

Shefer, Daniel; Salinger, Eyal

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The economic value of conservation: Some empirical results

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**The Economic Value of Conservation –
Some Empirical Results**

by

Eyal Salinger and Daniel Shefer

Center for Urban and Regional Studies
Technion–Israel Institute of Technology, Haifa, Israel

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The Economic Value of Conservation – Some Empirical Results

Eyal Salinger* Daniel Shefer**

Abstract

While conservation of privately owned buildings is produced by the private market, the benefit from conservation accrues not only to the estate of the private market, but also to the society at large. Conservation usually requires public involvement, due to market failures. Often market forces alone do not economically justify the conservation of buildings.

The objective of this study is to first measure the benefit ensued by conservation and accrues to private owners. Then to assess the social benefits ensued by conservation, and hence the required public intervention.

We examined the case of the White City of Tel Aviv, which UNESCO declared a World Heritage Site in 2003 because of its outstanding architectural ensemble representative of the Modern Movement in a new cultural context. Data was collected on transactions sales for properties, both for buildings and apartments, and the characteristics of the properties – structural and physical characteristics, location and externalities characteristics and planning regulations applied to the plot. The data included both buildings designated for conservation and buildings not designated for conservation.

The economic value of conservation on the private market is measured using the Hedonic Price Model, in order to estimate the effect of conservation on property values. Two models were estimated: one for apartments transactions and the other for buildings transactions.

Our preliminary empirical results show that conservation has a positive impact on buildings prices; the negative impact of negative externalities was stronger for buildings prices than for apartments prices. As expected the fact that the building was already conserved, the availability of parking space within the building's lot, and an elevator in the building, all have a positive impact on the prices of apartments.

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- Ph.D. candidate, Center for Urban and Regional Studies, Technion–Israel Institute of Technology, Haifa, Israel ` Corresponding author e-mail address: eyalsalinger@yahoo.com
 - ** Professor of Urban and Regional Economics, Center for Urban and Regional Studies, Technion– Israel Institute of Technology, Haifa, Israel.

1. Introduction

On July 2003, the White City of Tel Aviv was inscribed in the World Heritage List of the convention for the protection of the World Cultural and Natural Heritage. Inclusion in this list confirms a site's outstanding universal value, a site that deserves protection for the sake of humanity¹ (UNESCO nomination declaration, in: Municipality of Tel Aviv – Jaffa, 2004, p. 146). The White City was built from the early 1930s to 1948; today it is considered to contain the highest urban concentration in the world of buildings built in the International Style of architecture (known also as Bauhaus). Approximately 4,000 International Style buildings were built of that period, and approximately 1,000 of them were selected for conservation (Municipality of Tel Aviv – Jaffa, 2004).

The buildings designated for conservation are privately owned, and while conservation requirements and constraints increase the costs of conservation for building owners, the benefits from conservation accrue not only to the private owners but also to society at large.

The objective of this study is to measure the benefits from conservation accrue to the private owners. To do that we will employ the Hedonic Price Model for apartments transactions and for buildings transactions.

In the following sections we will present the theoretical background (section 2), describe the study area (section 3), the data collected (section 4), and the research methodology (section 5). Empirical results will be presented (section 6), and finally some concluding remarks (section 7). This paper presents some preliminary results.

¹For the map of the site see appendix 1.

2. Theoretical background

2.1 The good ‘Conservation’

Public goods can be characterized by two properties: First, public goods are non-excludible, meaning that it is technically unfeasible to keep users from enjoying the good. Second, public goods are non-rival in consumption, which means that two different people can enjoy (consume) the public good at the same time without diminishing each other's enjoyment. On the other hand, with regard to private goods, the enjoyment of the good is limited to a specific consumer (excludible), and consumption of the good by individual A competes with its consumption by individual B (rival) (Musgrave and Musgrave, 1989). In reality, goods are not always distinct and cannot be categorized as purely private or purely public goods. Mixed situation of various kinds exist: such is the case when private consumption or production generates **externalities**; these kinds of products are called “mixed goods” (Musgrave & Musgrave, 1989).

Cultural heritage goods such as conservation are typically public goods. They vary in their degree of excludability – you can be excluded from a museum if you don't pay the entrance fee, but you cannot be excluded from sightseeing. Cultural heritage goods also vary in their level of rivalness – a too-crowded cathedral can diminish one visitor's enjoyment when obstructed by another visitor's enjoyment (Navrud and Ready, 2002).

