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EDITOR'S NOTE

Cet article est une traduction de l'article *Géographie des prix immobiliers à Mexico : variabilité et hétérogénéité des valeurs enregistrées dans les annonces en ligne*.

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Introduction

- 1 How much does it cost to stay in Mexico City? Approximately US \$ 320,000 - over 6.5 million pesos (MXN) - for an apartment of 120 m² according to the *Global Property Guide* website¹. The median value of housing in the Ciudad de Mexico² is a little over one million pesos according to the *Sociedad Hipotecaria Federal*³, a price which falls around 500,000 pesos (MXN) in the State of Mexico. Finally, an exploratory empirical work on one of the urbanization fronts in the north of the metropolis has made it possible to establish an example cost price of around 300 000 pesos (MXN)⁴, including the purchase of the land, the self-construction of the house and the procedures for post-clearance regularization of title deeds.

- 2 These price ranges are considerable. They show the inequalities of wealth across the metropolitan area of the Valley of Mexico (MAVM) which plays, at least in part, a role in shaping residential areas; they also refer to the diversity of production systems and housing market segments.
- 3 Recent work on real estate price issues has highlighted the transformations in residential real estate production, under the double effect of massive domestic and international capital investment in the real estate domain and a surge in household debt. This double movement is part of the wider process of financialization of economies and urban societies, extending even to the strategies and practices of the households themselves (Le Goix, 2016). The volatility and increased level of speculation which characterizes housing markets is understandable in this context (Aveline, 2008); the standardization of urban forms being currently produced as well - condominiums in peri-central areas, housing developments on urbanization fronts. Thus, the outskirts of Cairo, as well as many Indian metropolitan areas have welcomed huge real estate projects, on public lands ceded to private promoters (Denis, 2011).
- 4 Similar patterns can be observed in the peripheries of Mexican metropolises, transformed by the massive settlement of housing estates on formerly communal land (Salazar, 2014), aimed for the middle and even lower-middle classes. (Duhau, Jacquin, 2008, Rivière d'Arc, 2014, Bidou Zachariassen, 2014). The arrangements and actor strategies at work have been the subject of specific works, both in the field of residential property development (Isunza, Mendez, 2011) and commercial real estate (David, Halbert, 2013, David, 2014): the role of public actors and local political configurations is emphasized, facilitating in both cases the reception of major projects in the conurbated municipalities of the State of Mexico - rather than in the central delegations of the Ciudad de Mexico. The central areas are not, however, abandoned, prestige operations, of smaller sizes, support the processes of social and economic transformations, Latin American way of the gentrification of historical centers (Diaz, 2014; Janoschka, Sequera, 2014). Working-class residential spaces - degraded center, but also pericentre in the process of densification and urbanization fronts - are largely taken in the processes of financialization of the real estate sector.
- 5 It is in this context of strong tensions in the residential property markets that we propose to observe the links between the spatial variations of prices and the forms of social division of space. Differences in prices record the characteristics of the properties but also the qualities of residential contexts - as appreciated by sellers and buyers - and they participate in the reproduction and renewal of forms of socio-spatial division. If these links have already been formalized with respect to other cases of study (Mouillart, 1998, Renard, 2000, 2003, Boulay, Guérois, Le Goix, 2011; Le Goix *et al.*, 2016), they are not linear: the games of property valuation and land rent mechanisms do not apply uniformly; In the case of metropolises such as Mexico City, these links are structured by the coexistence of formal and informal housing markets⁵. To what extent do real estate prices make it possible to grasp the heterogeneity of residential contexts? This is the first questioning behind this work.
- 6 As important as they are in the apprehension of urban dynamics, studies on property prices are confronted with the problem of sources. The generalization of the online real estate listings, on sites grouping the offer of multiple agencies, constitutes a new source whose scope we wish to examine here. This is the second objective of this work, methodological this time: to evaluate the quality of a database constructed with data from online real estate listings.

- 7 In Mexico City, although little invested by geographers, the analysis of housing prices has already been investigated. The first major works on the real estate market, articulated to the stakes of land, were led by O. Terrazas (1996) and by M. Perló and I. Kunz. We owe the latter a diagnosis of the mechanisms of production, financing, and of regulations and housing policies (Perló, Kunz, 1994; Perló, 2002). In line with this work, a first systematic identification of different segments⁶ in the housing market was conducted in the late 1990s, using various paper announcements published in the newspapers, on a sample of terrains and from several empirical studies series (Kunz et al., 2001). The variety of market segments is highlighted, but also their porosity: especially in popular colonies⁷, the consolidation process⁸ can enable the integration into the legal sphere of illegally born assets (see also demonstrations by Azuela, Tomas, 1997; Connolly, 2008; Valette, 2014). Another approach to real estate prices, which is more economical this time is based on hedonic modeling - in other words, the statistical "explanation" of prices according to the characteristics of the property (intrinsic, related to its situation and environment) and services it produces. This approach has led to the identification of submarkets at the scale of the metropolitan area (Sobrino, 2014); at the sole level of new production as well (Valdivia, 2014). Finally, the land and housing prices were punctually mobilized in the analysis of complex socio-spatial processes, such as the study of residential closure (Guerrien, 2004), that of poverty (Eibenschutz, Benlliure, 2009), or more generally of access to housing for the poor (Azuela, Tomas, 1997; Iracheta, Medina, 2008). The issue of working-class housing markets specifically has been the subject of specific investigations, in popular colonies (Jaramillo, 2008) or in relation to the social habitat (see the founding works of M. Schteingart, 2001).
- 8 For our part, we wish to explore the possibility of considering the variability of prices at the level of the whole MAVM, taking into account the different accessible segments, visible through the online ads channel. To do this, we will mainly support a database built on real estate advertisements from a major advertiser in Mexico, Metros Cúbicos, communicated in the framework of a partnership built during a field trip at the end of 2014 - 17,900 records of advertisements of properties for sale exploitable for July 2014⁹. In order to assess the quality of this database, beyond the number of recordings, we confronted it with another ad database, this time collected directly from the website of another advertiser, Realtor¹⁰ - 1950 records for one day of collection in the fall of 2014. Finally, in order to better understand the housing market in the metropolis, several empirical surveys have been carried out amongst real estate production actors in the central and subcentral city on one hand (public and private sector consultants), and amongst manufacturers and sellers in working-class suburbs on the other¹¹.
- 9 First, it will be necessary to briefly recall the context of the residential market in the early 2010s, in terms of types of housing, status and modes of production. Then, the sources from which this market was apprehended in 2014 will be presented. The data thus available will reveal the variability of real estate prices in the metropolitan area, in particular through the entry of different types of settlement.

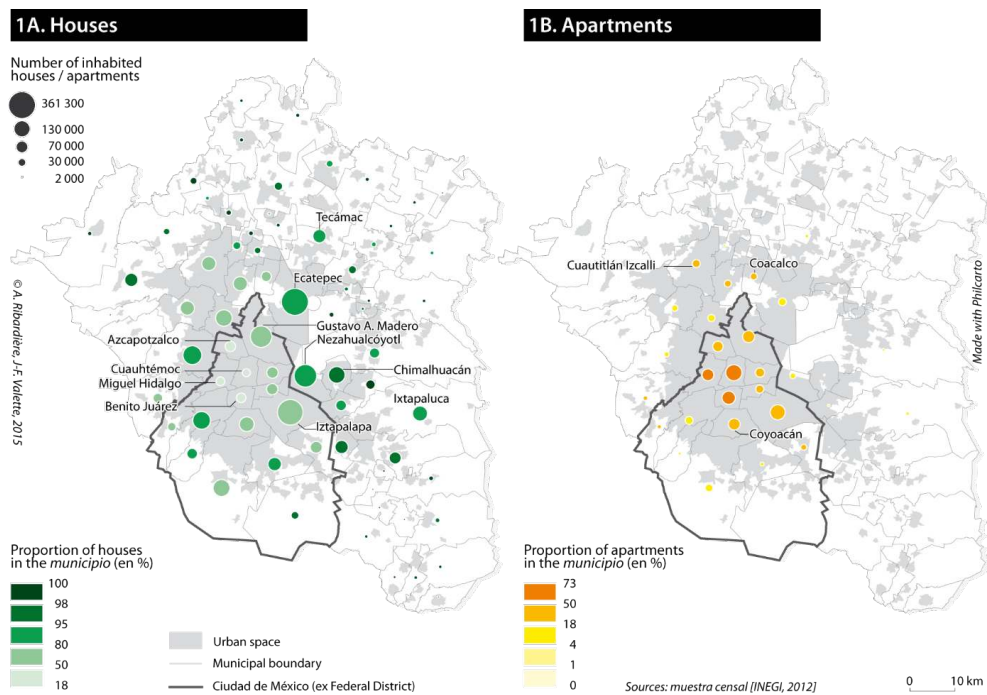
Context: Modes of production of housing in Mexico City

