailed information on 63 building transactions in the study area, 35 of which

were designated prior to their sale. All observations for non-designated/designated buildings are for buildings that were not renovated/not preserved prior to the transaction. In addition, we created a database for apartment transactions which contains information about 237 sales, 91 of which are in designated buildings that were earmarked for protection prior to the sale.

Our sample is unique, as to the best of our knowledge there have been few if any studies investigating the price impact of WH and ensuing preservation policies on designated buildings still endowed with development rights. Moreover, based on data from a real estate-appraiser practice, adjustments were made for the transaction price of buildings in cases involving a building sold with statutory tenants' rights and in cases in which a building permit was already issued for (additional) construction prior to the transaction. In the first instance, the expected cost of evacuating the statutory tenants, based on comparable transactions, was added to the transaction price. In the second scenario, the cost of obtaining a permit, in terms of both money and time saved, was taken into consideration when determining transaction price. Therefore, the sale price represents a building free of statutory tenants that was granted permission for additional construction.

Tables 1 and 2 below define the main variables that were tested in the hedonic price method.

Table 1. Main variables included in the hedonic price method – building transactions

Variables	Description	Mean	Std. Dev.
Dependent variable			
Ln_BUILD_PRICE	Ln nominal selling price of the building, in New Israeli Shekels (NIS)	16.17	0.59
Independent variables			
Variables controlling for location characteristics			
LOCATION_PEDESTRIAN_STREET	A dummy variable that equals to 1 if the building is exposed to positive externalities: e.g., located on a pedestrian street	0.24	0.43
LOCATION_MAIN_ROAD	A dummy variable that equals to 1 if the building is exposed to negative externalities: e.g., located on a main transportation artery	0.21	0.41
BUFFER_DESIGNATED	A dummy variable that equals to 1 if there are more than 25 designated buildings located within 100 meters of the sold property	0.20	0.40
Variables controlling for structural characteristics			
FACADE	A dummy variable that equals to 1 if the building has a wide façade or if it is a corner building	0.51	0.50
Ln_PARCEL_AREA	Ln parcel area in sq. m.	6.30	0.43
YEAR_BUILT	Year of construction	1949	23.5
UNITS	Number of apartments in the building	9.21	5.67
BUILD_ATTACHED	A dummy variable that equals to 1 if the building has a joint wall with an adjacent building	0.08	0.27
BUILD_PARKING	A dummy variable that equals to 1 if parking, or the possibility of parking, is currently available within the building's plot	0.44	0.50
Variables controlling for planning regulations that apply to the plot			
Ln_BUILD_%_USED	Ln development rights used, calculated as the total gross built-up area divided by the plot area, multiplied by 100 (equals 0 if the highest and best use of a non-designated building is to demolish and rebuild)	3.97	1.97
NOT_FOR_DEMOLITION	A dummy variable that equals to 1 for all designated buildings and for non-designated buildings if the highest and best use of non-designated buildings is not to demolish the building	0.81	0.39
DESIGNATED	A dummy variable that equals to 1 if the building is designated for preservation (all types of designations)	0.56	0.50
DESIGNATED_DETAILED	A dummy variable that equals to 1 if the building is designated for preservation according to a detailed statutory plan which sets very specific provisions and limitations	0.175	0.38
DESIGNATED_LOCAL_SEVERE	A dummy variable that equals to 1 if the regulation pertaining to a designated historic building sets "severe" (grade 1) management restrictions- thus curtailing the ability of owners to use, alter, or add to an existing building	0.175	0.38
DESIGNATED_LOCAL_REGULAR	A dummy variable that equals to 1 if the historic building is designated for "ordinary" more flexible (grade 2) preservation according to existing regulation. That is, it is not subject to severe restrictions on property	0.21	0.41
DESIGNATED_INTERNATIONAL	A dummy variable that equals to 1 if the building is designated as historic and was built in the early International Style	0.27	0.44
DESIGNATED_ECLECTIC	A dummy variable that equals to 1 if the building is designated as historic and was built in the eclectic Style	0.27	0.44

