Do High-rise condos equally value benefits over their neighboring buildings? Analysis of Ñuñoa, Santiago de Chile[1].

¿Los condominios de gran altura generan plusvalías en los edificios vecinos? Análisis de Ñuñoa, Santiago de Chile

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Resumen: Muchos estudios han demostrado que el aumento en el precio de mercado de las viviendas ubicadas en comunidades cerradas o valladas , pero poca o ninguna atención se ha visto afectada por el impacto de los precios de las viviendas en baja altura o de menor densidad población a su alrededor. Esta cuestión muy importante en las ciudades en las que las comunidades cerradas u otras comunidades de intereses comunes, destinadas a los grupos socio económicos medios y altos, tradicionalmente confinadas a enclaves de

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bajos ingresos. Desde una perspectiva cualitativa, han sugerido que esta proximidad social provoca diversos beneficios como la mejora de las expectativas de valor de los terrenos de los pobladores originarios, entre otros.

Esta investigación, utilizando un modelo de precios hedónicos basado en la información de las viviendas existentes vendidas en Ñuñoa entre 2002 y 2004, tratan de medir el impacto que se ha producido por condominios de gran altura construido recientemente en el precio de venta de estas viviendas. Los resultados sugieren que un condominio de tamaño medio produce una revalorización del 4,7% en las viviendas que lo rodean, aunque esto es un efecto de tipo local. El análisis espacial de los datos a través de un modelo de regresión geográficamente ponderada (GWR) revela que la revaluación es marginal mayor en las zonas de mayores ingresos, en la que los jefes de familia más solventes aumentan aún más sus valores. Por lo tanto, el impacto ñuñoínos condominios pueden aumentar la absorción causada por el impuestos territorial a las propiedades, la distribución espacial de los valores de propiedad que está lejos de ser democrático en la microescala.

Abstract: Many studies have shown the market premium enjoyed by homes located within gated communities, but little or no attention has been hit on the impact in the house prices around them. This question very important in the cities in which gated communities or other common interest communities, aimed to medium and high socioeconomic groups, are traditionally confined to low incomes enclaves. Salcedo & Torres (2004) and Caceres & Sabatini (2004), from a qualitative perspective, have suggested that this social proximity causes various benefits like improvement of value expectations of land from the original settlers, among others.

This research, using a hedonic pricing model based on information of existing homes sold in Ñuñoa between 2002 and 2004, attempt to measure the impact that has been produced by High-rise condos recently built on the sold price of these homes. The results suggest that a medium sized condo produces a revaluation of 4.7% in the homes that surround him, although this is a local type impact. The spatial analysis of data through a geographically weighted regression model (GWR) reveals that the revaluation is marginal higher in areas of higher incomes, in which the most creditworthy householders further increase their values. Therefore, the ñuñoínos condominiums impact can increase the uptake caused by the tax attorney to land property, the spatial distribution of property values it is far from democratic at the microscale.

I.- Introduction

The transformation of the city promoted by the change of the urban plans (e.g. to improve degraded areas) or by the spatial self-organization process of the activities (e.g., decentralization / replacement) has its maximum expression at the real estate redevelopment. According to DiPasquale & Wheaton (1996), acquire a built property to generate vacant land (building site) after the demolition of buildings is said that the ground has been redeveloped. This occurs when the potential value of soil, according to their location (usually central) and its constructability (typically increased by changes in the planning or increases it in the environment), is higher than the value of the construction placed, i.e. effectively consolidated by the building (Roca, 1986) plus the value of the existing building (including the cost of demolition). So, the "historic" density is replaced by a "current" one.

However, the redevelopment doesn't involve only an "upgrade" of density, but a change in the buildings typology, meanwhile the net density corresponds to each type of architectural structure. If we combine the fact that new buildings incorporate trends in tastes, habits, needs and possibilities of contemporary society, the result is a radical transfiguration of the city. That may be greater if the area is endowed with new facilities and infrastructure under public or private treasuries, therefore, generating a comprehensive redevelopment impact on the socio-professional structure of the zone (i.e.: gentrification).

The aim of this paper is to try to measure the impact on the spatial formation of the values produced by the residential redevelopment of parcels (generally single-family homes) to create high-rise condominium buildings (usually multi-family) with some characteristics of gated community. The main purpose of this research is whether if this impact is homogeneous throughout the city area, or conversely, tends to benefit a particular socioeconomic groups. Also discusses how this impact decreases with the distance and whether there are economies of scale.

With these objectives in mind the rest of the paper is organized as follows: 1) first, describing the types of high-rise condos within the Common-Interest Housing Communities framework proposed by McKenzie (2003); 2) then, reviewing the specific literature that has tried surveying the impact of these new housing developments on urban values; 3) in the next section, presenting the case of study, data and the model used; 4) then, discussing the results and 5) finally, summarizing the work done.

II.- Common Interest Housing Communities and new forms of private promotion in Latin America.

High-rise condos (HC) that have certain gated community characteristics could set in context of the Common Interest Housing Communities (CIHC) proposed by Evan McKenzie (2003). According to him, to this category would belong from gated communities to condominiums, including the townhouses[2]. These developments share certain characteristics, namely: 1) shared ownership buyers are the exclusive owners of certain units (e.g. apartments) and to share indivisible common service areas (e.g. swimming pools); 2) land use controlled by the private road, the acquisition involves the acceptance of a set of rules ranging from uniform architectural treatment (including the private units) to lifestyle aspects (e.g. around playing golf), behavior, ethnicity, religion, and even the age of residents (Bellet, 2007); 3) private management, homeowners associations are formed (known as communities, condominiums or simply homeowners associations) which are managed independently by the owners and sometimes with the support of legal professionals, management, accounting or architecture, and 4) safety measures such as access control, surveillance and internal walls.

Unlike the townhouses and gated communities, high-rise condos are usually located in both kinds of urban soils, in vacant ones and in those that are redeveloped; while private management is limited to the administration as opposed to what happens in large suburban developments where they often take their own powers of local governments, becoming in a private governed communities, and therefore have an important sociopolitical implication.

While this type of promotion have in the U.S., the “fortified nation” (Blakely & Snyder, 1997), its higher expression (it is estimated that in 1998 14.6% of housing in this country was in a CRIC - McKenzie, 2003), this "lifestyle" (or mode of real estate production) has spread throughout the globe. Latin America has not escaped to this process and it has exacerbated due to increased inequality in the distribution of the rent (Coy & Pöhler, 2002), increased public insecurity, inefficiency of local government in providing services and the historical process of privatization of public spaces from the colonial cities to the current (Sheinbaum, 2008). The Latin American urban model is characterized by three features: (i) an apparent gradual decline of the state, not only by the dismantling of the social system and its ability to redistribute revenue purposes,

[2] In North America this term refers to the suburban developments of houses which emulate single or pair-family homes, generally small size, with the living room and kitchen on the ground floor and couple of bedrooms and a bathroom on the top floor.

but also to its loss of leadership in the urban planning processes (Janoschka, 2002) and worthy housing production, (ii) the gradual replacement, in this sense, has become real estate capital in the construction and reconstruction of urban areas (De Mattos, 2002), often speculative (iii) lack of private solidarity practice in the construction of collective spaces, probably associated with the European Latin tradition, based on the prioritization of the individual construction of the city and the empowerment of home ownership as a mean for the historic proposed to strengthening family interests over the commons (Arbacia, 2008). These structural processes, coupled with the term associated mainly with the economic crisis that the region has experienced in the past two decades have led to a specific evolution model of territorial occupation. Ribeiro and Lago (1995) the sum of (i) a decrease of large cities in favor of the intermediate, (ii) the emergence of a new form of socio-spatial segregation, and (iii) the occurrence of upper classes where previously was only low ones.