- 10 Without directly addressing the issue of production regimes of housing in the metropolis, it is worth highlighting the main lines which make it possible to apprehend the wide variety of segments of the residential real estate market in Mexico City.
- 11 Features common to Latin America provide the first elements of framing: the logic of a high consumption of space, favoring private property and accommodation in single houses. However, Mexico City remains a dense city: 2,529 inhabitants/ km² if we consider the total administrative area of the MAVM, 8,545 inhab/ km² when considering only the urban area - the equivalent of the density covering Paris and the immediate suburbs. The highest densities are found in neighborhoods of the agglomeration, but also in the popular colonies of the pericentre in Nezhualcóyotl, Iztapalapa, Ecatepec and Naucalpan, where densities more often than not exceed 20,000 inhabitants / km² - the equivalent of the inner-city area of Paris.
- 12 This density contrasts with the predominantly horizontal urban landscape of the city, a legacy of urban growth largely in the form of popular colonies born illegally - involving a slow and limited process of verticalization - on the one hand, the trauma of the 1985 earthquake where the human and political consequences were disastrous, particularly with regard to vertical constructions¹², on the other.

A city of houses

- 13 Despite high densities, the single house remains the most frequent type of housing of the city representing as much as 76% of housing in 2010. The distribution of stocks underlines the weight of the most populous pericentral municipalities - Iztapalapa, Nezhualcóyotl, Gustavo A. Madero and Ecatepec - each counting over 200,000 units (Figure 1A). With lower stocks however, the single house remains the almost exclusive form of housing in the popular municipalities of the North and East - Chimalhuacán or Ixtapaluca. On the other hand, only 4 central delegations see the share of houses be lower than half of the total housing stock - Cuauhtémoc, Benito Juárez, Miguel Hidalgo and Azcapotzalco.

Figure 1. The types of housing in the ZMVM in 2010



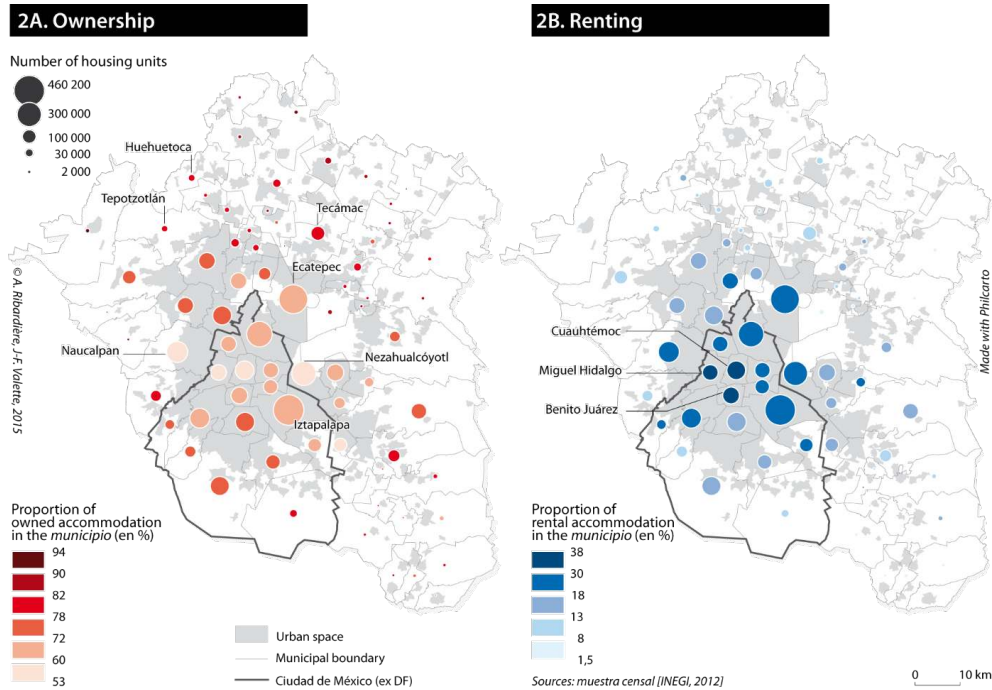
- 14 The stock of 4 million houses refers to several types of production, be they luxury villas, subdivisions for the middle and upper categories, housing estates of "social interest" houses¹³, or houses issue from popular production.
- 15 Apartments in buildings represented close to 19% of metropolitan housing in 2010. Their distribution in the metropolitan area combines the period of settlement and density, but is not limited solely by these (Figure 1B). A classic center-periphery gradient emphasizes the hypercentre, where apartments make up over half of total housing. Their overrepresentation is lower in the pericenter - Iztapalapa - and in more distant suburbs - such as Cuautitlán Izcalli. The variety of locations in the agglomeration refers to that of concerned housing stock: private apartments, social housing buildings, high standing buildings, etc.
- 16 In 2010, almost 95% of the housing units in the metropolitan area could fit in the "house" or "apartment" categories. Between these two main types, there is another figure which is quite characteristic of housing in Mexico City: the *vecindad*¹⁴, described in particular in the works of O. Lewis (1961), as well as other minority types, such as rooms on the roof, non-residential premises, shelters or mobile dwellings.

A city of owners

- 17 There is a 69% ownership rate among the 5.3 million households residing in the MAVM in 2010 (INEGI, 2010). Although Mexico City is historically a city of owners (Tomas, 1995), it is because the different policies of access to housing were primarily aimed at home ownership and not the development of a social rental offer (Coulomb, 1988; Bidou Zachariassen, 2014).
- 18 Property is not the prerogative of the middle or wealthy classes: the poor owners are numerous, particularly in the housing stock of the popular colonies (Duhau, 2004). The

spatial distribution of the owners' weight thus follows a clear center- periphery gradient (figure 2A). The highest relative values are observed in municipalities of peri-urban areas, whether they are villages in the northern and eastern outer city or municipalities more marked by the recent construction of social housing in promotion of home ownership - Tecámac, Huehuetoca. On the contrary, lower frequencies are observed in the hypercentre.

Figure 2. Occupancy status of housing in the MAVM in 2010



- 19 A rental market exists, both in the center, in the condominiums of wealthier neighborhoods as well as in the more popular outskirts. However, it concerns only 19% of households. It should be noted that this proportion increases considerably if one only considers population with recent intra-urban residential mobility, rising to 29%¹⁵.
- 20 Tenancy status can echo several types of residential steps. Tenancy can refer to the characteristic choices of the urban middle classes (to temporarily get closer to employment areas) and upper classes (in downtown reserved residences and real estate programs in the West of the city for example). Thus, the highest tenancy rates can be seen in three central delegations - Cuauhtémoc, Benito Juárez and Miguel Hidalgo (figure 2B). Tenancy is less visible in peripheral neighborhoods and concerns a lower population. Nevertheless, it remains a relatively large market, both in the economy of household owners that offer this service, but also for households that often do not have the means to access homeownership in these same zones (Coulomb, 1988; Dureau, 2000), specifically households which have only been living in the MAVM recently. (Ribardièrre, 2017)
- 21 Finally, 12% of housing in Mexico City had a status of occupation defined as "Other" in 2010. In this category, we find the "hosted" status, reflecting complex strategies where accommodation from a third party¹⁶ - family or not -, lending or even guardianship are frequent statutes for residential careers.
- 22 Despite the effective variety of occupancy status, ownership and the different ways of acquiring housing have a large impact on the residential space of the metropolis and the

structuring of the residential real estate market. The diversity of the methods of acquisition is significant: only 40% of household owners in 2010 bought housing which was already built; more than half were responsible for starting the construction of their dwelling, whether it be a "on command" construction (29%) or self-building (27%). This diversity of acquisition methods refers to the diversity of the forms of production which will now be presented.