End of Table 1

Variables	Description	Mean	Std. Dev.
Ln_PARCEL_AREA_DESIGNATED	An interaction variable of the variable Ln_PARCEL_AREA with the variable DESIGNATED	3.58	3.24
Ln_BUILD_%_USED_DESIGNATED	An interaction variable of the variable Ln_BUILD_%_USED with the variable DESIGNATED	2.66	2.42
Variables controlling for time			
TRANSACTION_YEAR	A dummy variable that equals to 1 for the year the building was sold (except for the year 1998)		
UNEMPLOYMENT	Unemployment rate in Tel Aviv, sorted by year	6.67	1.37

Table 2. Main variables included in the hedonic price method – apartment transactions

Variables	Description	Mean	Std. Dev.
Dependent variable			
Ln_APT_PRICE	Ln nominal selling price of the apartment, in New Israeli Shekels (NIS)	13.95	0.38
Independent variables			
Variables controlling for location characteristics			
LOCATION_PEDESTRIAN_STREET	A dummy variable that equals to 1 if the property sold enjoys positive externalities: e.g., located on a pedestrian street	0.22	0.42
LOCATION_MAIN_ROAD	A dummy variable equals to 1 if the property sold is exposed to negative externalities: e.g., located on a main transportation artery	0.04	0.19
BUFFER_DESIGNATED	A dummy variable that equals to 1 if there are more than 25 designated buildings located within 100 meters of the sold property	0.14	0.34
GARDEN	A dummy variable that equals to 1 if the property sold is within 150 meters of a public garden	0.46	0.50
Variables controlling for structural characteristics			
Ln_TOTAL_APT_AREA	Ln total apartment area, in sq. m.	4.27	0.32
FLOOR	Floor on which the apartment is located	3.02	1.19
PARKING	A dummy variable that equals to 1 if there is a parking spot within the building's plot	0.19	0.39
ELEVATOR1	A dummy variable that equals to 1 if there is an elevator in the building when the apartment sold is on the second floor or higher	0.44	0.50
YEAR_BUILT	Year of construction	1956	22.74
Ln_UNITS_PER_DUNAM	Ln number of apartments per dunam	3.13	2.67
APT_RENOVATED	A dummy variable that equals to 1 if the apartment sold had been renovated	0.20	0.40
BUILD_PRESERVED	For designated buildings, a dummy variable that equals to 1 if the building was preserved before the transaction	0.063	0.24
BUILD_RENOVATED	For non-designated buildings, a dummy variable that equals to 1 if the building was renovated before the transaction	0.17	0.38
Variables controlling for planning regulations that apply to the plot			
DESIGNATED	A dummy variable that equals 1 if the building is designated for preservation (all types of designations)	0.38	0.49
DESIGNATED_DETAILED	A dummy variable that equals 1 if the building is designated for preservation according to a detailed statutory plan which sets very specific provisions and limitations	0.16	0.37
DESIGNATED_LOCAL_SEVERE	A dummy variable that equals to 1 if the regulation pertaining to a designated historic building sets "severe" management restrictions (grade 1 buildings)- thus curtailing the ability of owners to use, alter, or add to an existing building	0.05	0.22
DESIGNATED_LOCAL_REGULAR	A dummy variable that equals to 1 if the historic building is designated for "regular" preservation according to existing regulation. That is, it is not subject to severe restrictions on property	0.17	0.37
Variables controlling for time			
TRANSACTION_YEAR	A dummy variable for each of the years sampled (excluding 1998)		
UNEMPLOYMENT	Rate of unemployment in Tel Aviv	7.24	1.39

5. Findings

The results of our analysis are presented in Tables 3 and 4. Table 3 shows that the independent variables that were expected to have an impact on transactions have indeed had the expected negative or positive impact on pricing. Model 1 depicts a simple comparison of the price of designated and non-designated buildings in UNESCO's White City. As can be seen from the results, DESIGNATED variable is not significant at the 10% level. A plausible reason for this is that designated buildings vary immensely in regard to the level of instituted preservation. While some are granted a range of developer incentives by the Preservation Plan, others are left with fewer incentives in order to ensure their preservation. Put differently, incentives for designated buildings differ according to the main characteristics of the building, which determine the value of the building and the highest and best use as if the building was not designated.