The above processes are embodied in certain forms of the city that reproduce the social division of space:

- In one hand are the CRIC private ventures type, with a considerable dimension, targeting the elite and with a horizontal format (e.g.: countries clubs), but cattle that have diversity in location, social profile, size and format (e.g.: high-rise condos), and in the other one have taken the side of gated communities to recreate specialized "models" of community life, giving a sense of security, showing a thematic lifestyle or simulating natural areas (Bellet, 2007).
- Following are the private enterprises but sponsored by the state who delegate on the first ones its responsibility for housing provision. These “precariopolis” (Hidalgo, 2008), would be characterized by mono-functional spaces, segregated, fragmented and with limitations in the provision of basic urban services. So, Rodriguez (2006) has called them the landscape of exclusion: massive production of cheap housing, closed roads and houses without corridors, where social housing, poor in size, design and quality, suggests a new socio-spatial configuration of the territory, landscapes and architectures of exclusion.
- In addition to the two previous relatively recent forms, coexist two more historically related, first with the informal production of housing (on illegal land), persistent despite (and sometimes because of) by the legalization-improvement programs, basically aimed at low income groups without regular incomes or (Botelho, 2007), where the big business goes to the lot-owner (Smolka, 2003). Then there is the housing auto-provision/production abundant in the middle classes, but has been

languishing along them; on par with the emergence of the mortgage system has allowed them to purchase completed homes.

Chile not immune to these major processes, and as the development of condominiums regards, they have adopted, when they are located in central districts, the facet of high-rise buildings. "In contrast to what happens in the U.S., the Chilean CRICS are not only often located in remote suburbs with low population densities, but they do in relative well urban areas where their inhabitants are only separated by a wall and a street coexisting with the poorest neighborhoods of the city "(Salcedo & Torres, 2004, p. 27). This spatial "coexistence" between low and high income groups generates a very interwoven mosaic that is rarely seen in most developed occidental cities and that, at a certain scale, might to seem a low spatial segregation, masking in the background a social exclusion processes (Sabatini, Cáceres & Cerda, 2001). So, as these authors have found for Santiago, at higher incomes average of the sector higher the socioeconomic diversity of the people, just as occurs in Maceió, Brazil (Marmolejo & Batista, 2008). This geographical proximity between rich and poor has been deeply appreciated by Caceres & Sabatini (2004) as a potential to reduce social isolation; in the meantime will generate job opportunities for the poorest inhabitants (e.g. domestic services), retail trade and other types. On the other hand it generates a dynamic for the sector, because although most of the benefits (in equipment and infrastructure) are beyond the enjoyment of neighbors, new services and facilities in the vicinity as a result of the increasing of localized demand. Also, Salcedo & Torres (Op. cit) argue that the dignity of neighborhoods is enhanced when they lost their stigma signs (e.g. in terms of drugs, crime and poverty) who once owned. Through a series of in depth interviews with neighbors of a Huechuraba CRIC (recently incorporated into the metropolitan area of Santiago), these authors have found that "the residents identified some aspects that have improved the conditions of the population and helped them to a fully integration to urban modernity [implementation of street lighting, drainage, drinking water and malls]. The most cited advantages of gated communities can be classified into 4 domains: improving quality of life in the area, better job opportunities, reducing the stigma of living in a poor district, and increased value of their land"(p. 33). "Despite their low educational level residents show a great understanding on the revaluation of the land in his district. Many people understand how speculative land market, and expected potential benefits from the sale of their land "(p. 34). Sabatini & Salcedo (2007) have repeated this same exercise on a set of peripheral municipalities of Santiago (Peñalolén, Huechuraba, La Florida and Puente Alto), finding that "the walls have not prevented the establishment of functional links between groups on both sides thereof. Residents of gated

communities do not consider that the "villagers" (a term used to refer to the original settlers of limited resources) are "hostile people" ... therefore, have no problem to buy the shops of those low-income residents or employ them "(p. 590). While this welcome is not always extended to the entire original population (see Figure 1).

Fig. 1 High-Race condos under contruction and local protests in Ñuñoa

Source: Aguirre & Marchant, 2007

So when the CRIC are scattered around the city (outside the districts traditionally occupied by affluent households), despite its walls, act as semi-open borders between different social groups (Sabatini et al., 2001, Sabatini & Salcedo, 2007).

While there is general consensus among academics (Caldeira, 2000; Judd, 1995, Low 2001, 2003) about the negative impact resulting from the CRIC to the integral construction of a virtuous civil society, seem to have private benefits that are reflected in the value of buildings that fall into this class as well as developments in the neighboring buildings as discussed in the next section, although persist doubts whether these benefits are distributed uniformly in space.

III.- New development impacts and its types on residential values.

Several studies have shown that the characteristics that define the CRIC generate a market premium on property values. Bible & Hsieh (2001) found, using a hedonic pricing model (PH), which the houses inside a gated community (GC) in Shreveport Louisiana worth, all else equal, a 6.07% more. LaCour-Little & Malpezzi (2001) decomposed a value increase of 26% of homes in St. Louis GC by 17% produced by the existence (and good management) of a neighborhood association and by 9% by the existence of walls and access control, thus concluding that empowerment should not be solely or primarily to the closing of the developments, but the efficiency in the provision of internal services and the ability to decide on them. Shelter (2007) found, using a model of PH, for a set of GC in Mazatlan (Mexico) a revaluation between 9.24% and 9.89%. Pompe (2008) using the same methodology of PH analyzed the prices of a sample of houses near Charleston, South Carolina, concluding that the premium of these was from 18.6%. With a different methodology, based on interviews with experts (Real estate agents) from Los Angeles, Le Goix (2005) has suggested that the increase in value is 10%

So, those households inside the CRIC, especially in the GC, worth more than, all else equal, those located outside, although the maintenance and management costs are higher. Thus, exclusivity or exclusion (and thus reducing congestion, pollution and *free riders*[3]), social prestige, the feeling of security and other efficient Self-care services under public management, seem to be behind most WTP demand. Pompe (op) and LaCour-Little & Malpezzi (Op. Cit) have added further that the higher typological regulation, land use and even the rules of behavior within the CRIC, increases the certainty about the future value (acting as a sort of insurance) and therefore reduces the risk of depreciation of real estate assets.

However, little or no attention has been given to analyze the impact that these developments generate in their neighborhoods. A not less impact when it comes from a redevelopment processes of atomized parcels in the built soil (e.g. vertical condominiums), and therefore most likely to generate conditions in large areas. In any case, the quantification of this impact is important for the proper evaluation of urban projects from a public perspective, meanwhile affect the collection basis of taxes linked to property, and taken to the social extreme,

[3] Refers to those who enjoy a service of a public good (e.g. a park) at the expense of others who pay for their maintenance.

could democratize the property values spatial formation with the revalue of the assets of lower income groups. [4]

From a theoretical perspective we can define that the impact is associated with four distinct issues:

1. The improvement of the urban landscape created by the new quality of edification and the provision of small infrastructure (outside the development but paid by the developer) produces an effect of externality that is internalized in the value of the site from thirds.
2. The arrival of new settlers, usually with a higher purchasing power than the original population, produces a social restructuring that may involve a process of gentrification.
3. The located increase of settlers generates an increase in demand for services that might appear new providers in the vicinity.
4. The property dynamics of the areas to be redeveloped affects the perception of the owners of land (or buildings built) who see increased their expectations of revaluation.