Forms of real estate production

- 23 A first typical observation framework of the forms of production of the residential space is based on the legal status (Scheingart, 2001). Since the 1960s, the residential space of the MAVM is schematically broken down into formal housing estates approved and authorized, under the generic name of *fraccionamientos*¹⁷, and in illegal housing estates, the *asentamientos irregulares*. However, the boundary between the two categories is hazy due to the possible forms of regularization for a dwelling created illegally. In addition, this reading grid does not make it possible to reproduce the recent dynamics of densification of the central and pericentral zones, nor the forms of recomposition of the peripheral settlement - linked both to the construction of social housing estates and the abolition of land protection - especially in the state of Mexico¹⁸.
- 24 By integrating the legal status of housing at the time of construction, the actors of production and the type of housing, four types of production emerge, at the crossroads of scientific literature on the field (Turner, 1976, Connolly 1988; Connolly et al., 1991; Scheingart, 2001; Duhau, Giglia, 2008; Dureau, Paquette, 2006; Coulomb, 2010).
- Production on order first. In this process, the inhabitant controls production, finance, but does not invest personal work. This mode of production refers primarily to buildings intended for the upper classes, but also to part of the production in the popular colonies - where construction is ensured by a third party, either a member of the family for the more modest, or an actual company, be it declared or not.
 - Private capitalist promotion comes next. An individual or a company invests in land and construction with the goal of selling and obtaining profit from the operation. As a widespread type of property production in the legal sphere, it refers to property access modes which often involve a credit for households, in essence targeting middle and upper categories (villas, luxury buildings, operations in the center). However, as before, it is not reduced to it. Indeed, even within the illegal market, capitalist promotion is possible and accompanies land privatization strategies and property speculation.
 - Self-construction on illegally occupied land, also known as "self-production" or "social production of housing" [Diario Oficial, 2006, Art. 4.I, 4.VIII]. Depending on the exact case, the allotment may be the result of an illegal transaction with the landowner on non-building land, or an "invasion" without prior agreement. In Mexico City, construction models without promoters, in which the developer owns the land and is the future user of the housing, are mainly seen in the popular colonies.
 - Finally, state-supported production, encompassing a complex set of modalities. Firstly, this concerns the production of social housing for the middle and lower classes, on assisted homeownership. This production refers to two housing stocks: the large constructions started by the State between the years 1950 and 1980, of vertical form; large developments started by private developers in the 2000s, of horizontal form this time. Thus, the State went from being a builder in the 1950s to 1970s, to become more and more of a promoter, or even

merely a "facilitator" (Dureau, Paquette, 2006). The State grants credit for home ownership, but it is companies which buy land, build and sell social housing. This facilitated production is closer to capitalist promotion in the sense that the State only provides a guardianship (Paquette, Yescas, 2009, Bidou Zachariassen, 2014). Only families with a real estate credit (obtained in most cases by having a formal and declared job) can access this type of housing.

- 25 Since the end of the 1990s, the outskirts of Mexico City have been invested by groups of national scale - including Ara, Casa Geo or Trovit - who built giant housing estates (*conjuntos habitacionales*) each consisting of several hundred, or even several thousands of small houses¹⁹. Between 1999 and April 2017, according to the Government of the State of Mexico, there were no less than 330 projects authorized by the urban development services in the municipalities integrated to the MAVM, for a total of 675,000 housing units for a potential population of more than 3 million people (Secretaría del Desarrollo Urbano, Gobierno del Estado de México, 2017). Although popular colonies remain the main type of settlement, the huge scale of real estate transactions has marked a real turning point in the urbanization forms of municipalities of the State of Mexico. Since 2012, however, the numerous bankruptcies of construction companies have led to a marked slowdown of this model.
- 26 At the same time, the center has enjoyed strong land value gains and, especially at the scale of the Ciudad de México, a "diffuse" densification process²⁰, by small projects of fifty houses, of high standing most often. In a context of requalification and gentrification of the central zones (Hiernaux, 2003; Paquette, 2006; Hiernaux, Imelda, 2008; Diaz, 2014), "the goal in the DF is now to build high, heavily and expensively"²¹. The State partially supervises this densification via planning regulations relating in particular to the height of buildings in the central area²² or on the delimitation of specific development areas (such as the ZODES - Economic and Social Development Zones). In this dynamic of densification and verticalization, speculation has led to a sharp rise in real estate values in the central and peripheral zones of the agglomeration, creating a price alignment of the center on the grid of "global" cities and a process of gradual exclusion of the lower classes from the central areas, especially during new real estate operations.
- 27 A city of owners, dominated by the single house, Mexico City is none the less characterized by a very heterogeneous residential stock, which refers to differentiated sectors on the housing market. However, the production form at the origin of the housing only partially determines the segment of the market in which the property is sold. I. Kunz et al. (2001) have previously stressed how the legal form of the transaction is not systematically linked to the production form: Legal private promotion may, on resale, be the subject of an informal transaction, while an illegally erected edifice on land unsuitable for construction, may, once regularized, be integrated into the formal market (Kunz et al., 2001; Abramo, 2008; Ward, 2008; Huamán, 2010; Valette 2014).

From the online ad portal to the databases

- 28 While some agencies have their own ad site on the Internet (Century 21 for example), the most important sites in terms of ad volume correspond to portals which bring together the offers of several agencies, promoters and possibly individuals. This model corresponds in part to the publication of the traditional specialized press (such as *El Universal* or *Encuentra tu casa* in Mexico City); on the other hand, it distinguishes itself by giving both the seller and the buyer an unprecedented ease of comparison, at city level,

or even on the national or international urban network. Ad portals, as a new type of intermediary between sellers and buyers, modify the structure of the real estate market, the modalities of prospecting potential buyers (Larceneux et al., 2014) and, more generally, the construction of the value of "opinion" described by M. Halbwachs (Halbwachs, 1908).

- 29 Databases made from such sources combine the qualities and limits of non-academic digital databases²³: on one side, the possibility of working on exhaustive information at the time of collection, which however describes a population whose sampling is not controlled; on the other, the possibility of geolocalised information with a very high level of accuracy after correction and harmonization work (Kitchin, 2013).

Online ads and georeferencing

- 30 The database used in this article comes from the national ad portal *Metros Cúbicos*: it was communicated to us in the context of a research convention. During the month of July 2014, almost 49,000 ads passed through the *Metros Cúbicos* website, including about 20,000 only for the metropolitan area of Mexico City. In parallel, a second database we created from online ads²⁴ on the international portal *Realtor* is used as a control base. The collection of the equivalent of one day of ads brought together 3,500 ads for the MAVM. These two databases required cleaning, verification and correction work, in particular with regard to the geolocation of the advertisement²⁵.
- 31 In total, 17,859 ads were retained in the *Metros Cúbicos* database and 1,948 in the control database (Table 1).

Table 1. Number of real estate advertisements registered and spatial coverage of the metropolitan area in 2014

	Number of selected real estate advertisements after cleaning	Statement date	Number of units with information*		
			<i>municipio</i>	<i>colonia</i>	<i>ageb</i>
Metros Cúbicos — sale	17 859	july 2014 (1 month)	55 (/76 = 3/4)	1 716 (/6 274 = 27,4 %)	2 230 (/5 666 = 39,4 %)
Realtor – sale (control base)	1 948	october 2014 (1 day)	54 (/76 = 7/10)	802 (/ 6 274 = 12,8 %)	Inadequate accuracy

*: Number of units where at least one ad is observed. In brackets, the total number of geographical units for the given step at the scale of the MAVM and the proportion represented by the spatial coverage of advertisements.

Sources: Metros Cúbicos, 2014; Realtor, 2014; INEGI, 2013

- 32 Neither site being developed with a map interface that could have allowed to collect the geographic coordinates of the ad, georeferencing was performed by address in the *Metros Cúbicos* database, with the colony in the only in the control base. Thus, only the *Metros Cúbicos* database allows aggregation of advertisements on the level of AGEBs (*área geoesadística básica*), census unit used by the National Statistics Institute - INEGI.

Exhaustive collection ... of only a fraction of the market

- 33 A key issue is the representativeness of the base, relative to the overall housing market. From an investigative work on a sample of land in the early 1990s²⁶ Kunz et al. believe that the ads channel (paper) of the specialized press allows playback of 40% of all metropolitan sub-markets, 79% of high-value properties, but almost no lower values, even if 38% of the ads refer to the informal sector (Kunz et al. , p. 29). It is difficult to consider conducting a similar survey work across the whole MAVM, however, the simple spatialization of advertisements collected via the online portals allows us to gauge the over-representation of residential space belonging to the upper category (Figures 3 and 4). The East / West imbalance, major form of the social division of the metropolitan area, appears from the level of municipalities and delegations: Western municipalities – which is mainly where the housing stock for the well-off is located - are well represented in the database, in absolute values and with respect to total quantity of housing in the municipality or delegation.