We can define conservation of privately owned buildings as “mixed goods” - while the good is produced by the private market, it generates positive externalities – the benefit from the good accrues not only to the estate of the building's owners and tenants, but also to the estate of the society at large.

2.2 Private owners benefits from conservation

A number of papers investigated the effect of historic conservation on property values. Using the hedonic method enables us to evaluate the effect of historic conservation on property values, holding constant all physical, neighborhood and property characteristics (Leichenko, Coulson and Listokin, 2001).

Ruijgrok (2006) in the case of Tieler and Culemborgerwaard, a non urban area in the south east of the Netherlands, found that historic characteristics of buildings and their surroundings account for almost 15% of property values.

Leichenko, Coulson and Listokin (2001) in the case of nine Texas cities found in most cases that historic conservation is associated with higher property values for residential properties. The average property value increases by 5%-20% of the total value.

Ford (1989) in the case of Baltimore, Maryland found that when controlling for all other factors, houses in areas with historic district conservation, where they are required to maintain exteriors in the historic style of the neighborhood, have higher transactions prices than in similar non-historic districts.

Cyrenne, Fenton and Warbanski (2006) in the case of the city of Winnipeg, Manitoba, Canada also found higher assessed value for some classes of historic buildings, holding constant other characteristics of buildings and neighborhood.

2.3 Social benefits from conservation

The question is, how may the social benefits derived from conservation be quantified? Girard (1986), following Forte (1973, 1977), suggests that the social value of conservation (the total heritage value) is the sum of the following (cited in Lichfield [1988]):

- a. a willingness to pay for direct visits;
- b. indirect benefits or costs to those nearby who are impacted by the conservation (e.g., increased trade for hotels, shops, transport modes, and car parks);
- c. potential users, who have the option to visit owing to the continued existence of the heritage;
- d. benefits and costs to future generations, whose option for utility from the heritage is left open.

The most common economic method to evaluate projects with a heritage value is with a Social Cost-Benefit Analysis (SCBA), a method that is adequate when the analysis is concerned not simply with the economic costs and benefits for the project developer but also for others whose activities will be affected by the project (Lichfield, 1988).

3. The study area – the White City of Tel Aviv

The study area shown in map 2² covers approximately 2,600 buildings. The area is characterized by a high concentration of buildings built in the International Style, approximately 760 buildings (30%) were designated for conservation.

We define four types of buildings in the study area:

- a – Buildings designated for conservation that were conserved;
- b – Buildings designated for conservation that were not conserved;
- c - Buildings not designated for conservation (designated for renovation) that were renovated;
- d - Buildings not designated for conservation (designated for renovation) that were not renovated.

Table 1: Types of Buildings

	Conserved/ Renovated	Not Conserved/ Not Renovated
Buildings designated for conservation	a	b
Buildings not designated for conservation (designated for renovation)	c	d

The study area can be divided into two sub-areas according to their main historical/current plan(s): (1) the Geddes plan³; (2) the Heart of Tel Aviv plans⁴ (the two sub-areas adjoining Ben-Zion Blvd., Marmorek Street, and Bougrashov Street, marked in blue on Map 2).

3.1 The Geddes Plan

This sub-area, built according to the plan of Sir Patrick Geddes, is considered part of the “Central White City”; it covers approximately 1,000 buildings, approximately 230 of which were designated for conservation. Residential buildings are usually 3-4 floors high, with flat rooftops. Buildings in this sub-area were designated for conservation based on the Tel Aviv Local Plan for the Conservation of Buildings and

² See appendix 2 (boundaries of the study area are marked in red).

³ Named after Sir Patrick Geddes, the reputable British urban planner who planned the central and northern parts of Tel Aviv in the late 1920's.

⁴ Four detailed plans covering the heart of Tel Aviv that were approved during the 1990's.

Sites. The plan contains a list of buildings designated for conservation, some of which come with severe restrictions, allowing no additional construction. The plan asserts that demolishing buildings designated for conservation is not allowed, and it offers incentives, such as Transfer Development Rights (TDR) policy, whereby the development rights in sites of buildings designated for conservation with severe restrictions (where no additional construction is allowed) can be transferred to a different location.