This research assumes the hypothesis that all this above exposed, generates a revaluation of buildings surrounding the parcels on which they stand this kind of high-rise condos[5]. This hypothesis is part of Segal (1977) who suggested that concentrations of new housing units had a high probability of impact on neighbor property values. An early work which quantified this impact is that of Simons et al. (1998). Thus, by analyzing sales prices of duplexes[6] and single family homes in Cleveland and by using a HPM the authors found a positive impact. Specifically for each new home built, within a radius of two blocks residential, the value was increased about 670 U.S. dollars (1.9% of average household). Also, following the work of Can (1990) confirmed that this impact is not stationary across space. However, this first job left open some questions of great importance: a) the impact is independent of the size of new developments?; B) how fast the effect decreases in space?; C) affects more poor neighborhoods?; d) depends on the typologies of the new construction? In a follow article Ding, Simons & Baku (2000) attempted to answer some of these challenges. Using the same HPM method (although with outdated spatially

[4] McKenzie, 1994 has also raised concerns that, from the perspective of supply, the many restrictions imposed on households, contribute to better control the future value of the parcels through the control of potential negative externalities.

[5] Although the effects of the high-raise buildings can be negative the when there are not accompanied by improvements in infrastructure, causing congestion, while shadows and loss of visual privacy of surrounding houses.

[6] Duplex homes in America are those that accommodate two homes in the same building structure.

variables) and also with data from Cleveland but only of houses, the authors found that: a) small developments had little or no influence on the values of the environment, b) the influence hardly extends beyond the 91.44 m (300 ft), c) the revaluation is greater in neighborhoods with low-income population as well as those dominated by Caucasians.

The impact may be greater when the new building is constructed in replacement of degraded areas. In this line De Sousa et al. (2009) have measured the impact of the regeneration of industrial sites (usually contaminated) promoted and, in part, funded by public entities on the value of neighboring houses in Milwaukee and Minneapolis. By two hedonic pricing models (one before and one after regeneration) have found that homes values were increased in 11.4% and 2.7% respectively. Although the impact was greater when the feedback was intended to build houses or parks and no new industry or commerce. Is not a surprice that the impact is so large in the case of a radical change in which negative externalities are replaced with positive ones. A similar conclusion was reached Noonan et al. (2007), but have stressed that this positive impact is intermingled with a change in the socio-professional composition and quality of residential park produced by the attraction of the people to an environmental improvement.

IV.- Case study, data and model

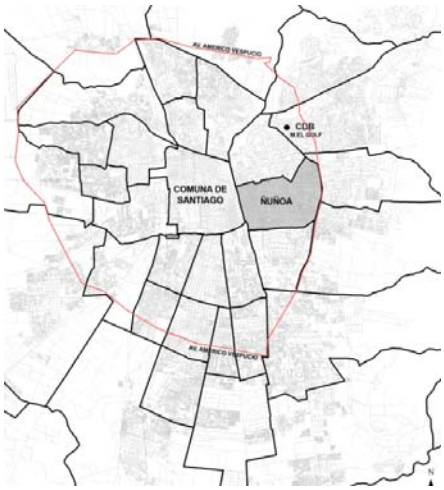
1.- Transformation Ñuñoa and condominiums in urban vertical

Ñuñoa is one of the 52 counties (municipalities) of the Metropolitan Region of Santiago (32 in the "Great Santiago"). Has an area of 16.9 km2 and according to the 2002 Census has a population of 163,511 inhabitants in 52,884 households, resulting in an average of 3.09 persons per household. The Socioeconomic status of its residents is rather medium to medium-high, so we can say that this is a district with an unusually diversity in the socioeconomic structure for Greater Santiago, where there is a predominance of groups of middle and upper middle income, if while there are poorer areas. Specifically, data from Census 2002, the socioeconomic structure of households in Ñuñoa, following the conventional classification of Adimark (1999) is: ABC1 High-income (32%), C2 middle-high income (35%), C3 middle income (17%), D lower-middle income (14%), and E low-income (2%)[7].

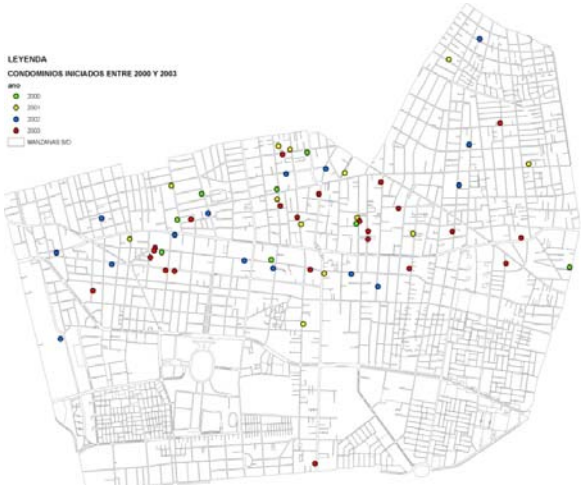
[7] Indicator of socioeconomic group: ABC1 = High; C2 = medium high, C3 = Medium, D = Medium-low, E = low; This indicator is made by combining the level of "the boss" training of the household and tenure a set of tangible

Fig. 2 Localization of Ñuñoa and the High-raise Buildings in study

Location of Ñuñoa in the Great Santiago



Location of the High-rise condos studies in Ñuñoa



Source: self elaboration

But this social structure is in transform. Since the early 90s, pericentral communes of Santiago de Chile[8], have developed a significant change in their building typologies, and socioeconomic groups to which they are leaded. This change is seen mainly in Ñuñoa, where it begins to densify parts of his the districts since 1990, with the construction of high-rise condos in areas that were dominated by single family homes (up to three plants), considering that the buildable capasity was materialized in 0.46 m2t/m2s at 2001.

This transformation is caused mainly by changes in local regulations, which progressively have been densified such districts, and the nature of the existing lots, usually of large size, which are attractive for property investment, especially if they have a fusion (merge) because that, under the current planning legislation, increase their buildable potential[9]. The typology of these condo projects is high-rise buildings, with various internal services and access control. These projects are inserted in areas of low density types, establishing a

property. These goods, collected from the Census, are 10: shower, color TV, refrigerator, washer, heater, microwave, automotive, cable TV or satellite TV, computer and Internet connection.

[8] It is called "pericentral" to 11 communities that share their administrative boundary with the municipality of Santiago, which is the functional core of the historic city. Furthermore, the expression and those enrolled between the first ring, Vicuña Mackenna planned for mid-nineteenth century and the second ring in the 60 planned in the first metropolitan plan (Aguirre & Marchant, 2007).

[9] Article 63, Ley General de Urbanismo y Construcciones.

major impact on the lives of concurrent residents[10], although the impact might be greater in the case of peripheral municipalities with a significant amount of marginalized populations.

Fig. 3 Images from a vertical condo in Ñuñoa

Street view

"It highlights the opaque perimeter closure (up to 30% by law), as well as the presence of low-rise houses in the neighborhood"

Parking

Piscina

Private greenareas

Gym

Sala de estudio

Games room

Source: www.portalinmobiliario.com

The condos, as required by building regulations in Chile, only mitigate road impacts, presenting only one environmental impact statement that sets out the minimum, and zero in some cases, mitigation and compensation of other possible impacts. These projects are presented as real estate products that incorporate within their attributes: private green-areas, swimming pools, laundry, meeting room, barbecues, mini-cinemas, and private parking lots (See Figure 2). It can be said that much of the activities that once took place in the public spaces of the city (even private) were now concentrated inside these condominium spaces with ownership and excusive use, this is the main feature by which the Condominiums can be categorized as CRIC. This research studies the impact on the price of houses in the vicinity of 59 of those HC in whose construction began between 2000 and 2003. These condominiums, as shown in Table 1 have an average area of 7651 m2, ranging from 1,700 m2 approx. up to 42,000 m2, with heights ranging from 5 to 19 levels, and a number of apartments ranging from 20 to 393 units. Table 1 also details the vast majority

[10] We recommend the documentary film Ignacio Aguero, "This is when" 2003 which chronicles the lives of people in the Dr. Johows street, during the years 2001 and 2002, Ñuñoa.

of dwellings (78%) and condominiums (81%) are aimed for high income households (ABC1), while the rest for upper-middle income households.