Figure 3. Urban Landscapes of residential areas well represented in the database



Lomas de Chapultepec, Miguel Hidalgo

Bosques de las Lomas, Cuajimalpa

Landscapes of the Lomas in the Western part of the city, well represented in the database

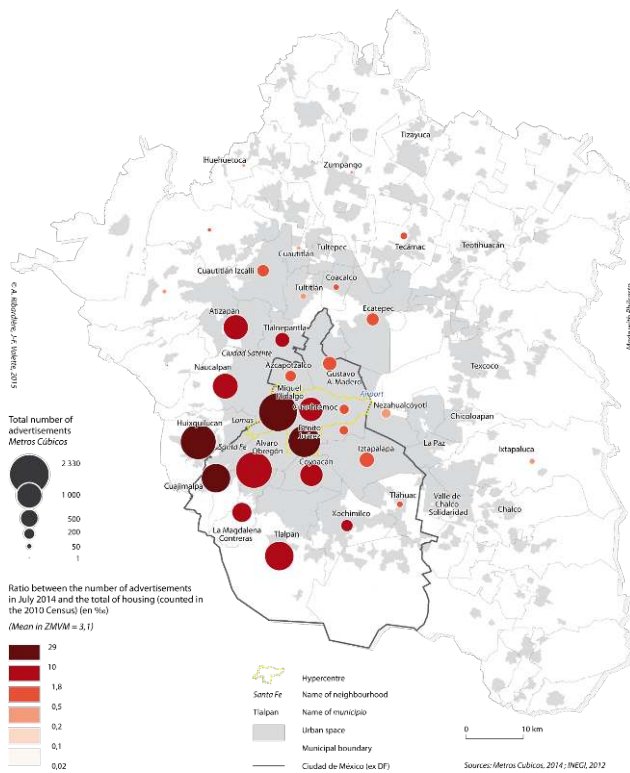


La Condesa, Cuauhtémoc

Júrez, Cuauhtémoc

Landscapes of the Western part of the city-center, well represented in the database

Figure 4. The unequal distribution of ads *Metros Cúbicos* in July 2014 - municipal level



- 34 It is in the delegations of Alvaro Obregón and Cuajimalpa, in which is built the Santa Fe business Park, that ad densities are the highest (Figure 3). Miguel Hidalgo and Benito Juárez, two central and historically "favored" delegations and the municipality of Huixquilucan in the extension of Lomas are also well informed. In contrast, the three most populated municipalities of the MAVM - Iztapalapa, Ecatepec and Nezahualcóyotl (1.2 million units of housing for 4.6 million inhabitants) - are very little present in the base, just like a large part of the North, East and South of the metropolis. The vast majority of housing stocks of these underrepresented areas are classifiable as "working-class."
- 35 We can now make two assumptions. On the one hand, the housing market is less bright in popular colonies than in other parts of the city (Kunz et al., Duhau, 2004). In particular, it is almost nonexistent in the most recent settlements, where housing access mostly comes through access to land and self-construction and through the land market over the real estate market. On the other hand, the existing property market goes through other channels (knowledge networks - family and / or friends - small ads in the street or directly on buildings, etc.). The exploratory talks conducted with popular colony residents have consistently illuminated strength of these networks as vectors of i) information, ii) credit and financial arrangements, iii) transaction security. Advertising opportunities offered by the Internet appear unsuited to the terms of the transactions, as reflect these two excerpts from interviews conducted late 2014, about buying and selling strategies for households.
- 36 *Juán*, residing in Tláhuac says: " it is not in the habits of people here [residents of the popular colonies] to seek accommodation through the Internet (...) Usually, you go by taxi, by bus, or on foot, and you inform yourself. "

- 37 Marisol, resident in La Paz, said that she wants to sell her house on the medium run: "I do not want to go through the Internet, I hadn't even thought about it (...) I prefer selling in person, meeting people (...) In a pinch, with posters on the street, by setting up ads."
- 38 Thus, the process of ads directly affixed to the properties or on the street, with the main housing characteristics (size, name of the neighborhood, price and phone number to contact), remains important for popular housing areas (figure 5). In popular colonies - where ads are more likely to be for land than real estate - or in sets of social housings or in medium-affluent residential areas, market visibility through this channel can be very strong, reducing the interest of using the Internet to read the dynamism of the housing market (figure 4). However, the popular housing areas are not absent from the data base, which is the first sign of the porosity between the different segments of the housing market.

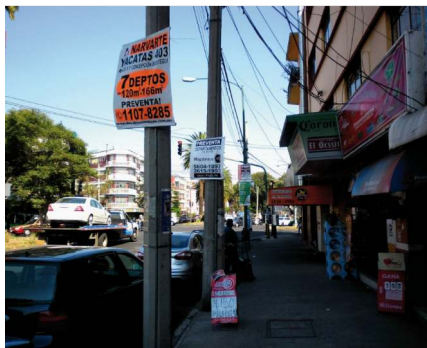
Figure 5. Real estate ads in public spaces



Ad poster to sale a house in a colonia popular, directly affixed on the property. Jiménez Cantú, La Paz, 2014.



Ad poster from Century 21 Agency at the entrance to a gated street in social housing development. Hacienda Cuautitlán, Cuautitlán, 2014.



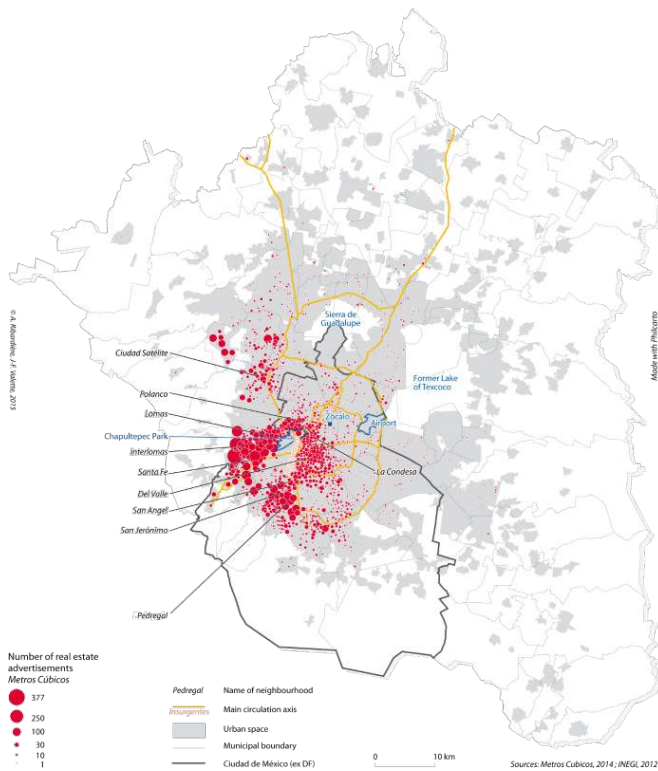
Apartments pre-sale ads in the streets of the colonia Narvarte (new apartments for middle and upper classes). Benito Juárez, 2014.



Ad in the street to resale a house in a social housing development. Santa Elena. Cuautitlán, 2014.

- 39 If the coverage of the database is uneven, the observation grain can nevertheless be refined. At the level of census units - AGEBS - the over-representation of the Western pericentre and of residential areas reserved for higher categories from the West of the city appears even clearer. (Figure 6)

Figure 6. The uneven distribution of *Metros Cúbicos* ads in July 2014 – infra-municipal level (AGEBs)



- 40 The concentration of ads is organized along three main axes: first, the axis corresponding to the wealthy zone of Lomas, starting near the center of the Chapultepec Park until the offset business center of Santa Fe in the West; secondly, a south-southwest axis, starting from the well-off pericentre (La Condesa) to the bourgeois neighborhood of the Pedregal de San Ángel, along Insurgentes Avenue; and finally, an area slightly more densely populated in the Northwest, corresponding to the new city of Ciudad Satélite, built in the 1950s-1960s in the north of Naucalpan, which mainly houses the middle and upper classes.
- 41 The coverage of the rest of the city is much lower, even if the maps testify the presence of advertisements in three quarters of municipalities (Table 1).

Advertised prices

- 42 Even though our interest is more in the analysis of the relative price variability rather than in the appreciation of property prices as such, the fact remains that an important limit for databases built from ads exists in the nature of the recorded price: the recorded price is the advertised price and not the actual amount of the final transaction. This limit is especially important because the gap between the two values varies depending on the properties (Kunz *et al.*, 2001) and also, depending on the time of year and market dynamics. In addition, all property offered for sale do not necessarily find a buyer. However, in the Mexican context as in any contexts marked by widespread tax evasion, it is very difficult to obtain the actual amount for each transaction. The advertised prices remain the only sources which are systematically accessible (Scatigna *et al.*, 2014).