3.2 The Heart of Tel Aviv Plans

In the early 1980's, the municipality of Tel Aviv, with the cooperation of the Ministry of Construction and Housing, initiated an urban renewal program in the heart of the city. The area suffered at the time from urban blight, negative migration, an aging population, and the penetration of office use in residential buildings. Approximately 50% of the buildings in the area were three floors high, and only 30% were higher, suggesting a potential for the addition of new floors.

In the 1990's, four detailed plans covering the heart of Tel Aviv were approved (hence, the Heart of Tel Aviv plans). The plans allowed additional construction up to a height of five floors, subject to the renovation of these buildings. The plans marked the buildings designated for conservation, defining three types: Type A buildings, in which additional construction is not allowed (TDR is also not allowed for these buildings); Types B and C buildings, in which additional construction is allowed up to a height of five floors. (The destruction of type C buildings is allowed subject to several conditions.)

There are approximately 1,600 buildings in this sub-area and surroundings, approximately 530 of which were designated for conservation (half of them according to the Heart of Tel Aviv plans and half of them according to Tel Aviv Local Plan for the Conservation of Buildings and Sites). Conservation in this sub-area was observed ten years before UNESCO's declaration. It is assumed, based on observation and on data regarding the development of the area, that the majority of conservation projects were executed in parallel with adding new space to the buildings.

4. The data

Data was collected on transactions both for apartments and buildings between the years 1998-2009 in the study area and in the nearby surroundings. The buildings data base includes also transactions for vacant lots in which development rights allows the establishment of a residential building, in accordance with the urban fabric in the study area.

4.1 Data Collection method

The first source for transactions data was real estate appraisers firm, there we collected data on real transactions taken from contracts in real estate assessments. The assessment gave us also data on the characteristics of the property sold. The second source was an online data-base used by real estate appraisers/agents, which includes transactions that were published in the news paper. We used this data source in order to identify properties that were sold.

The third source was the transactions data-base of the ministry of Justice, which includes only data on transaction price. From this source we have taken the transaction price of properties identified in the previous phase and collected data on more apartments transactions, based on a random selection of properties in each block, in order to achieve a balanced spatial distribution of the observations in the study area.

4.2 Data on the characteristics of the properties sold

Data on the characteristics of the properties sold was collected from various sources:

- A physical survey: we have conducted a physical survey for all the buildings in the study area (including buildings with no transactions). The physical survey supplied data on characteristics such as the physical condition of the buildings; the physical condition of surrounding buildings; number of floors; usage in the ground floor; narrow or wide façade of the building; availability of parking space within the building's lot.
- The municipality of Tel Aviv: Data received from the municipality of Tel Aviv included the building regulations applied to the plot (also taken from the online Geographic Information System of the Tel Aviv municipality); Year the building was built; number of units in each buildings; permit requests and final certification issued

for each building (in order to spot the year that the building was conserved/renovated); The total built-up area and development rights for buildings that were sold.

- Legal registration document for each property sold: this data source supplied the registered area of the apartment sold (the net built-up area of the apartment) ; attached area to the apartment such as open balcony, garden; the floor in which the apartment is located on; availability of parking place on the lot; Legal rights: ownership or lease rights.

- Geographical Information System (GIS): The GIS was used in order to identify location and externalities characteristics such as distance to the nearest public garden; distance to the nearest main public building, etc.

- Central Bureau of Statistics: data from this source included demographic characteristics based on statistical area⁵ such as population growth over the years; economic characteristics such as the average selling price of apartments in Tel Aviv over the years.

- An online data-base used by real estate appraisers/agents (mentioned earlier) – this data-base includes also publications of apartments for sale and was used in order to identify if there is an elevator in the building, and to spot the condition of the apartment sold.

5. Methodology

5.1 The Hedonic Price Model

The Hedonic Price Model will be applied in order to estimate the component of (positive) externalities (from neighboring buildings that were conserved) embedded in the property value. The Hedonic Price Model is a method of estimating the implicit prices of characteristics that differentiate closely related products in a product class, such as housing (Rosen, 1974; Sheppard, 1999; Freeman, 2003).

⁵ small municipal geographical units as homogenous as possible, with a population of 3,000-4,000 inhabitants and not more than 6,000 inhabitants. The division to statistical area was made by the central bureau of statistics in the 1995 population census.