Table 1 Characteristics of the High-Condos in study

VARIABLE	N	Min	Max	Media	St. Desv.
Build area (m2)	59	1.739	42.560	7.651	5.984
number of levels	59	5	19	10	3,9
number of apartments	59	20	393	74	64
initial year of construction	59	2.000	2.003	2.002	1,1

	Housing	Housing (%)	HC Buildings	HC Buildings (%)
Offer to high incomes groups (ABC1)	2.695	78%	38	81%
Offer to med-high incomes groups (C2)	752	22%	9	19%
	3.447	100%	47	100%

Note: the segmentation of the offer by socioeconomic groups is owers and is based on the new apartments offered price (when it was available) and the purchasing power of groups.

Source: New build works permits (Ñuñoa district) and www.portalinmobiliario.com

2- Model

As seen in paragraph 3 above, with few exceptions, the method used in the literature to assess the impact of the new construction and of the CRIC is the HPM. This method, belonging to the family of revealed preference, assumes that the value of assets implies the marginal value of their attributes (Bøjner, 2003). In practice, it uses the value of the buildings to infer, econometrically, the marginal value of externalities, once the rest of locational attributes and housing complexes have been controlled (Lancaster, 1966). Thus in a model like (1), where the dependent variable P is price and covariates k are n builts and location attributes, (including the presence of vertical condominiums in the neighborhood), you would expect a positive sign of the coefficient k_R that affecting it, if the revaluation hypothesis is confirmed.

$$P_i = f(k_1, k_2, ..., k_n) \quad (1)$$

As shown the main strength of the method is that infers the implicit price of environmental attributes from the actual behavior of individuals in the market. However it has some limitations:

1. *In relation to the specific property market*. In theory, if individuals might to see unmet his expectations, they would have to sell the house immediately and seek another one, thus adjusting the price (Feitelson, et al., 1996), which does not happen because the significant transaction costs (e.g. changes, taxes, commissions, legal services, etc.).. The main assumption of the method is that one person, in order to maximize their utility, would have to choose those goods whose attributes have a marginal value coincident with its marginal WTP for each one (Rosen, 1974). Which, in fact, it is difficult to occur because they are difficult to assess simultaneously and all the attributes that belong to the property with enough depth, and also have at their disposal a large enough supply.
2. *Regarding the econometric analysis*. There are also problems relating to: (i) the origin of information (e.g. using price data built for other purposes), (ii) absence of socio-demographic characteristics of buyers, and (iii) costs of the econometric problems in the specification and / or omission of covariates (as shown by Bateman, et al., 2001 in his study of Glasgow), especially in this case the noise because the areas are usually noisier, also the best served.
3. R*egarding the significance of the evaluated externalities*. This method, used cross-sectional data, does not see the increase extended in value over the neighboring buildings is due to an increase chrematistic expectations generated by the proximity of a new real estate development, and to what extent are due to the appreciates demand externalities generated by this new urban development or related services.

Specifically, the model used in this article is as follows:

$$Ln(P) = B_0 + \sum_{v=1}^{n} B_v V_v + \sum_{s=1}^{n} B_s S_s + \sum_{e=1}^{n} B_e E_e + \sum_{a=1}^{n} B_a A_a \qquad (2)$$

In (2) P is the price of homes surrounding HC, V is the structural attributes of such housing (e.g. surface), S are the socioeconomic characteristics of the home environment, E are the environmental externalities (e.g. proximity to a vertical condominium) and A is the dimension on which are inscribed the measurable covariates the level of accessibility of housing. Note that (2) attempts to explain the value of existing homes, building plots although vacancies exist they would have been a better indicator of the impact of the condominiums. Finally it is noted that the semi logarithmic form of (2) allows direct measurement of the semi-elasticity, i.e. the percentage change in housing prices with a change of one unit of the explanatory covariates.

3.- Data and spatial process

The variable to be explained is the price of used houses (UH) that were sold in Ñuñoa between 2002 and 2004. Note that this type of homes are surrounding by HC. A total information of 1,185 CU has been used, with an average sold price of 3,872 financial units (UF)[11], equivalent to 101,911 Euros. The information of these UH comes from of Property Registry Office (CBR), although the surface of the plot is a self analysis from the digital cartography.

Each one of the 1185 houses was georeferenced in the Grand Santiago plan conducted by the aero-photometric service of the Chilean Air-Force (SAF) in 1998. This same digital map allowed the geo-referenced of the rest of the available information: demographic, socioeconomic characteristics of existing buildings, use and size of local economic activity, and equipment, primarily obtained from the Census of 2002 and available at the level of urban squares (manzanas), and the data of land use and constructability (edification potential) of the current urban planning (Plan Regulador Comunal de Ñuñoa finally adopted in 1989).

On the other hand it has been georeferencing each of the 59 high-rise condos whose "new-building" license was granted between 2000 and 2003[12] (see Figure 1). This information comes directly from the website of the Commune of Ñuñoa. For each condominium information was available the floor area, number of levels, number of households and the market price.

Because the model analysis unit is each one of the used houses (UH) has been necessary to transfer to them the information of the characteristics from their environment. To perform this transfer has been used a buffer area of influence or irregular buffer with the help of a GIS. While all environmental variables were transferred considering a buffer of 300 meters from the edge of the plot as suggested by Acharya and Bennett (2001), to transfer the characteristics of the environment were tested condos different areas of influence to 100, 200, 300, 400 and 500m[13] and 100m concentric rings of amplitude, whose analysis,

[11] UF or Unidad de fomento= Chilean financial unit daily actualized according to the IPC.
1UF = 26,32EUR = 37,04USD. Fuente: Banco Central de Chile al 20 de junio del 2009.

[12] Because the high-rise condo projects studied, are not only deployed in areas where the plan determined more buildable, we infer that is the whole community that is provided by the buildable potential, and that each house has the potential for being redevelop.

[13] For each buffer, the presence of new development of high-rise condos is taken two years cumulatively prior to the date of the transaction of UH (i.e. the UH sold in 2002, capture the buildings whose license was granted in 2000 and 2001).

however, is not reported in this article. It should be noted that those households located in bordering areas from Ñuñoa receive contextual information from the bordering districts. So, as regards to the characteristics of the environment, GIS transcends the geographical boundaries of Ñuñoa.

Moreover, the level of accessibility of UH was evaluated in Transcad, a GIS software specialized in transportation, using the road-net of SAF, considering standard service rates[14]. In this analysis did not consider the subway (metro) because at the time of the study only Line 5 was operative (with 2 stations on the western edge of the commune). In particular we have calculated the minimum distance and time of each UH to: community colleges[15], parks and squares of the municipality, universities, Julio Martinez National Stadium and to the CBD[16]. In addition, there were several indicators of proximity to major routes, calculating the linear meters of main streets (avenues) entered in the buffer of 300m from each UH. To complement the accessibility information was sought from the Origin-Destination Survey 2005 of the Inter-Ministerial Secretariat for Transport Planning (SPECTRA), specifically analyzed the travel time that residents employed in Ñuñoa used to reach their work place.