Thus, in Model 2 and Model 3 we replace the DESIGNATED variables with two main characteristics: parcel area and built-up area (i.e., development rights already used by the building's owners). In Model 2 all variables are significant at the 10% level. The signs of the interaction variables, positive for ln_BUILD_%_USED_DESIGNATED and negative for ln_PARCEL_AREA_DESIGNATED, imply a stronger impact of built-up area for designated buildings and a weaker impact of parcel area for designated buildings compared to non-designated properties. The variable controlling for development rights equals zero for non-designated buildings that can be demolished. The same variable has a value attached to it in cases of designated buildings that cannot be demolished, or in cases of non-historic properties whose best use is to keep them intact (the average ln value being approximately 5). Thus, we added a dummy variable in Model 1 and Model 2 that equals to 1 for (a) designated buildings

Table 3. Estimated coefficients for building transactions

Building type	Model 1	Model 2	Model 3	Model 4	Model 5
	All	All	All	Non-designated	Non-designated
	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
Independent variables					
CONSTANT	12.703 (27.09)***	11.850 (18.74)***	11.023 (20.69)***	11.738 (17.99)***	11.366 (19.30)***
Ln_PARCEL_AREA	0.761 (9.70)***	0.913 (8.74)***	1.014 (11.49)***	0.881 (8.22)***	0.901 (9.13)***
Ln_BUILD_%_USED	0.572 (5.82)***	0.351 (2.13)**		0.273 (1.28)	
UNEMPLOYMENT	–0.203 (–8.80)***	–0.211 (–9.88)***	–0.196 (–9.06)***	–0.176 (–5.32)***	–0.152 (–5.25)***
LOCATION_PEDESTRIAN_STREET	0.350 (4.59)***	0.367 (5.11)***	0.383 (5.15)***	0.417 (2.46)**	0.359 (2.25)**
LOCATION_MAIN_ROAD	–0.111 (–1.55)	–0.120 (–1.71)*		–0.079 (–0.87)	
FAÇADE	0.147 (2.40)**	0.164 (2.77)***	0.195 (3.24)***	0.252 (2.79)**	0.283 (3.39)***
YEAR_2009	0.551 (3.94)***	0.512 (3.86)***	0.524 (3.72)***	0.561 (3.49)***	0.566 (3.52)***
Ln_PARCEL_AREA_DESIGNATED		–0.230 (–1.81)*	–0.440 (–6.34)***		
Ln_BUILD_%_USED_DESIGNATED		0.292 (1.87)*	0.537 (5.98)***		
NOT_FOR_DEMOLITION	–3.00 (–5.79)***	–1.904 (–2.28)**		–1.489 (–1.35)	
DESIGNATED	0.074 (0.88)				
DESIGNATED_LOCAL_REGULAR	–0.093 (–1.05)				
BUFFER_DESIGNATED	0.029 (0.39)				
Number of observations	63	63	63	28	28
F=	35.93	41.96	51.52	24.84	37.71
Adjusted *R* Square	0.861	0.869	0.851	0.876	0.872

Note: * $\rho < 0.1$; ** $\rho < 0.05$; *** $\rho < 0.01$.