- 43 In July 2014, the median advertised price of a house for sale on the site *Metros Cúbicos* amounted to 6.3 million pesos (Table 2) - or about 358 000 euros²⁷ - which appears considerable in terms of living standards of households. In 2014, the minimum wage in the MAVM is between 1 900 and 2 020 MXN (or around € 110) monthly (SAT, 2014), while the monthly median household income in 2010 was only at 7 300 MXN (440 €) (INEGI, 2010).
- 44 The median price of an apartment amounted to 3.8 million pesos, which is also very important. Through these basic statistical values we find price ranges which are characteristic of a metropolis well inscribed in globalization.

Table 2. Median price depending on the type of property for sale on *Metros Cúbicos* throughout the metropolitan area of Mexico City in July 2014

Type of property for sale		House		Apartment	
		Metros Cúbicos	Control base	Metros Cúbicos	Control base
Price of properties (MXN*)	Median Price	6 300 000	4 150 000	3 800 000	2 300 000
	1st decile	1 650 000	700 000	980 000	550 000
	9th decile	20 670 000	16 979 586	12 350 000	11 680 620
Price of the square metre (MXN)	Median Price	17 333	14 700	25 000	23 160
	1st decile	8 690	7 122	13 949	9 184
	9th decile	32 064	28 531	45 772	45 484

* MXN = mexican pesos

- 45 The comparison with the values found in the control base here is enlightening. The median advertised prices are slightly lower: 4.15 million pesos for a house and 2.3 million pesos for an apartment. In other words, higher prices are over-represented in the database of *Metros Cúbicos*. If the ads are far more numerous in the latter, they are also much more concentrated in wealthy neighborhoods (figure 6). We see here the main bias of databases built from online ad portals: overrepresentation of high prices. Increasing the sample size does not automatically reduce this bias, in our case it's the opposite.
- 46 The announced values can be described by another variable than the price of the housing: the advertised price per square meter. As expected, apartments appear more expensive than houses this time (Table 2). The control base here refers to values much closer: in other words, expensive assets that are overrepresented on *Metros Cúbicos* are also large areas properties; their weight is partly corrected by applying weighting coefficients.
- 47 In general, the area of property accounts for, statistically, almost 60% of price changes for advertised apartments. The relationship between size of the property and announced price is lower for houses (40% of the variance only), reflecting the heterogeneity of the housing stock: the surface of the house doesn't define its price as much as the other features of the property - such as location.
- 48 In total, ad portals allow to build databases across the entire metropolitan area and in so doing, to have unprecedented coverage. Despite the number of ads regrouped (about 18,000 to describe 55 delegations and municipalities and 2,230 census units), the recording densities are very unequal: the basics only describe a portion of the city. However, this selective information does not imply a price homogeneity. On the contrary, variation range is very wide, and raises the question of spatial registration price differences.

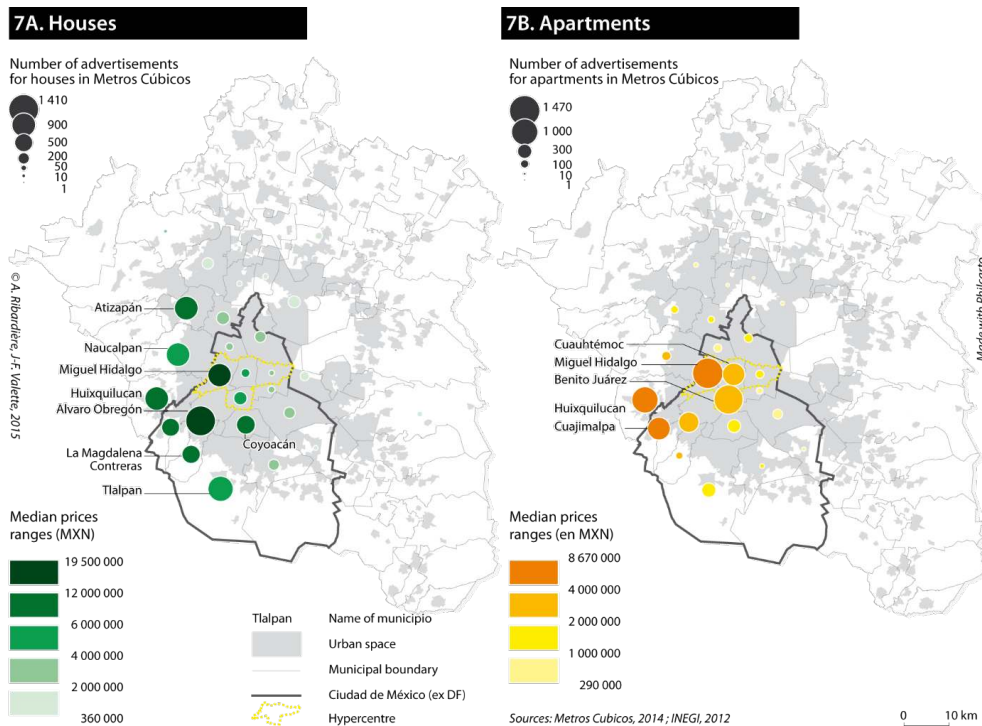
Variations in property prices in the metropolitan area

49 The location of the property can be approached from two perspectives: the geographical localization in the urban agglomeration on one hand, the dominant settlement type in the area where the announcement was registered, on the other. Some figures illustrate the value of such approaches: in summer 2014, the median price of a home exceeds 7.6 million pesos in the Ciudad de Mexico, against 4.8 million in the municipalities gathered in the conurbation of the state of Mexico. Similarly, the differences between the median price of a house announced in residential projects of social interest and that of a house in the wealthiest residential space are of the order of 1 to 8.

Variations depending on the geographical localization

50 The differences between the observed price ranges for houses and apartments are significant enough to warrant the observation of the two housing stocks separately when considering the price of property. Figures 7A and 7B represent the median prices advertised for sale in each municipality and delegation of MAVM. The differences in the distribution of the two types of properties refer to logics applicable to all housing (figure 1), in particular to the overrepresentation of apartments in the central areas. Having said that, even with everything equal in the number of ads recorded, price changes reveal a clear East / West opposition in both cases.

Figure 7. Median Price of houses and apartments for sale on *Metros Cúbicos* in July 2014 - municipal level

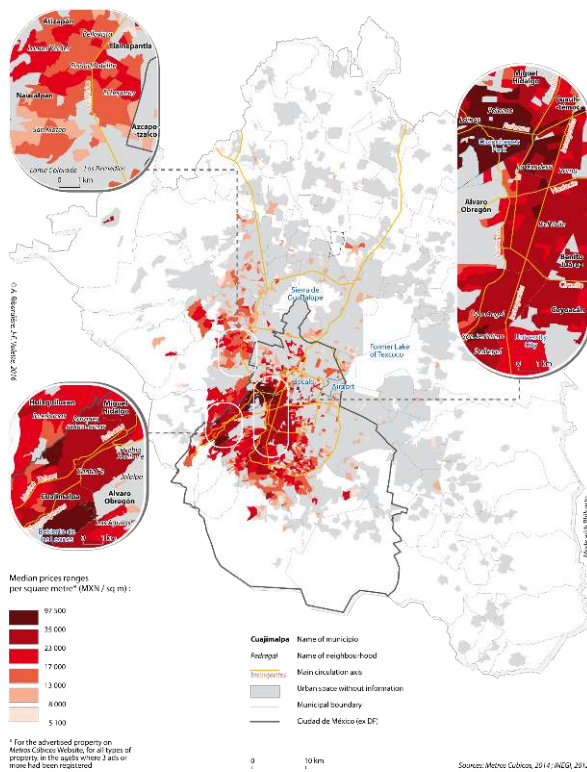


51 The stock of houses for sale is important in the West, especially in the wealthy outskirts around Santa Fe and north of Ciudad Satellite, near Atizapán. The five delegations and municipalities of Atizapán, Naucalpan, Huixquilucan, Alvaro Obregón and Miguel Hidalgo

concentrate 46.5% of the ads - against 12.9% of the total number of houses identified by the INEGI in 2010 (figures 7A and 1). Within the western half where prices announced are higher, there is a center-periphery gradient: median prices are the highest in the two delegations of Miguel Hidalgo and Alvaro Obregón, and they decrease in most pericentral areas (Coyoacán, Benito Juárez) and in the southwest (La Magdalena Contreras), while maintaining a very high level in comparison with the prices announced in the east and north of the metropolitan area.