Finally the purpose of controlling the seasonality (i.e. the increase in WTP of people with the proper time) and the temporal variation in prices (i.e. the price increase after the crisis 97-01) were constructed fictitious variables or dummy for each of the n-1 seasons and n-1 years studied. The descriptive statistics for the variables are in Table 2 below.

[14] Used weight: 17kms / h on avenues; 10kms/h on roads; 3kms/h on passages.

[15] The schools were divided into three sub-categories: private schools, subsidized and municipal, the private being generally, in Chile, have better educational quality.

[16] We considered three points of reference to establish the CBD (Metro station "El Golf"; “Plaza Italia” or Metro station Baquedano and Metro station "Universidad de Chile"), since according to some authors, it has been moving from the center of the capital to the east, currently located in the municipality of Las Condes, in the current "Barrio El Golf," which won this being the best correlation with respect to Ln of the sale price of the CU.

Tabla 2 Estadísticos descriptivos de las variables utilizadas

DIMENSION	VARIABLE	UNITS	N	MIN	MAX	Media	St. Desv.	Source
	Sold Price (UH)	UF (Foment Units)	1.185	236	56.019	3.872	4.744	a
	Ln Sold Price (UH)	Ln UF	1.185	5,46	10,93	7,93	0,76	a
	Price per m2 (UH)	UF/m2	1.185	0,88	55,35	10,72	6,14	a
	Site area square (UH)	m4	1.185	2.152	17.017.357	303.428	1.139.979	b
	Site area (UH)	m2	1.185	46	4125	394,6	384,5	b
	Max. potential constructability (UH)	m2 useful/m2s	1.185	1,2	3	1,78	0,39	c
	Average sales value previous year	UF	1.185	0	18,72	10,31	2,39	a
	Factor low-income grups (+) vs low-income grups (-) 74,8% [1]	factor	1.185	-2,25	2,77	-0,02	0,98	d
	Internal community area indicator(ac)	m2 ac/m2 built area	1.185	0	0,28	0,11	0,06	d
	Quality average	1high - 5 low	1.185	2,99	4,01	3,44	0,17	d
	Max. height buildt	levels	1.185	4	12	8,86	2,94	d
	Year of construction average	year	1.185	1937	1974	1957	7,86	d
	Tax appraisals construction m2 (rateable value)	chilean pesos /m2	1.185	2,36	7,9	5,5	1,02	d
	Gross density average	hab./ha	1.185	18,18	283,27	110,1	27,43	d
	Density built in apple	m2 t/m2s apple	1.185	0,14	0,92	0,46	0,15	d
	Factor Premises.: equipment(+) vs residential(-) 29,3% [2]	factor	1.185	-1,93	6,46	0,041	1,067	d
	Factor Premises: metropolitan activities(+) vs neighbor activities	factor	1.185	-1,43	9,57	0,016	1,014	d
	Factor Premises.: trade(+) vs residence(-) 9,5%	factor	1.185	-1,67	2,84	0,005	1,001	d
	Factor Premises.: cult and entertainment(+) 8%	factor	1.185	-3,09	5,43	0,014	0,982	d
	Factor Premises.: local sports equipment (+) 6,4%	factor	1.185	-3,41	7,40	-0,001	0,982	d
	Factor Premises.: national stadium (+) 5,7%	factor	1.185	-1,62	15,53	-0,011	0,988	d
	Factor use per m2: economic activities (+) vs housing (-) 11,9%	factor	1.185	-1,51	5,09	0,029	1,016	d
	Factor use per m2: activ use (-) vs leisure (+) 8,5	factor	1.185	-2,10	16,01	-0,017	1,006	d
	Factor use per m2: public facilities (+) 7,6%	factor	1.185	-5,67	5,20	0,001	1,021	d
	Factor sup uso: educational (+) 6,4%	factor	1.185	-4,55	4,28	-0,029	0,966	d
	Time to CDB metro station El Golf	min	1.185	10,50	33,51	21,14	4,30	b
	Distance to private schools	m	1.185	5,23	2.413	661	430,5	b
	Average time to workplace	min	1.185	12,82	40,88	23,26	6,97	f
	Linear meters of avenues (main roads)	m	1.185	0	3.876	1.528	833	b
	Dummy UH sold on summer	dummy	1.185	0	1	22%	0,41	e
	Dummy UH sold on autumn	dummy	1.185	0	1	23%	0,42	e
	Dummy UH sold on winter	dummy	1.185	0	1	25%	0,43	e
	Dummy UH sold 2003	dummy	1.185	0	1	46%	0,49	e
	Dummy UH sold 2004	dummy	1.185	0	1	10%	0,3	e
	Dummy presence of new building (HC) buffer 300m	dummy	1.185	0	1	42%	0,493	e
	Number of new building housing (HC) buffer 100m	number of housing	1.185	0	324	10	37,2	e
	new building area (HC) buffer 100m	m2	1.185	0	19.719	955	3.103	e
	Average levels of new building (HC) buffer 100m	number of levels	1.185	0	16	1,12	3,31	e
	Number of new projects (HC) buffer 100m	number of buildings	1.185	0	3	0,129	0,387	e
	Number of new building housing (HC) buffer 200m	number of housing	1.185	0	393	23,65	54,81	e
	new building area (HC) buffer 200m	m2	1.185	0	42.560	2.325	5.075	e
	Average levels of new building (HC) buffer 200m	number of levels	1.185	0	19	2,52	4,58	e
	Number of new projects (HC) buffer 200m	number of buildings	1.185	0	5	0,32	0,63	e
	Number of new building housing (HC) buffer 300m	number of housing	1.185	0	481	44,9	76,89	e
	new building area (HC) buffer 300m	m2	1.185	0	42.560	4.468	7.295	e
	Average levels of new building (HC) buffer 300m	number of levels	1.185	0	19	3,95	5,17	e
	Number of new projects (HC) buffer 300m	number of buildings	1.185	0	6	0,64	0,94	e
	Number of new building housing (HC) buffer 400m	number of housing	1.185	0	517	69,69	102,68	e
	new building area (HC) buffer 400m	m2	1.185	0	48.205	6.936	9.787	e
	Average levels of new building (HC) buffer 400m	number of levels	1.185	0	19	4,82	5,16	e
	Number of new projects (HC) buffer 400m	number of buildings	1.185	0	7	1,01	1,28	e
	Number of new building housing (HC) buffer 500m	number of housing	1.185	0	775	111	146	e
	new building area (HC) buffer 500m	m2	1.185	0	60.928	11.008	13.798	e
	Average levels of new building (HC) buffer 500m	number of levels	1.185	0	19	5,66	5,09	e
	Number of new projects (HC) buffer 500m	number of buildings	1.185	0	8	1,57	1,73	e

Notes:

HC= High-rise Condos, **UH**= Used Houses, **CBD**=Central Business District, Metropolitan activities (industry, supermarkets, offices), Neighbor activities (minor commerce).

Source:

a) Santiago's Real Estate keeper , **b)** Chartography from the Aerophotometric Service (SAF), **c)** Ñuñoa's District Plan, **d)** Census 2001, e)New building permits, f) Origin-Destination Survey Department of Transportation (SECTRA)

Clarification:

[1] Factorial reduction performed with variables of socioeconomic and educational status of the population, obtaining a factor explaining 74.8% of total variance, and negative values indicating the presence of groups of higher incomes-education, and its positive values to lower-income-education

[2] The % at the end of the variables indicates the variance explained by each of these in a factor analysis that attempts to summarize the structure of activities that are intended for the local housing environment studied.