Following Freeman (2003) we will briefly introduce the basic model:

The hedonic technique assumes that the housing market is a single market that is in equilibrium. Each household chooses a housing unit that maximizes its utility, given the prices and characteristics of alternative housing units in different locations.

The price of a housing unit j is a function of the structural, locational, and externality characteristics of that unit:

$$(1) \quad P_{hj} = P_h(S, L, Ex)$$

P_{hj} –price of housing unit j

S - vector of the structural characteristics of the housing unit (such as the size of the unit, number of bedrooms, physical condition of the unit)

L –vector of the location characteristics of the housing unit (such as access to workplaces and to shopping, neighborhood characteristics)

Ex –vector of externalities (such as physical state of neighboring buildings (i.e., renovated/conserved, not renovated), state of infrastructures, and public facilities).

The utility function of an individual who chooses housing unit j :

$$(2) \quad U_j = U(S_j, L_j, Ex_j)$$

From the price function, it is possible to distinguish the implicit marginal price of a characteristic – or the additional amount that must be paid by any household to move to a bundle with a higher level of that characteristic, other things being equal. Assuming that households are price taker in the housing market, each household will try to maximize its utility at a point where the marginal willingness to pay for an additional unit of that characteristic equals the marginal implicit price of that characteristic:

$$(3.1) \quad \partial P_h / \partial s = P_s(s)$$

$$(3.2) \quad \partial P_h / \partial l = P_l(l)$$

$$(3.3) \quad \partial P_h / \partial Ex = P_{Ex}(Ex)$$

A household is in equilibrium when the marginal implicit price of the characteristics included in the housing bundle chosen equals the corresponding marginal willingness to pay for those characteristics (Freeman, 2003).

5.2 The main variables

The main variables that were tested in the models are as follow⁶:

Dependent variable:

APT_PRICE - the nominal selling price of the apartment in New Israeli Shekels (NIS).

BUILD_PRICE – the nominal selling price of the building in NIS.

Independent variables

Variable for the apartments transactions model:

1. APT_AREA - The registered area of the apartment sold in sqm, stated in the legal registration document⁷.
2. ATTACHED - Attached area to the apartment in sqm (such as open balcony, garden).
3. TOTAL_APT_AREA- A combined variable of the registered area plus attached area in sqm was calculated (the attached area was multiplied by an equivalent factor ranging between 0.2-0.5 depending on the total area attached).
4. FLOOR - The floor in which the apartment is located.
5. PARKING - dummy variable equals 1 if there is a parking place on the plot.
6. ELEVATOR - dummy variable equals 1 if there is an elevator in the building
7. ELEVATOR1 - dummy variable equals 1 if there is an elevator in the buildings when the apartment sold is on the second floor or above.
8. DENSITY - Land per unit in sqm - calculated as the total area of the parcel divided by the number of sub-parcels in the building (an indication for density – as the land per unit in sqm increases the density decreases).
9. RENOVATED – dummy variable equals 1 if the apartment sold is renovated (only in observations where there was sufficient data, either from the data-base on apartments for sale or apartments in new buildings)
10. BUILD_CONSERVED – dummy variable equal 1 if the building was conserved before the transaction.

⁶ For descriptive statistics see appendix 3

⁷ Registered area as defined in the property law (1969) is the floor area of the apartment not including balconies and external walls

Variables for the buildings transactions model:

11. BUILD_AREA - The total gross built-up area of the building sold in sqm.
12. DR - Development rights for vacant lots in sqm; reminder development rights for buildings in sqm.
13. TDR - Reminder transferable development rights in sqm for buildings designated for conservation with severe restrictions.
14. TOTAL_BUILD_AREA - A combined variable of the total gross built-up area plus (reminder) development rights plus reminder transferable development rights in sqm was calculated: development rights for vacant lots were multiplied by an equivalent factor of 0.5; reminder development rights for buildings were multiplied by an equivalent factor of 0.4; reminder transferable development rights were multiplied by an equivalent factor of 0.3.
15. PARCEL_AREA - the parcel area in sqm.
16. BUILD_FLOORS total floors in the building
17. UNITS - total units in the building.
18. FAÇADE - a dummy variable equals 1 if the building has a wide façade.
19. BUILD_PARKING - a dummy variable equals 1 if parking space is available within the building's lot.