Table 4. Estimated coefficients for apartment transactions

Building type	Model 6	Model 7	Model 8	Model 9
	All	All	Non-designated	Non-designated
	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
Independent variables				
CONSTANT	11.026 (56.41)***	11.014 (56.37)***	11.145 (42.88)***	11.062 (43.19)***
Ln_TOTAL_APT_AREA	0.702 (22.84)***	0.700 (22.79)***	0.708 (16.37)***	0.721 (17.07)***
PARKING	0.116 (4.43)***	0.126 (5.01)***	0.123 (4.43)***	0.128 (4.67)***
ELEVATOR1	0.07 (2.93)***	0.085 (3.98)***	0.044 (1.48)	0.056 (2.01)**
FLOOR	0.023 (2.93)***	0.023 (2.92)***	0.021 (2.26)**	0.019 (2.04)**
Ln_UNITS_PER_DUNAM	–0.112 (–3.16)***	–0.109 (–3.08)***	–0.154 (–3.46)***	–0.140 (–3.16)***
DESIGNATED	–0.025 (–1.15)			
BUILD_PRESERVED	0.129 (3.14)***	0.105 (2.80)***		
BUILD_RENOVATED	0.022 (0.80)		0.033 (1.15)	
LOCATION_PEDESTRIAN_STREET	0.08 (3.65)***	0.075 (3.46)***	0.074 (2.53)**	0.066 (2.27)**
LOCATION_MAIN_ROAD	–0.182 (–4.01)***	–0.190 (–4.23)***	–0.213 (–2.25)**	–0.212 (–2.24)**
BUFFER_DESIGNATED	0.061 (2.27)**	0.057 (2.12)**	0.073 (1.62)	
YEAR_2001	–0.192 (–5.18)***	–0.199 (–5.41)***	–0.204 (–4.21)***	–0.196 (–4.07)***
YEAR_2006	0.164 (5.52)***	0.164 (5.54)***	0.195 (4.84)***	0.191 (4.78)***
YEAR_2007	0.277 (9.67)***	0.273 (9.69)***	0.302 (7.55)***	0.297 (7.52)***
YEAR_2008	0.389 (14.09)***	0.393 (14.29)***	0.371 (11.03)***	0.362 (10.94)***
YEAR_2009	0.474 (13.20)***	0.490 (17.88)***	0.478 (13.10)***	0.474 (13.20)***
Number of observations	237	237	146	146
F=	121.43	138.52	89.43	102.85
Adjusted *R* Square	0.891	0.891	0.895	0.894

Note: * $\rho < 0.1$; ** $\rho < 0.05$; *** $\rho < 0.01$.

and for (b) cases in which the highest and best use of a non-designated building is to keep the existing building (NOT_FOR_DEMOLITION). The variable has a negative sign, correcting for the non-continuous distribution of the variable controlling for development rights.

Model 3 uses the stepwise method and refers to the variables ln_PARCEL_AREA and ln_PARCEL_AREA_DESIGNATED. The results suggest that the impact of the parcel area (in ln) is more pronounced for non-designated buildings than for designated buildings. A change of 1% in the parcel area (Ln_PARCEL_AREA) affects the price for non-designated buildings by 1.014%, implying a high demand for a limited supply of large plots in the White City of Tel Aviv. As for designated buildings, where demolition is prohibited, and hence property development opportunities are restricted, an interaction variable of the parcel area with designated buildings (ln_PARCEL_AREA_DESIGNATED) is included with a negative sign, mitigating the impact of the parcel area. According to Model 3, for designated buildings, a change of 1% in the parcel area affects the price by 0.574% (1.014 – 0.440 = 0.574). Moreover, the variable controlling for development rights (BUILD_%_USED_DESIGNATED) has a significant positive sign only for designated buildings. A change of 1% in the utilized development rights affects the price of designated buildings by 0.537%.

In order to calculate the value of the option to demolish and rebuild we applied Model 4 and Model 5 only for non-designated buildings. In Model 4 the variable controlling for development rights (Ln_BUILD_%_USED) was not significant at the 10% level. This variable was omitted in Model 5 (the stepwise method), implying that the value of a building is not explained by its physical attributes. One possible explanation of this result is that all buildings in the sample were in poor/deteriorating physical condition when sold. Moreover, in 40% of cases the highest and best use for the property was to demolish the building and build a new structure, or to remain indifferent about the option of demolition. Thus, the physical component attribute in these cases equals to zero[2].

We made an out-of-sample prediction where the impact of preservation regulations on property value is calculated as the difference between the actual sale price of the building and its value if it were not earmarked for preservation. This calculation is performed by placing the attributes of the historic building (the independent variable values) in Model 5 (non-designated buildings). When the actual sale price is lower than the estimated value of the building if it were not designated for preservation, then there is a decrease in the value of the property owing to the lack of the option to demolish and rebuild. Results suggest that in about 70% of the buildings sampled, the property value calculated in Model 5 is higher than the actual sale price. This implies a decrease in value owing to the lack of the option to demolish and rebuild. The average difference in natural log (Ln) for all 35 buildings sampled is 0.21. However, when extreme results of differences (between the actual sale price of the building and the estimated value if it were not designated) are omitted, the average difference is 0.12, implying a decrease of 12.5% from the actual price of designated buildings because of the lack of the option to demolish and rebuild.