[3] In factorial reductions is expected a mean = 0 and standard deviation = 1, however, during the model development process were eliminated UH traded in 2001, so there are differences in these estimates, however, for purposes of this analysis we consider as negligible the error.

V.- Case study & data results

1.- The impact depends on the size of the condominium?

Best model obtained (Table 3) is detailed in terms of adjustment and conventional assumptions of Ordinary Least Squares calibration (i.e. no multicollinearity, and normality of heterocedasticity of the residuals). This model has two variants that match on all explanatory covariates, except one: the way how the presence of high-rise condos in the existing home environment (UH) was introduced. Thus, the Model 1A only introduces a single dummy variable indicating the presence in a 300 m buffer around the UH of a high rise condo. As shown (Table 3 left), this dummy variable does not enter in the model when it is calibrated by stepwise after establishing a confidence level of 95%. This first analysis suggests that the mere presence (or absence) of condos in the neighbor is not sufficient to alter the function of residential prices in Ñuñoa. Model 1b is trying to demonstrate that the impact on prices of HC in the neighbor depends on the critical mass, and therefore is subject of economies of scale. This introduces a variable that measure the amount of square feet of High-rise condos built in the neighbor of every UH property in a buffer of 300m - new building area (HC) buffer 300-. As shown (Table 3 right) the sign of this variable is, as raised our hypothesis, positive and significant at 95% confidence. The coefficient B (not standardized) suggests that a medium sized HC, approximately 7651 m2 built, increasing the market value of homes located in a buffer of 300m from it by 4.7% (i.e. 7.651 x 6,131 E^{-06}).

The beta coefficient (standardized) allows to compares the importance of different covariates in the explanation of the price of the UH. First, as expected, enters the surface (with positive sign) and its square (negative). The introduction of the square surface attempts to model the principle of diminishing returns, whereby we would expect that from a certain area, the value per m2 of the UH became progressively less, at the same time as it reduces its usefulness for a conventional home. Secondly, in order of importance, is the social composition of the environment. Specifically, the model introduces, component 1 of a factor analysis that summarizes the socioeconomic structure of households Ñuñoa by the synthesis of the income level and study of a home and his boss respectively as a negative. According to the sign of the coefficient that affects this variable, for a higher income level and training of the neighboring homes UH, higher is the price of these. In third place comes, with positive sign, the dummy that controls the higher price of the UH in 2004 as the base year of comparison (2002). Fourthly two variables are related, first the existent buildings density (derived from the Census of 2002) and the area of new development of HC which has already been explained. Also enters the

proximity of private schools, but is interesting because when is greater the distance between existing homes and theme, lower is the price of this. Proximity to educational centers is elitist, therefore, a market premium reflected in home values. While there is no clear causal link between the decision to locate the most prestigious colleges and locational decision of the wealthiest households. In any case, both seem to have mutual externalities, which in the housing market becomes a premium.

Table 3 General Model (variant a and b)

OLS Model	**MOD. 1a**			**MOD. 1b**		
R Square	0,576			0,579		
Adjusted R Square	0,574			0,576		
Std. error of the estimate	0,495			0,494		
Covariable / factor	Unstandardized Coefficients B	Sig.	Standardized Coefficients Beta	Unstandardized Coefficients B	Sig.	Standardized Coefficients Beta
(Constant)	7,035	-		7,081	-	
Site area	0,002	0,00	0,945	0,002	0,00	0,941
Site area square	- 0,000	0,00	- 0,420	- 0,000	0,00	- 0,418
Factor low-income grups (+) vs low-income grups (-)	- 0,148	0,00	- 0,191	- 0,147	0,00	- 0,190
Density built in apple	0,632	0,00	0,126	0,481	0,00	0,096
Dummy UH sold 2004	0,341	0,00	0,135	0,324	0,00	0,129
Distance to private schools	-1,20E-04	0,00	- 0,068	-1,20E-04	0,00	- 0,068
presence of new building (HC) buffer 300m				nd	nd	nd
new building area (HC) buffer 300m	nd	nd	nd	6,13E-06	0,01	0,059
ANOVA						
Model	Sum of Square	df	Mean Square	Sum of Square	df	Mean Square
Regression	392	6	65,41	394	7	56
Residual	288	1.178	0,24	287	1.177	0
Total	681	1.184		681	1.184	
	F	Sig.		F	Sig.	
	267	0		231	0,00	

Dependent variable: Ln Sold Price (UH)

OLS stepwise

So, these models suggest that is not enough to have one HC near to a house, all else equal, to alter the rent function of these. It required that the condominium has some critical mass.

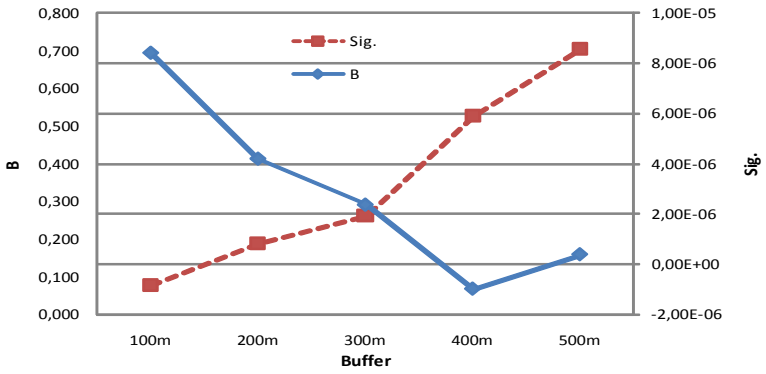
2.- Decrease the impact with de increase of the distance?

So far, the analysis suggests that the presence of condos is important; meanwhile it is internalized in the prices of existing homes. However, we need to explore how this impact decreases in the space that is, analyzing the extent of the spatial impact. Doing so has built a set of univariate regression models, where:

1. The explain variable are the unstandardized residuals from the model 1a, i.e. the model who does not consider in their covariates the new building area of HC.
2. The explanatory variable, for each of them, is the near new building area of HC considering influence areas in buffers of 100, 200, 300, 400 and 500 meters around them.

Simplifying, this approach consist to analyze how decays the importance of the presence of high-rise condos when all other factors that are explaining the transformation in house prices has been controlled. Figure-Table 4 summarizes the results of these tests. It shows with enough clearly that with the increasing of the distance from the UH, the coefficient B of the area of the hige-rise condos listed in the respective buffer declines, while the variable ceases to be significant. In fact, under the best models, i.e. in the 100m buffer, the surface is significant only at 90% of confidence.

Fig. 4 Spatial delay of the impact of the high-rise condos



Statial interdependence	B	Sig.
new building area (HC) buffer 100m	8,4E-06	0,08
new building area (HC) buffer 200m	4,2E-06	0,19
new building area (HC) buffer 300m	2,4E-06	0,26
new building area (HC) buffer 400m	-9,7E-07	0,53
new building area (HC) buffer 500m	4,1E-07	0,70

Dependent variable: Unstandardized residuals from model 1b without new building area (HC) buffer
Source: Self elaboration, independent variable forced into the OLS model (enter)

The above results suggest that the impact of the condominiums is rather short range, i.e. it is a localized externality, because as you increase the spectrum space, it loses bellows variable in explaining housing values, because the sample loses variance when it become homogeny in its presence throughout the district[17].

3.- Is the impact uniform throughout the space?