- 52 The stock of apartments for sale is primarily focused in the central area: the delegations of Miguel Hidalgo, Cuauhtémoc and Benito Juárez alone account for 45.7% of ads - against 28.8% of total apartments identified in 2010 in the MAVM (figures 7B and 1). The East-West opposition detected concerning the advertised prices for houses is even stronger here, especially within the limits of Ciudad de México.
- 53 Geotagging allows ad observations at sub-municipal level, especially for census units - AGEBs. However, there is the problem concerning the representativeness of ads: below 3 recording, we consider that the information is insufficient to describe a given AGEB. In order to observe a maximum of AGEBs, we'll consider two housing stocks together, weighting the announced prices by the surface of the property (figure 8).

Figure 8. Median price per square meter of property advertised on *Metros Cúbicos* in July 2014 – AGEB level



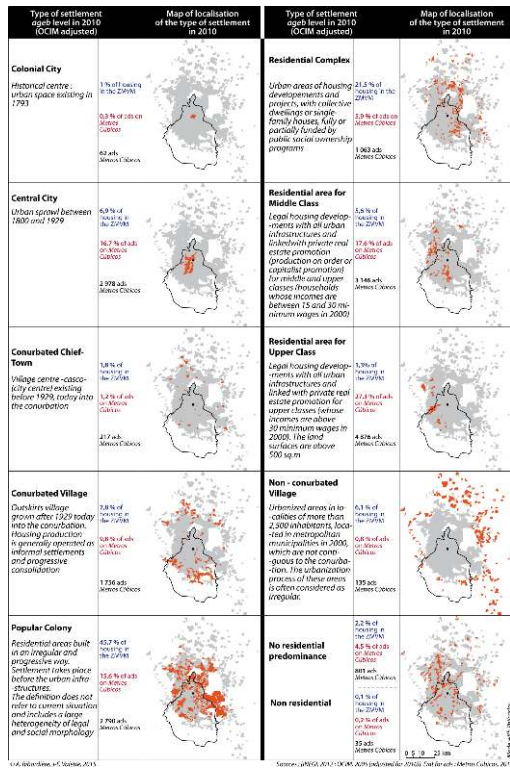
- 54 The first reading level of this map refers to "dips" and "peaks" already noticed in this end level, bearing witness to how municipalities are entered in the database (figure 6). For example, working-class settlement areas in Alvaro Obregón and Naucalpan are virtually excluded (see non-indicated urbanized areas of Pueblo Santa Fe or Jalalpa in the first case, Chamapa, San Jose de los Leones or Loma Colorada in the second case).

- 55 A second reading level refers to the compactness of spatial forms, despite the fineness of the observation mesh. Two lines with very strong values clearly stand out. First, the Lomas of Chapultepec zone, center of upper class housing, in villas and luxury condominiums. Secondly, the Insurgentes axis (from the Condesa to Pedregal) is clear: pericentral, it also possesses very high prices per square meter. Around these two axes, values decrease following a gradient, reinforced by the disconnect between the Ciudad de México and the State of Mexico: on the administrative border, which is very strong in a federal state²⁸, with a marked differential of values for residential real estate, in favor of the capital entity.
- 56 At the scale of the agglomeration, the spatial distribution of the announced price is structured by an East / West dichotomy, coupled to a center-periphery gradient, which form two lines critical to understanding how social divisions belong to the metropolitan space in Mexico City. The spatial differentiation induced by property values actually refer to multiple aspects of residential space production patterns and of the morphology of the construction, which can be designated by the more general designation of "types of settlement", to use terminology adopted by the Mexico City Observatory in 2005 (*Observatorio de la Ciudad de México - OCIM*) (Connolly, 2005).

Variations according to the types of settlements

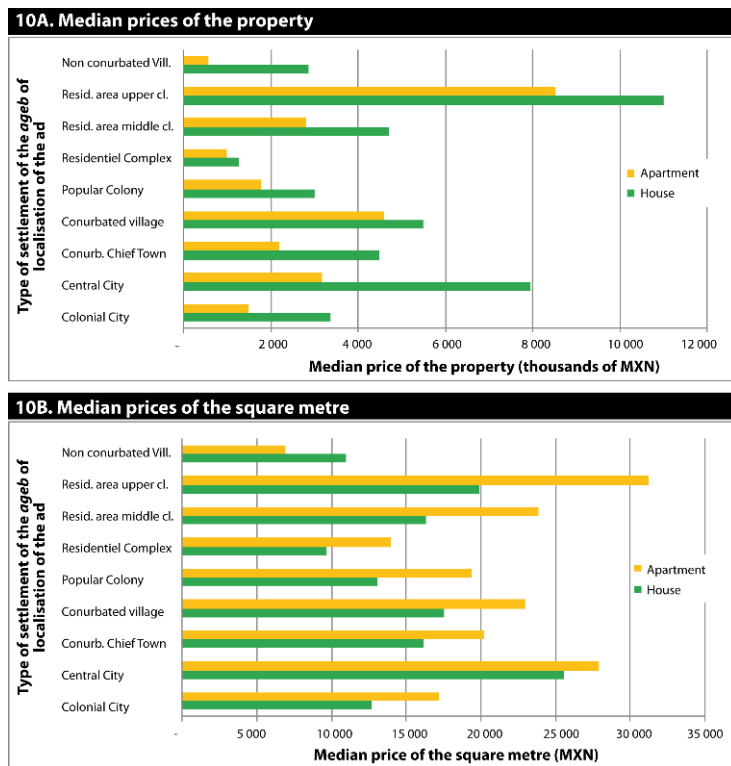
- 57 Considering both the morphology of the housing stock, age of settlement, density and legal conditions of their production and the actors involved, the OCIM has succeeded in the publication of typologies describing the metropolitan area between 1990 and 2000 at the level of the AGEB - each AGEB is characterized by the dominant type of settlement. We relied on this typology, which we have updated and adjusted for 2010²⁹ (see Appendix).
- 58 With the ads disaggregated according to the type of settlement of the AGEBs where they were located, the considerable overrepresentation of upper residential space is clearly apparent: this type of settlement represents just over 1% of the housing of the metropolitan area, but over a quarter of online ads on *Metros Cúbicos* (figure 9). Conversely, the under-representation of popular colonies is evident (45% of homes and 15% of ads), as well as that of "social" residential complexes (6% ads and over 25% of homes).

Figure 9. Types of settlement in 2010, distribution of advertisements and price of property in 2014



59 The median price differences recorded in each settlement type is discriminant: the relationship between the two extremes – wealthy residential spaces on one side, housing complexes on the other - is of the order of 1 to 10 (figure 10).

Figure 10. Median price of advertisements by type of settlement depending on the type of property in July 2014



Sources: Metros Cúbicos, 2014; OCIM 2005 (adjusted).

- 60 The advertised price of homes is extremely high in the residential space of upper categories: this is due to the considerable size of properties being sold – when adjusted per square meter, the prices are similar to those of the central zone. However, the price of apartments remains high per square meter: the "entry ticket" into these residential areas is particularly expensive. These price levels appear exceptional, especially with respect to those observed in the “middle class” residential space: the difference between the median price of a home in the two housing stocks is close to double; it is even higher if we look at the apartments stock.
- 61 Next up, the review of prices in the central area clearly shows the effects of size. Apartments appear cheaper than in wealthier residential areas of the periphery: they are mostly smaller, while the houses are more expensive, when considering the price per square meter. Alongside these highly valued areas, ubiquitous on the website, the few advertisements recorded in the old center ("Colonial City ") show much lower values, of the same order as those recorded in the popular colonies.
- 62 As for the two housing stocks of the working-class residential area, the announced price for property in the residential complexes points to lower values than recorded in the popular colonies - which was not necessarily expected. Several exploratory surveys in popular suburbs of Mexico City between 2009 and 2014 corroborate these results: if we compare the purchase of an old house in the popular colonies to the purchase of formal social housing, the price of the property in the popular colony may be higher, due to the size and quality of the building. In addition, the comparison between online advertised prices and the prices observed on the field suggests that high prices are over-represented

on the Internet, both in popular colonies and in residential complexes. For example, in 2014, in popular colonies in the east of La Paz, it was estimated that the cost of a house (on a 120 m² plot) was approximately 1 million pesos (against a median of 3 million according to *Metros Cúbicos* - Figure 10A). Similarly, in a residential complex in Cuautitlan, empirically approached prices in 2014 were lower than those advertised online: in the Hacienda Cuautitlan, the resale price for a house of 96 m² was 315,000 pesos, or three times less than the median of houses in residential complexes in the database.