Variables for both apartments and buildings transactions models:

20. CONSERVATION - a dummy variable equals 1 if the building is designated for conservation.
 21. CONSERVATION_SEVERE - a dummy variable equals one if the building is designated for conservation with severe restrictions.
- Other dummy variables of designation for conservation were tested only for the buildings transaction model, such as:
22. CONSERVATION_HEART_A – a dummy variable equals 1 if the building is designated for conservation – type A according to the heart of Tel Aviv plans (where no addition construction or TDR is allowed).
 23. CONSERVATION_LOCAL_SEVERE - a dummy variable equals 1 if the building is designated for conservation with severe restrictions according to the local plan for conservation of buildings and sites (where no addition construction is allowed, but TDR is allowed).

24. AGE – the year that the building was built.
25. CONDITION - The physical condition of the building in the year of transaction - we have set a scale ranging from 1 to 5 in order to rank the physical condition of the building: 1– indicating a very good physical condition; 5- indicating a very bad physical condition. (For the building transactions the value 0 for this variable represents vacant land).
26. CONDITION1 – a dummy variable equals 1 if the building is in a very good/good physical condition (ranked 1 or 2)
27. CONDITION_SURROUND - The physical condition of the 5 surrounding buildings in the year of transaction – the sum of the points for the 5 surrounding buildings ranging from 5 – if all buildings are in a very good physical condition to 25 – if all buildings are in a very bad physical condition.
28. YEAR a dummy variable for each of the years sampled (except the year 1998). .
29. APT_PRICE - an average yearly selling price in NIS per sqm, in the study area taken from the apartment transactions data (This variable was tested only for the buildings transactions model due to the fact that for some of the early years in the sample, there was only one observation, thus a YEAR dummy variable will control only for one observation).
30. GARDEN – a dummy variable equals 1 if the property sold is within a distance of 150 meters from a public garden
31. EXTERNALITIES_NEG a dummy variables if the property sold suffers negative externalities: located in a main public transportation road; within a distance of 150 meter from a cemetery.
32. EXTERNALITIES_POS ; a dummy variables if the property sold enjoys positive externalities: an attractive location; located in a boulevard; located in a Pedestrian-street.

6. Empirical results

We have tested for the linear functional form; the log functional form; the Semi Log functional form and the double-log functional form. We have found that the double log functional form produced the highest adj-Rsq for both models.

6.1 Results for the apartments transactions model

Function:

$$\ln(APT_PRICE) = a + b_1 \ln(TOTAL_APT_AREA) + b_2(ELEVATOR\ 1) + b_3(PARKING) + b_4(EXTERNALITIES_NEG) + b_5(CONDITION_SURROUND) + b_6(BUILD_CONSERVED) + b_7(YEAR\ 2001) + b_8(YEAR\ 2007) + b_9(YEAR\ 2008) + b_{10}(YEAR\ 2009)$$

We have used the stepwise regression model.

Table 2: Estimated coefficients of the apartments model (in brackets are t-values,

* indicates significant level at 1% ; ** indicates significant level at 5%)

Independent Variable	Coefficient (t-value)
CONSTANT	10.745
TOTAL_APT_AREA	0.756 (23.8)*
ELEVATO1	0.106 (4.299)*
PARKING	0.072 (2.237)**
EXTERNALITIES_NEG	-0.115 (-2.422)**
BUILD_CONSERVED	0.097 (3.126)*
CONDITION_SURROUND	-0.14 (-3.756)*
YEAR2001	-0.241 (-6.030)*
YEAR2007	0.220 (6.619)*
YEAR2008	0.409 (11.55)*
YEAR2009	0.443 (12.312)*

Number of observations: 179

F = 120.671

Adjusted R Square. 0.871

D.W. 2.195

Discussion

The explanatory variables obtained the expected sign.

The percentage effect on the price, of a change of 1 % in the total apartment area (TOTAL_APT_AREA) as can be seen from the results is 0.76%. (For example an apartment sold for 2.000.000 NIS, if the total area of the apartment will increase in 1% from 100 sqm to 101 sqm meter the price of the apartment will now be 2,015.200).

For the dummy variable the calculation of the percentage impact on the price, of the presence of the factor represented by the dummy variable is slightly different. Following Halvorset and Plamquist (1980) calculation, the results implies that:

- If the building is conserved prior to the transaction (BUILD_CONSERVED) the price of the apartment **increases** by 10.2 %.
- If there is an elevator in the building and the apartment sold is on the second floor or above (ELEVATOR1) the price of the apartment **increases** by 11.2%.
- If there is a parking place on the plot (PARKING) the price of the apartment **increases** by 7.5% .
- If there are negative externalities due to the location of the apartment sold (EXTERNALITIES_NEG) the price of the apartment **decreases** by 10.9%.