The final research question tries to identify the variability of the impact of HC along the space. As mentioned before Ñuñoa, like almost all administrative boundaries, is presented as a heterogeneous municipality in socioeconomic terms. Well, is evident that this heterogeneity is been transmit to the urbanized tissues. Thus, it is not difficult to find areas of social housing in vertical blocks of poor quality, coexisting with self-promotional single-family homes or historic urban areas, some with high-quality homes and even artistic value of assets, or other just old. This urban and social heterogeneity suggests that the way how the presence of HC within the ambit of price also tends to change. More background is needed to investigate whether the revaluation of assets founded in the previous sections tends to benefit equally all the original settlers via the appreciation of their founded heritage.

To address this question, unlike the work of Simons et al. (1998) and Ding, Simons & Baku (2000) who proposed a "hard" segmentation of the sample, this research proposes the use of a “soft segmentation". Segmenting the sample, in a "hard" in two or more subsamples for parallel econometric models and then compare their results has three drawbacks: 1) decide how many subsamples to create, 2) decide where to divide, and 3) prevent that the externalities exert on each other dwellings are considered by the models.

Following the work of Paez et al. (2008) was used the geographically or locally weighted regression (GWR and LWR (in ALARA). This method, widely used in geography (Brunsdon et al., Fotheringham, et al., 2002), has been used also in the urban economy McMillen (1996) and in the real estate market analysis (Marmolejo and Gonzalez, 2009). Its main advantage is that determines how the influence of explanatory factors, in this case the impact of HC on their neighboring homes, change and blends over the space, while allowing another great remedy shortcomings of econometric models applied to cross-sectional

[17] Which is evident, from the data in Table 2 for descriptive statistics, splits, for the new building area of CV, the standard deviation of the mean, we have for the 100m buffer ratios of 3, 24 for the 200, 2.18, 1.63 for 300, 1.41 for the 400 and finally 1.25 for the 500m.

studies: spatial autocorrelation (i.e. the influence they exert on each other the objects in study for the simple fact of sharing a spatial neighborhood).

The GWR regress so many observations as are made. In these regressions the importance (i.e. weight) of the observations on the estimation of the parameters B decreases as the distance increases to the pivot point of regression which they are located (a different one for each regression). So the weighting matrix is calculated:

$$w_{ij} = \left\{1 - \left(\frac{d_{ij}}{h_i}\right)^2\right\}^2 \; si \;\; d_{ij} < h_i \;\; alternativamente = 0$$

Where *w* is the spatial weighting matrix, *i* is the pivot point of regression, *j* is each of the N observations in the local regression and *h* is the distance from point N*HT j* (Charlton et al., 2005). When the density of the observations (e.g. existing homes) is not constant throughout the space is appropriate to use a kernel[18] or adaptive sphere of influence, also, that not precondition the geometry of the analysis area, which should not be isotropic from the point *i*.

[18] To determine the size of the kernel is followed by two criteria: firstly that the level of adjustment is maximized, and secondly that in no case be less than 10% of the aggregate sample, for this not to reduce the degrees of freedom of the models.

Table 4: Parameters for the geographically weighted regression model (GWR)

GWR Model		Akaike information criterion	
Coefficient of Determination	0,674	OLS	1.699
Adjusted r-square	0,626	GWR	1.731
Sigma (St. Error)	0,464		

B coeficients - estatistical distribution				Significance tests		
	Lwr Quartile	Huber's M Estimator	Upr Quartile	Local regressions significant at 95% level	Monte Carlo significance tests for B spatial variation (p-value)	
Intercept	6,533	7,057	7,465	100%	0,00	***
Site area	0,001	0,002	0,003	84%	0,00	***
Site area square	-1,00E-06	-4,23E-07	-	49%	0,00	***
Factor low-income grups (+) vs low-income grups (-)	- 0,294	- 0,177	- 0,058	43%	0,00	***
Density built in apple	- 0,425	0,417	1,297	15%	0,00	***
Dummy UH sold 2004	0,038	0,242	0,442	39%	0,00	***
Distance to private schools	-4,39E-04	-2,04E-04	4,90E-05	22%	0,00	***
new building area (HC) buffer 300m	-6,00E-06	3,37E-06	1,20E-05	18%	0,00	***

*** = significant at 0,1% level

ANOVA					
	Suma de cuadrados	df	Media cuadrada		
OLS Residuals	287	8			
GWR Improvement	65	144.13	0,4485	Number of nearest neighbours	119
GWR Residuals	222	1032,87	0,215	Number of locations to fit mode	1.185
F	Sig				
2,086	0,00				

HC= High-rise condos

dependent variable: Ln sold price

GWR Adaptative Kernel

Table 4 summarizes the results and, as expected, being a set of models, locally calibrated (i.e. whose parameters are adjusted to specific local), the overall coefficient of determination thereof is substantially higher than the non spatial model MOD 1b (R2 = 0.626 versus R2 = 0.576). The summary of the distribution of the coefficients (recall that in dealing with many regressions as there are existing homes, there is a different B coefficient for each house) is expressed in terms of upper and lower quartiles and the Huber M-estimator that provides robust half the outliers (see Huber, 1981). As you see the coefficient measuring the impact on the price of existing homes (UH) that each m2 of new construction of high-rises condos (CV) is slightly lower than its comparable non-spatial model OLS (MOD 1b); well, if B in the OLS model is equal to 6.131×10^{-06}, down to 3.367×10^{-06} in geographically weighted version of the same model; this would amount to saying that a mid-size condominium does not add 4.7%

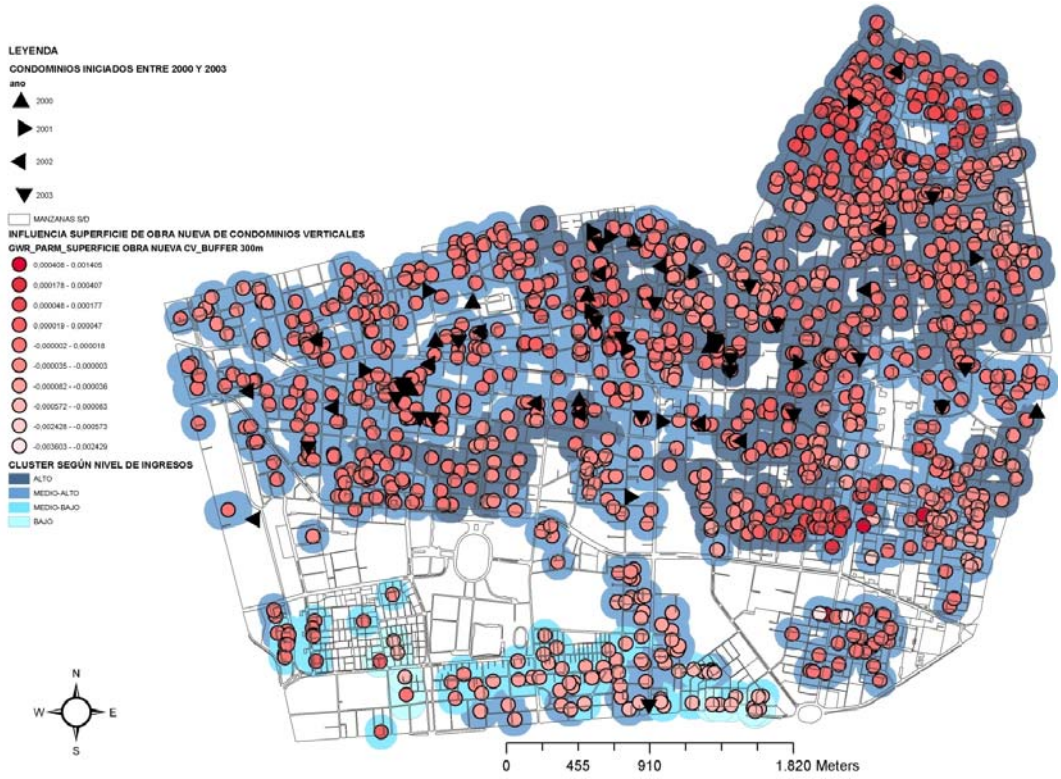
the value of the houses that surround it, as was said before, but only 2.6%, when the local specificities have been taken into account. This suggests that the impact of HC prices on residential neighborhood is not homogeneous throughout the space, so that if one looks at the lower quartile value, seems to have areas where the presence of the condos will not add value to the neighbors, but it extracts it (e.g. by increasing road congestion or shadows). *The point is that virtually all variables have nonstationary effects. This means that the marginal value of each unit of each attribute change over space*. It is likely that improved the explanatory power of the GWR is due precisely to the consideration of these local specificities in the valuation of residential properties. To statistically validate the spatial variation of local factors has been carried out the Monte Carlo test (Fotheringham, et al., 2002). The results (Table 4 right) confirm this conjecture at 99% of confidence.