For buildings for which no decrease in value was found, the average plot area is 605 sq. m., and the average development rights used (in %) is 164%. For buildings for which a decrease in value was found owing to the lack of option to demolish and rebuild, the average parcel area was higher, 701 square meters, and the development rights used were lower, only 114%. This implies that the lack of the option to demolish and rebuild is most pronounced for designated buildings with a large plot area and limited development rights.

As for the results for apartment transactions (see Table 4), the independent variables that were expected to have an impact on transactions have indeed had the expected negative or positive impact on pricing. Results of Model 6 suggest that, by itself, designation of heritage properties (expressed by the DESIGNATED variable) was not significant at the 10% level. Nevertheless, a premium of 11% on the price of apartments was found in designated buildings, but only if the building was preserved prior to the sale of the apartment (BUILD_PRESERVED). Thus, there was a major investment in preserving the building which is much higher compared to a lower investment for the renovation of non-designated buildings prior to the sale of the apartment (BUILD_RENOVATED).[3] This result can be explained by the fact that buyers of apartments usually do not have the resources to preserve the building in its entirety; they often will appreciate preservation if the building had already been preserved.

An interesting result from Model 6 is that the variable controlling for the physical condition of non-designated buildings (BUILD_RENOVATED) is not significant at the 10% level. This variable was omitted in Model 7 (the stepwise method), implying that the value of an apartment unit in a non-designated building is not explained by the physical condition of the building (whether renovated or not). Two factors may explain this result: first, 39 of 40 non-designated buildings in the sample that were renovated have an elevator; and second, 23 out of 40 buildings offer parking space. Both variables were included in the model with a significant positive impact. These results suggest that the increase in value expressed by these two variables together (23.5% in Model 7) may also reflect the contribution of the renovation to the price of the building.

In addition, Model 7 illustrates that the positive externalities that preservation generates increases the prices of apartments in the urban environment by 6% (BUFFER_DESIGNATED). This implies that apartment buyers in the White City generally appreciate locations within a given conservation area, where preservation generates positive externalities (spillover effect). Thus, World Heritage sites may generate a premium on apartments in already preserved buildings as well as on apartments located near an ensemble of heritage assets. World Heritage could then have a cumulative effect which depends on a concentration of heritage properties in one location. As more buildings are preserved, property values in the urban environment are expected to increase by more than 6%. However, it should be noted that the BUFFER_DESIGNATED variable was not significant at the 10% level in Model 1 for transactions (sales) of entire buildings. This can imply the existence of separate markets for those who buy entire buildings (i.e., real estate developers) and those purchasing a single apartment.

The interpretation of other variables included in Model 7 suggest that a change of 1% in the total apartment area (TOTAL_APT_AREA) affects the price by 0.7%. For example, for an apartment sold in the White City for NIS 2,000,000, if the total area of the apartment increases by 1% (say from 100 sq. m. to 101 sq. m.), then the price of the apartment will amount to NIS 2,014,000. This is in line

[2] The evaluation was based on real estate appraisers' practice.

[3] In Model 6, the premium is calculated as the difference between the coefficient of the two variables (0.129 – 0.022 = 0.107). It is similar to the coefficient of BUILD_PRESERVED in Model 7 (0.105). See also Halvorsen and Palmquist (1980) for the interpretation of dummy variables in semi logarithmic equations.

with former studies that found an impact of size on prices (for example, Farinelli & Gabrielli, 2017).

Interpretation of the dummy variables in Model 7, which is in line with the calculation by Halvorsen and Palmquist (1980), implies that if there is an elevator in the building and the apartment sold is on the second floor or higher (ELEVATOR1), the price of an apartment *increases* by 9%. Moreover, if an apartment has a car parking space (PARKING), the price of an apartment *increases* by 13.5%.

We applied Model 8 and Model 9 (the stepwise method) for non-designated buildings and made an out-of-sample prediction: we calculated the difference between the sale price of each apartment unit in a designated building and its value (based on Model 9) as if it were not in a designated property. For apartments in designated buildings that *were preserved*, we found that the price of these apartments was higher in 13 out of 15 cases compared to the value when calculated as if they were not located in a historic building. The average difference in natural log (ln) is 0.133, demonstrating an increase of 14% for apartments in designated buildings, which is owed to the fact that the building was already preserved. This result is consistent with Model 6 and Model 7 (which showed an increase of 11% in the price of apartments in designated buildings that were preserved).