- 63 However, in the basis of online ads, the gap between settlement types is lower if we consider the price per square meter, the differential between residential sets and popular colonies is partly due to the very small size of the properties offered for sale in residential complexes (a typical dwelling would be a small duplex of around 60 m²). The fact remains that this gap refers both to the progressive valorization of the popular colonies dynamics and the catching-up process shown from demographic criteria (Ribardière, Valette, 2013) and on the other hand, on the questioning of the giant housing estates model, made for assisted homeownership and / or the diffusion of the model towards the lower middle categories.
- 64 Finally, it is in the most remote and peripheral settlements that we observed the lowest values.

Table 3. Heterogeneous prices in the types of settlement

Type of settlement - age level in 2010 (OCIM adjusted)	Number of ads	Houses			Apartments		
		Number of ads	Median prices of the property	Ratio between 9th decile and 1st decile	Number of ads	Median prices of the property	Ratio between 9th decile and 1st decile
Colonial City	62	8	3 375 000	-	54	1 490 000	-
Central City	2 978	805	7 950 000	10,6	2 173	3 180 000	6,8
Conurbated Chief-Town	217	174	4 475 000	10,3	43	2 200 000	-
Conurbated Village	1 756	1 049	5 500 000	7,8	707	4 600 000	10,4
Popular Colony	2 790	1 605	3 000 000	6,9	1 185	1 773 000	13,5
Residential Complex	1 063	644	1 270 000	12,2	419	980 000	6,3
Residential Area for Middle Class	3 146	2 066	4 700 000	6,4	1 080	2 800 000	5,0
Residential Area for Upper Class	4 876	3 139	11 000 000	4,8	1 737	8 500 000	4,6
Non conurbated Village	135	134	2 875 000	21,9	1	580 000	-
No residential predominance	801	373	9 800 000	17,1	428	7 175 000	10,2
Non residential	35	13	10 600 000	-	22	2 974 000	-
TOTAL	17 859	10 010	6 300 000	12,5	7 849	3 800 000	12,6

Sources: Metros Cúbicos, 2014; OCIM 2005 (adjusted).

- 65 Overall, price differences observed through the prism of the 11 major settlement types return almost a third of the total price variation³⁰. This means that, as expected, housing production plans affect property values - but only partly. A significant heterogeneity was also observed within each major category.

- 66 It is in the top residential stock that this heterogeneity is the lowest - the decile ratio between the first and last price is lower than 5 (Table 3). When looking at online real estate ads, we can see the specificity and uniformity of richer residential spaces, which appear through other criteria (Guerrien 2004; Ribardière, Valette, 2013; Capron, Esquivel, 2016). If we only consider the house stock, popular colonies also appear as homogeneous residential spaces - to a lesser extent than upper residential areas however. On the other hand, if we only consider the apartments stock, very high spreads are uncovered (the difference between the first and the last decile being higher than 13): this diversity refers, in part, to the uneven degree of verticalization in popular colonies and thus, the different maturation paths (Valette, 2014). Finally, the heterogeneity of residential complexes corresponds to the stratification of the housing stock, between lots, but also within the subdivisions; the hypothesis of a devaluation of the stock during resale can also be formulated.
- 67 On the scale of the metropolis, the range of variation of announced prices on online retail sites proved significant - on the order of 1 to 12 if one only considers the first and last deciles of the house stock and the apartments stock. By construction, this range does not take into account the properties for sale outside of online ad portals; one can easily make the assumption that it would tend further towards lower values if it included other dominant forms of market in popular colonies. The inclusion for this price range in metropolitan space testifies, unsurprisingly, of the forms of social division of space which we can highlight from classic sociodemographic variables describing the resident population. However, price analysis at the end level of the AGEs brings out variations specific to the geography of real estate prices: gradients along the main roads, boundary effects between the two major federative entities that make up the metropolitan area - the State of Mexico and Ciudad de México. The source used, knowledgeable in the wealthier residential areas reveals shades that remain hidden when only using socio-demographics variables. These "locational effects" also appear quite strongly through the prism of settlement types: beyond the expected opposition between wealthy and working-class settlement types, the differences between "middle" and upper residential stocks were highlighted - the strength of those differences was validated by the number of ads registered in each of these types. Variations between median prices are lower between the different types of popular colonies, but small differences between median values do not mean homogeneity. Instead, observed data shows the diversity of prices recorded within the popular colonies stock, or within residential complexes made for assisted homeownership.

Conclusion

- 68 The listings available online are a reliable source for evaluating the geography of real estate prices in Mexico City, as evidenced by the confrontation of two bases of different origins. They track the legal market at the scale of the city on several geographic levels (municipality, census division, district). However, this type of sources does not embrace all segments of the property market of the megacity: the market for upper categories is clearly over-represented, while the market for the working-class is only partially represented. This bias does not appear related to the choice a particular advertiser, but more towards the information broadcast channel. The "empty areas" observed on the maps are not randomly distributed: they correspond to settlement types where the

dissemination of information goes through other channels - paper ads, posters affixed directly on facades, word of mouth.

- 69 This expertise on the quality of the data collected is, of a methodological standpoint, essential in the case of cities like Mexico City, where there are no other sources that allow us to understand the real estate market across the entire city. If uploading online enables the comprehensive collection of available information and regular updates for this information, the fact remains that database insertion requires a cleaning and layout job and – here too, data used differs greatly from academic sources.
- 70 Thematic contributions from the exploitation of such databases are not negligible. The analysis of the advertised property prices completes the characterization of residential settings as they may be established from the data from censuses. Not only is the magnitude of the differences between settlement types highlighted through the differences in observed prices, but two other elements must also be emphasized. First, wealthy residential areas, often addressed globally, prove to be split by large gaps. Secondly, in the popular stocks, the observed differences do not refer so much to a distinction between popular colonies and large residential developments as to a heterogeneity within each type of settlement. Beyond the original forms of real estate production, it is through the trajectories of valuation or devaluation of each residential context that we are invited to interpret this heterogeneity of prices. If the consolidation differentials of popular colonies are a first hypothesis to explain the disparities in this type of settlement, the observed differences in residential projects point to more open hypotheses, in terms of building quality, but also the aging of the stock and validity of this housing model.
- 71 Taking the measure of the value of the highest rated areas allows us to better understand the production logics at work, marked by speculation, but also by the pressure on working-class residential spaces. This pressure does not translate only in forms of gentrification, it also embodies the financialization of the production of housing made for the working class who mark the landscape on the outskirts of the city, and in the enhancement of the most consolidated stock in the popular colonies. All these movements contribute to announced sale prices which expose the issue of housing access for all in this megacity of 21 million inhabitants.

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APPENDIXES

Methodological Appendix

The characterization of settlement types at ageb level in 2010 was developed from the crossing of several sources:

- the settlement typology of the agglomeration in 2000 carried out by the OCIM (Connolly, 2005, p.15-19),
- a clean update for 2010.

For the purposes of this study, we have tried to preserve the reading of the urban space structure of the OCIM in 2000 and to retain the fineness of the urban structure identified - unlike in previous work (Ribardière, Valette, 2013, 2014). However, in order to ensure the updating of information - census data not being available in exactly the same way in 2000 and 2010 - adjustments had to be operated.

Aggregation of settlement types of the OCIM in 2000

In 2000, the OCIM established 12 different types of settlement. For 2010, we have aggregated the 3 non-residential types of ageb (see Table A).

Table A. Aggregation of the OCIM typology

Type in 2000 (OCIM)	Type adjusted in 2010
« Colonial City » (of 1793)	Colonial City
« Central City » built between 1820 and 1929	Central City
Principal villages (existing before 1929) now integrated in the urban fabric	Conurbated Chief-Town
Peripheral villages that grown after 1929 and now integrated in the urban fabric	Conurbated Village
<i>Colonias populares</i>	Popular Colony
Peripheral villages not integrated in the urban fabric	Non conurbated village
« Housing project » built in series of housing units which development is often linked with the public sector	Residential complex
Housing estate for middle class	Residential area for middle class
Housing estate for middle class	Residential area for upper class
Space which principal use is not residential	No residential predominance
Non-residential areas	Non residential

Assignment of settlement types in 2010 and ad hoc changes

Since the urban spaces and the ageb mesh were different between 2000 and 2010, it was necessary to assign a type of settlement to the geostatistical units which did not have one in 2000 - the new ageb identified between 2000 and 2010 being linked, on the one hand, to the urbanization of areas not taken into account in 2000, and on the other, to occasional modifications causing a redrawing of the meshes. In addition, a systematic verification of areas identified as "non-residential" in the periphery in 2000 was carried out, the latter being the most likely to have changed (in terms of urbanization) during the past decade.