Table 4 also reports the percentage of local regressions in which the covariate on the surface of new development of HC has been significant at 95% of confidence, as seen only in 18% of them, this covariate is statistically significant.

As we have seen so far, the impact of condominium space on the training of house prices is not uniform Ñuñoa, it is therefore wonder how it tends to vary depending on socioeconomic status of the zones. To answer this question all existing homes have been classified into 4 categories according to the socio-economic area in which they are located. This classification was done using the same analysis factor has been used in the regression models summarized in two main components of the socio-economic and educational status of the district. The factor one (which in fact is one that has been used in the models) on one hand polarized groups of higher incomes, education and the other to the least creditworthy-formed, the component 2, for its part, synthesized the middle classes. The classification therefore has been to make a cluster analysis of k-means by specifying 4 clusters a priori (see clusters in Figure 5).

Once sorted the cases were derived descriptive statistics of the coefficient B-GWR that internalizes the impact of the presence of HC on the price of existing homes. The results are detailed in the Figure-Table 5. As shown there is a concomitance between the income level of the areas where existing homes are located and the relative importance of the presence of condos on the market price thereof. In particular the higher socioeconomic level, the greater the positive impact of the HC on the value of homes. In fact, robust, to areas in groups of lower-middle income is slightly negative impact, which also is relevant given the percentage of regressions in which this factor has been significant at 95% of confidence.

Figure 5 High-rise condos impacts over residential values per socio-economic areas



			Unstandardized Coefficients B in GWR model				
		N	Min.	Max	Huber's M Estimator	St.Desv.	Local regressions significant at 95% level
high income groups	new building area (HC) buffer 300m	545	-6,03E-05	7,00E-05	3,65E-06	2,06E-05	7%
med-high income groups	new building area (HC) buffer 300m	567	-3,60E-03	1,41E-03	4,63E-06	2,03E-04	25%
med-low income groups	new building area (HC) buffer 300m	62	-1,29E-04	3,93E-05	-4,48E-05	4,09E-05	50%
low income groups	new building area (HC) buffer 300m	11	-1,56E-04	2,77E-05	-1,19E-04	5,78E-05	0%
Sum		1.185					18%

HC= High-rise condos

Note: Segmentation of the sample according to an factorial analysis and cluster performed on the percentage of persons by level of education and income

Source: self elaboration

At has been seen, the influence of the condominiums is not homogeneous throughout the space, so that those most richer areas are precisely the ones

benefited. It is no wonder that there is a modestly positive and significant correlation (r = 0.07, p = 0.008) between the price of existing homes and the coefficient B -GWR surface of new building of high-rise condos in their neighbor. Put this in another way, the marginal impact of 1 m2 of HC in areas where housing is more expensive.

Therefore, it is concluded that the construction of condominiums, as in how they're doing in Ñuñoa, perpetuate and may exacerbate the social space division, that in the dimension of the housing market, is reflected in a higher differential prices among the most solvents, which are increasingly less affluent and, increasingly lagging behind in relative terms. *The impact of ñuñoíns condos, therefore, is far from democratic, at the microscale, the spatial distribution of property values in this particular enclave of Santiago de Chile.*

VI.- Conclusions.

The result of the crisis of the state in land use and residential production in Latin America produced a liberalization in the model of housing provision. In this context, and to find solutions to the needs and tastes of groups of middle and upper middle class, have proliferated various forms of Common-Interest Housing Communities, such as gated communities and HC. In some cities, like Santiago de Chile, these developments tend to incardinated in neighborhoods that have traditionally been populated by groups of low incomes, because developers take advantage of the relatively low land prices. Several authors such as Sabatini, Cáceres & Cerda (2001), Cáceres & Sabatini (2004), Salcedo & Torres (2004) and Sabatini & Salcedo (2007) studies the sociological implications of this new form of coexistence, which among many other findings, suggest a revaluation of land owned by the original inhabitants. This research has attempted to quantify the impact that produce high-rise condos, most notably the interest has focused on whether this impact has uniform effect throughout the space, in particular, if you have uniform impact on the value of the assets of the original settlers.

With this objective in mind, a database has being built from information of existing homes that, through a sale, have been transmitted in Ñuñoa between 2002 and 2004. In this information have been added, through the assistance of a GIS, data and context of each house: the level of accessibility, service provision, socio-economic structure, environmental externalities, etc. Just as those derived from the 59 HC whose construction began between 2000 and 2003. On this basis is calibrated HPM, where the dependent variable is the price of existing homes (assumed as the value of the assets of the original

settlers), and the independent context variables including the presence of condos.

The results suggest that a HC of average size, i.e. about 7651 m2, produces a 4.7% appreciation in homes that are in a range of 300m. Furthermore, this impact appears to be affecting the economies of scale, since the mere presence of a condo is not sufficient to alter the role of ground rent of neighboring buildings, is therefore necessary that the condo has a certain critic mass. To analyze the extent of how decreases the impact as you increase the distance from where a HC is located to a house, has a family of models calibrated by the progressive inclusion of those condos that are part of successive buffers of 100m from each house. This analysis suggests that the externality is generated by local type condos, since as the distance increases the presence of condos loses strength, in statistical terms, in the explaining of the prices of the neighboring house.

However, the main finding of this research is the finding that the revaluation that generates vertical condominiums in the heritage of the original population is not uniform across space. Specifically, using a geographically weighted model, and segmenting the sample, using factor analysis followed by k-means cluster analysis, has been found that the condominiums produce a increased revaluation in areas of higher income. That is, areas that are structurally more expensive, where more wealthy people live, are precisely those where the marginal impact of a new condominium m2 is greater. Therefore a redistribution of the wealth in the microscale doesn't occur in Ñuñoa. Quite the opposite, it creates a greater differentiation in the value of property assets that must be understood as a reflection of socio-economic differentiation of space. This impact could be greater if we consider explicitly in the model the socioeconomic profile of new residents who will be in those 59 condominiums (78% of households are high income and 22% of upper middle), given that the socioeconomic hierarchy is the main exogenous explanatory factor in the price of existing homes.

It must be concluded, therefore, that the private model of housing production, characterized by a concentration of condos in the northern part of Ñuñoa, bordering the prestigious district of Providencia, but produces a revaluation of assets that can increase government coffers through property tax, is far from promoting a democratization of the spatial training in property values. The spatial self-organization in a liberalized context, again, demonstrates his ineffectiveness in the social redistribution of wealth.

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