Excluded Variables

- The variable FLOOR was significant at the 10% level with a positive sign.

- For the condition of the apartment or the condition of the building were the apartment is located we have tested with the variables RENOVATED ; CONDITION ; CONDITION1 and BUILD_CONSERVED, using the stepwise regression model. The variable BUILD_CONSERVED entered the regression. When omitting the variable BUILD_CONSERVED the variable CONDITION1 entered (significant at the 5% level) the adj-Rsq was slightly lower. When omitting both variables BUILD_CONSERVED and CONDITION1 from the regression, the variable RENOVATED entered the regression (significant at the 5% level) again the adjR-sq was slightly lower.

BUILD_CONSERVED was the only variable from the conservation variables that were tested, that entered the regression. All other conservation variables were not significant at the 10% level.

An explanation for these results could be that buyers of apartments usually don't have the tools and resources to conserve the building, and thus a building already conserved contributes significantly to the value of the apartment. This contribution is more pronounced than in cases of buildings not designated for conservation that were already renovated, where tools and resources are more available for apartment buyers.

- 4 YEAR dummy variables entered the regression: YEAR2001 ; YEAR2007 ; YEAR2008 and YEAR2009. Table 3 below shows the average yearly nominal price per sqm taken from the apartment transactions data. It could be seen from the table that the years entered the regression represents the extreme cases (2001 the lowest price, 2007-2009 the highest prices).

Table 3: average yearly nominal price in the study area based on the apartments data (in NIS).

Year	Nominal Price per sqm
1998	13,098
1999	14,218
2000	12,719
2001	10,965
2002	13,453
2003	13,622
2004	15,378
2005	14,594
2006	15,027
2007	18,254
2008	20,237
2009	20,793

6.2 Results for the buildings transactions model

Function:

$$\ln(BUILD_PRICE) = a + b_1 \ln(TOTAL_BUILD_AREA) + b_2 \ln(APT_PRICE) + b_3(CONSERVATION) + b_4(EXTERNALITIES_NEG) + b_5(CONDITION) + b_6(FACADE) + b_7(YSERVATION_HEART_A)$$

We have used the stepwise regression model.

Table 4: Estimated coefficients of the buildings model (In brackets are t-values,

* indicates significant level at 1% ; ** indicates significant level at 5%)

Independent Variable	Coefficient (t-value)
CONSTANT	-5.045
TOTAL_BUILD_AREA	0.767 (11.113)*
APT_PRICE	1.670 (7.443)*
CONSERVATION	0.186 (2.229)**
EXTERNALITIES_NEG	-0.258 (-2.832)*
CONDITON	-0.109 (-4.575)*
FAÇADE	0.18 (2.534)**
CONSERVATION_HEART_A	0.404 (3.256)*

Number of observations: 61

F = 35.358

Adjusted R Square. 0.800

D.W. 1.798

Discussion

The explanatory variables obtained the expected sign

The percentage effect on the price, of a change of 1% in the total building area (TOTAL_BUILD_AREA) as can be seen from the results is 0.77%. (For example a building was sold for 15,000,000 NIS, if the total area of the building will increase in 1% from 1,000 sqm to 1,010 sqm meter the price of the building will now be 15,115,500).

If the building is designated for conservation (CONSERVATION) the price of the building **increases** by 20.4 %.

If there are negative externalities due to the location of the building sold (EXTERNALITIES_NEG) the price of the building **decreases** by 22.7%. (It can be seen that the effect of negative externalities on the price is significantly stronger for buildings than for apartments, where a decrease of 10.6% was observed).

The CONDITION variable sign was negative as expected, indicating that as the physical condition of the building deteriorates the price of the buildings **decreases**. It is worth noting that for vacant land the variable received the value 0, thus vacant land enjoys a premium over buildings in a very good physical condition. This could be explained by the fact that for vacant land there are no physical restrictions, parking solution is available and there is more flexibility in the planning design of the building.