For apartments in designated buildings that were not preserved, we found that in about 50% of cases the actual price of the apartment was higher than the value calculated as if the apartment was in a non-designated building. The average difference in natural log (ln) for all 76 observations is –0.0274, implying a decrease of 2.7% for apartments in designated buildings that were not preserved.

Conclusions and summary

This paper investigates the link between World Heritage sites, local regulations, and their possible impact on property and property price. The analysis focuses on the White City of Tel Aviv and unpacks some of the consequences of historic designation. In effect, the findings illustrate that the assimilation of international directives and norms into local preservation practices can have both positive and negative impacts on property owners. The findings show that price change is a probable outcome of certain World Heritage inscriptions that generate area-based conservation.

The findings add to existing literature which explores the effect of heritage on property (Alterman, 2010). A large share of scholarly contributions to-date compares the market price of designated properties to the market price of non-designated properties. These analyses do not always consider the lack of the option to demolish and rebuild designated buildings. In fact, however, buyers of historic assets in World Heritage sites already know they cannot demolish and rebuild, and thus pay a price reflecting the current legal provisions and limitations according to local regulation. To take this into account, and to add to the current gap in knowledge, we estimated the value of the option to demolish and rebuild by comparing the market price of designated buildings to their theoretical value, which is not subjected to heritage regulations (i.e., having the option to demolish and rebuild).

The findings present a nuanced picture concerning the impact of historic designation on property values. In part, we found that designation in itself does not significantly affect prices in the White City of Tel Aviv. This can be attributed to site-specific characteristics and a variety of qualities of heritage structures and regulatory stipulations that apply to them. Likewise, when entire buildings are sold (often to developers and not to single homebuyers), the agglomeration of many historic assets in a given (Buffer) zone does not affect the sale price. On the other hand, the results suggest that the existence of a large group of heritage buildings, can and does affect positively the sale price of nearby single apartments. Thus, homebuyers of single apartments in the historic district, are not indifferent to the architectural context and the general setting of their apartment. Likewise, a premium of 14% on the price of apartments was found in designated buildings, but only if the building was preserved prior to the sale of the apartment. Thus, designation may have a positive impact in certain situations.

In addition, we found that the lack of the option to demolish and rebuild a designated building in a World Heritage site decreases its market value, on average by 12.5%. The lack of this option is more pronounced when a building's total built-up area is smaller and when the parcel of land on which it is located is larger. Conversely, there is an increase of 14% in value for apartment units in designated buildings, but only if the building was preserved and refurbished prior to the transaction. Results also shows that having an elevator in the building increases the price of an apartment (on the second floor or higher) by 9%. Moreover, a parking space on the plot (legally attached to the apartment) increases its price by 13.5%. These value upticks are expected to reveal themselves following a substantial (and costly) investment in the building's preservation. Such an investment, we found, was reflected in the value of apartment units in designated buildings that were already preserved. However, in most cases, the premium in value of heritage properties is not sufficient to cover the loss of the option to demolish and rebuild.

These findings suggest that local regulation which protects World Heritage may bring about significant changes in the rights of owners as well as their property value and ability to manage the building. Heritage properties are an important part of our collective past, and they can generate invaluable economic benefits for the city and its economy. On the micro level, however, property owners may not be so appreciative of these virtues. The imposition of regulatory burdens with their effect on price is not theoretical but real. If policy makers are to design heritage programs that correspond with World Heritage designations, they should take into account their possible impact, and plausible opposition from owners and developers. Indeed, the Tel Aviv case illustrates that while World Heritage status may have been most welcome by politicians and cultural coalitions, property owners and real estate interests have nevertheless fought the city's regulations, highlighting the

detrimental changes and challenges to property brought to the fore by heritage protection. These changes are still being debated by real estate appraisers, urban planners, economists, appeal tribunals, and courts. Our findings suggest that the trajectory of heritage protection – in terms of price increase\decrease – needs to be further investigated and studied in the future, both in Tel Aviv, as well as in other World Heritage sites.

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Author contributions

ES and DS conceived the study and were responsible for the design and development of the data analysis, including data collection. ES and DS wrote the first draft of the article, and NM wrote the second and third drafts.

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