From the conservation variables two variables entered the regression with a positive sign. CONSERVATION which includes all the buildings designated for conservation, and CONSERVATION_HEART_A which includes only buildings designated for conservation, type A, by the “Heart of Tel Aviv Plans” (for these buildings no additional construction is allowed and Transferring Development Rights is also not allowed).

Results imply a high premium for these buildings over all other buildings designated for conservation. This result is somewhat surprising and will be analyzed later on when discussing excluded variables.

Excluded variables

The variable ‘ buildings designated for conservation with severe restrictions by the local conservation plan’ (CONSERVATION_LOCAL_SEVERE), was not significant at the 10% level. For these buildings no additional construction is allowed but

Transferring Development Rights is allowed. The reminder transferable development rights were included in the TOTAL_BUILD_AREA variable and thus added to the price of the building.

The variable EXTERNALITIES_POS was significant at the 10% level with a positive sign. When entering this variable to the regression using the enter method the coefficients of both CONSERVATION and CONSERVATION_HEART_A decreased – thus their effect on the price of the building decreased. Also the variable CONSERVATION was significant at the 10% level.

This implies especially with regard to CONSERVATION_HEART_A buildings that these buildings enjoy also positive externalities, which are to some extent embedded in the CONSERVATION_HEART_A variable (there are 6 observations for CONSERVATION_HEART_A, 5 of which enjoy positive externalities). This could explain some of the premium gained for these buildings.

7. Conclusions

The empirical results show a positive economic value of conservation for the private owners of buildings. The price of buildings designated for conservation increased by approximately 20% relatively to the buildings not designated for conservation in the same area. (Though the analysis implies that some of this increase could be attributed to positive externalities, nevertheless there is still a significant increase in the value of buildings designated for conservation).

Furthermore, buildings buyers that will conserve their building, enjoy a premium when selling the apartments, since apartment buyers, restricted by their ability to conserve, yet they highly appreciate buildings that were already conserved.

Buildings buyers are usually the main actors in the real estate market. Their perspective is more for the longer term than that of apartment buyers. In relevance to apartment buyers, buildings buyers are less sensitive to dynamic factors such as the condition of the surrounding buildings, or whether the building was already conserved. On the other hand they are much more sensitive to static factors such as negative environmental/location externalities.

Buildings buyers value conservation. Conservation of the built heritage is a long going process, and as more buildings are conserved it will permeate the market of apartment buyers.

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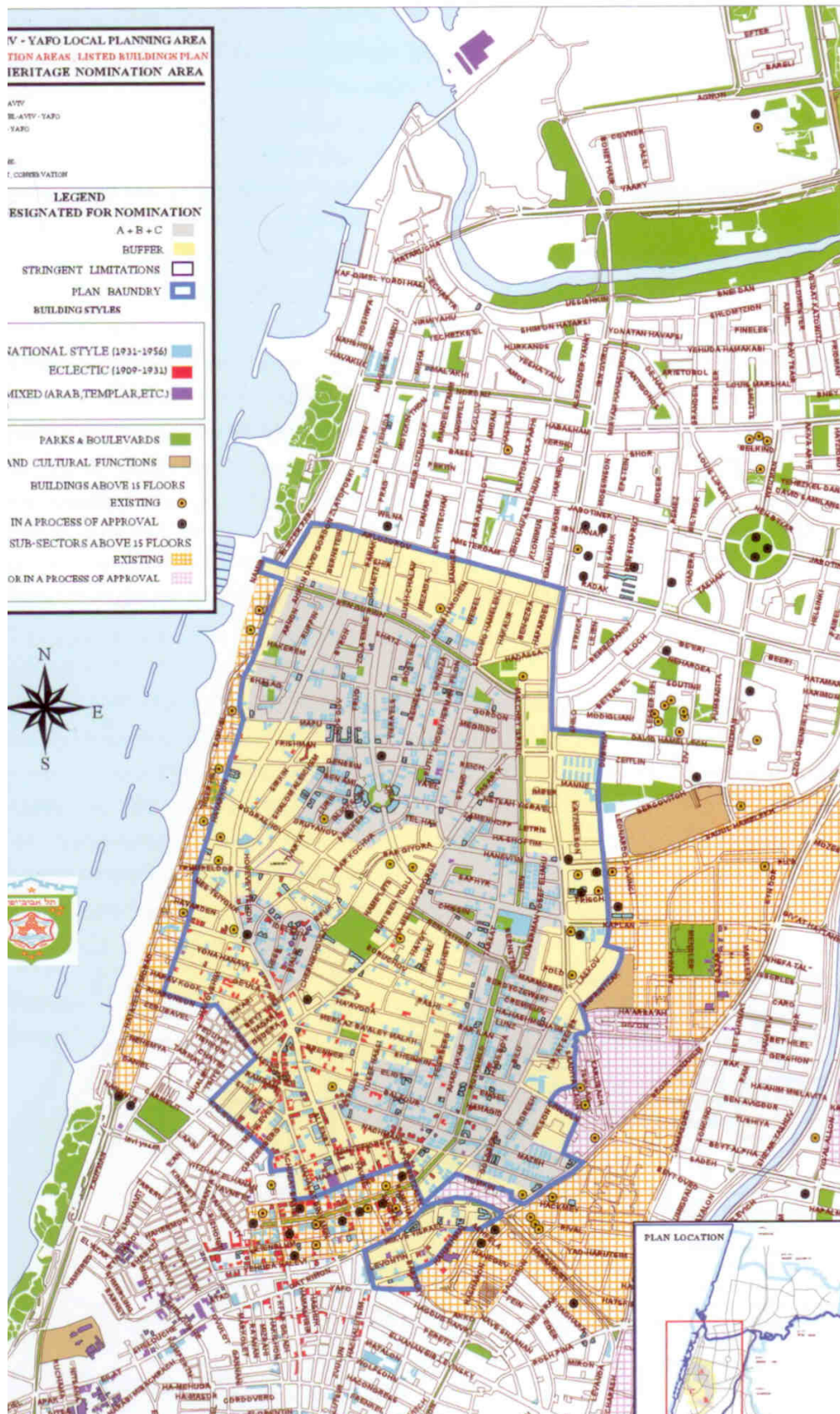
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Appendix 1: Map of the site – the White City of Tel Aviv



Appendix 3: Descriptive statistics

Table 3A: Descriptive statistics for the apartments model variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
DENSITY	179	14.3	100.8	43.1	11.2
FLOOR	179	1	6	2.98	1.24
TOTAL_APT_AREA	179	21.2	176	72.5	23.4
PARKING	179	0	1	0.15	0.35
ELEVATOR	179	0	1	0.38	0.48
RENOVATED	179	0	1	0.15	0.36
CONDITION	179	1	5	3.1	0.95
CONDITION1	179	.0	1	0.27	0.44
CONSERVATION	179	0	1	0.46	0.5
CONSERVATION_SEVERE	179	0	1	0.08	0.27
CONDITION_SURROUND	179	8	23	15.46	2.77
APT_PRICE	179	390,330	2,700,000	1,109,362	401,958
AGE	179	1927	2007	1960	25.21
GARDEN	179	0	1	0.41	0.49
EXTERNALITIES_POS	179	0	1	0.21	0.41
EXTERNALITIES_NEG	179	0	1	0.05	0.22
ELEVATOR1	179	0	1	0.36	0.48
BUILD_CONSERVED	179	.0	1	0.12	0.32

Table 3B: Descriptive statistics for the buildings model variables

	N	Minimum	Maximum	Mean	Std. Deviation
PARCEL_AREA	61	202	1,566	634.2	253.4
TOTAL_BUILD_AREA	61	101.5	3,498	964.8	501.2
BUILD_PARKING	61	0	1	0.31	0.47
CONSERVATION	61	0	1	0.62	0.49
CONSERVATION_SEVERE	61	0	1	0.31	0.47
GARDEN	61	0	1	0.20	0.4
EXTERNALITIES_POS	61	0	1	0.41	0.5
EXTERNALITIES_NEG	61	0	1	0.18	0.39
APT_PRICE	61	10,965	20,793	16,941	2,595
BUILD_PRICE	61	1,427,300	40,812,000	12,877,794	7,324,968
CONDITION_SURROUND	61	8	22	15.15	2.96
AGE	61	1932	2009	1945.6	19.5
CONSERVATION_HEART_A	61	0	1	0.1	0.3
CONSERVATION_LOCAL_SEVERE	61	0	1	0.21	0.41
BUILD_FLOORS	61	0	6	2.97	1.4
CONDITION	61	0	5	3.3	1.67
FAÇADE	61	0	1	0.52	0.5