The updating of the typology of the OCIM was carried out on 923 agebs, based on analyzes of aerial photographs or satellite images via Google Earth and of land surveys conducted between 2009 and 2011 (Valette, 2014, 828-829): 882 were the subject of a direct affectation of a settlement type, and 41, of a change from the affected type in 2000. Only 17 new ageb identified as the "middle-upper residential" type for 2010 were classified as "default" In the "middle residential" category - the criteria for distinguishing between "middle" and "upper" are no longer available in the 2010 census.

NOTES

1. Prices shown for November 2015.
2. The Metropolitan Area of the Valley of Mexico (MAVM) consists of the 16 delegations of the Ciudad de México (former Federal District - DF), 59 municipalities of the State of Mexico and one of the State of Hidalgo. They are referred to as "delegations" or "administrative divisions" within the DF and as "municipalities" in the rest of the country.
3. National credit corporation, which has replaced the National Bank of Mexico since 2001 for operations related to the construction, the acquisition and improvement of housing, particularly in the context of social ownership policies. Value indicated for last quarter of 2014.
4. Example in Cuautitlán. Reconstitution based on surveys carried out between 2009 and 2014 - cf. Valette, 2014.
5. This binary reading grid, based on the legal or non-legal recognition of the legality of the tenure, construction and occupancy of housing, has limits of course, including issues related to the definition of the property norm in Mexico City and the porosity between the two markets presented as such. Thus, a reading of this classic opposition as a continuum is now raising a consensus in the literature on the subject. For these questions, we refer, among other things, to the works of E. Denis (2009), A. Durand-Lasserve (2004) and of the Lincoln Institute of Land Policy (2002).
6. By segment, we mean a specific part of the real estate market, coming from the differentiation and hierarchization process of the characteristics of the property (even if these processes are not based on formalized criteria).
7. Translation of *colonias populares*. These are urban areas born from a wider production of housing within the informal sector, ie outside the legal framework at the time of foundation and /or currently. The colony is the term used to designate a district or a neighborhood.
8. Understood as the set of improvement processes that make the district durable.
9. In this respect, thanks go to the company *Metros Cúbicos* for its help, and particularly to Simon Dagleish.
10. We find this same advertiser in the work done by R. Le Goix on Los Angeles (Le Goix, 2016).

11. First, a dozen long exploratory internships amongst the actors of legal production (entrepreneurs, designers, architects, civil service executives) were conducted in order to better understand the dynamics, mechanisms and legal framework of the residential property market in the metropolis. As such, special thanks go out to Jose Luis Parra Cabrera. Furthermore, at the same time, long and repeated interviews were conducted in peripheral neighborhoods in order to better understand residential strategies on the one hand and developments in property prices on the other. For the second part, the empirical work was carried out during doctoral stays between 2009 and 2011 and a postdoctoral stay in 2014: on the one hand, in four groups of popular colonies - in the delegations of Tláhuac and Milpa Alta and in the municipalities of La Paz and Cuautitlán - on the other hand in four residential complexes in the municipality of Cuautitlán (Santa Elena, Real San Fernando, Villas Cuautitlán and Hacienda Cuautitlán). In these districts, some thirty interviews were carried out with inhabitants, notably with heads of islets or neighborhoods, but also with officials of the services of urban planning and, where possible, supervisors of construction companies. In the popular colonies, the landowners and owners of plots are aware of the approximate prices charged by the surrounding vendors. In residential complexes, grids for the sale of houses are more formal. In addition, field surveying provides a plethora of displays on facades and other types of announcements.

12. Although most of the damage was due to non-compliance with anti-seismic standards, which also revealed corruption scandals in the Mexican state machinery, the collapse of much of the city's buildings built at the time of growth of the "Mexican miracle" of the 1950s and 1960s - in particular the social housing units of the large vertical complexes in the Tlatelolco district where several hundred people were killed - strongly marked consciences, impacted the urban policies of the DF and helped to slow down the construction of vertical buildings in the center and the city center until the end of the 2000s. See also Melé (1998), Rivière d'Arc (2014) and Bidou Zachariassen (2014).

13. In Mexico, we speak of "social interest" housing to refer to social housing, most often in assisted homeownership.

14. Literally "neighborhoods", the term originally refers to the housing units of the city center of Mexico City, often occupied by poorer populations. The *vecindades* are the symbol of the degraded historic center (notably around the Guerrero colony or in the Tepito district), described in 1958 by the INV (National Housing Institute, Instituto Nacional de Vivienda) as the "slum dwelling shoehorn" (*Herradura de tugurios*) around the center. There are old colonial buildings, with a central patio, divided into tiny, often uninserted apartments, intended to accommodate tenants with very low income. The division of a house into one-room units, offered for rental, is also found in the popular colonies and also refers to the name "*vecindad*".

15. Mobility measured by a change in municipality of residence between 2005 and 2010 (Valette, 2014, p.414).

16. On this theme, reference can be made in particular to the work of C. Paquette on the "hosted" status in the case of the working-class districts of Santiago de Chile (2003) or those of M. Bertrand on the analysis of cohabitations and complex residential compositions in the case of Accra (2003).

17. Literally, a "splitting", which can be translated by subdivision. The term refers to a subdivision of land to obtain a building plot. This may be legal or illegal. The fractionation refers to the traditional method in Mexico City of dividing the properties into different lots for construction. The term has remained to designate today the way in which the parcels are divided into several lots. The legality of the split depends on the existence of rules around the transaction and the valuation of urban land.

18. A major change took place in 1992 with the reform of the 27th article of the Mexican Constitution, which previously established the inalienability of land under the "social" regime, redistributed from the agrarian reform of 1917. Large volumes of land previously unenforceable

could thus be privatized and fueled the reserve of potential building land on the outskirts of the city (Salazar, 2011, 2014).

19. In Tecámac, for example, in the northern part of Mexico City, the Sadasi company built an immense complex, "Los Héroes": the 2004 project included 25,910 homes for 116,595 occupants. In Ixtapaluca, in the east, the subdivision of San Buenaventura, populated as of 1998, also allows us to take the measure of things: in 2010, there were around 21 000 houses for a population of more than 48 000 inhabitants. In this particular case, see the works of E. Duhau, A. Giglia (2008), C. Jacquín, G. Capron (2010), G. Capron and M. Esquivel (2016) and Maya, Cervantes (2005).

20. Interview with an executive of the Tinsa Group, an international real estate appraisal company. (Mexico City, November 2014).

21. Interview with the director of an architectural firm of the DF. (Mexico, December 2014).

22. These include Bando Dos, which was applied between 2000 and 2006 and canceled in 2009, which aimed to limit the construction of residential complexes in the peripheral delegations of the DF, while allowing them to be used in central delegations; The Norma 26, which gave the possibility of building social housing in the center in order to favor large social housing operations and densify while giving priority to working-class categories; The Norma 30-31, supposed to correct the bias of the Norma 26 but still not being applied due to political tensions around their implications.

23. The term "non-academic" makes sense here in relation to the databases produced by official bodies providing census data.

24. We would like to thank François Lelay for his assistance and expertise during the information gathering phase.

25. Only 43% of the *Metros Cúbicos* ads were properly geolocated. After verification and data testing, the main localization problems identified were inconsistencies between (i) neighborhood names and municipal names, (ii) between XY coordinates and names of municipalities, (iii) between geographical codes and place names, or (iv) spelling of place names. The correction therefore consisted of locating the property as precisely as possible from the different names of the places indicated in the advertisement.

26. The survey was carried out on two samples of districts (possessing between 126 and 149 colonies, ie between 267 and 326 agebs), from the examination of 4 periodicals, the consultation of two agencies (Century 21 and Lomelín) and the collection of announcements posted directly on buildings.

27. Conversions were made at the rate in effect on July 30, 2014, 1 euro = 17.6 pesos (or 1 MXN = 0.06 €).

28. It is marked by political opposition: the Ciudad de Mexico is held by the PRD (partido de la Revolución Democrática, left leaning) since 1997, while the State of Mexico is a historical stronghold of the PRI (Partido Revolucionario Institucional, populist party born the day after the Revolution).

29. On questions relating to the interest, but also to the limitations and the actualization of this typology, see Ribardière, Valette (2013, 2014).

30. A variance decomposition was performed on the price values converted in logs: the breakdown into 11 settlement types accounts for 35% of the total variance for the house stock, 32% of the total variance for the apartment stock.

ABSTRACTS

The purpose of this article is to explore an original database, built from on-line real estate listings during the summer of 2014. The database allows us to capture the housing market visible by this way, at the scale of the metropolitan area and at two compliance levels: the level of the census units on the one hand, the level of the types of settlement on the other. Primarily, we remind the context of the housing market in the early 2000s in Mexico City, in particular the different forms of housing production. Secondly, we examine the spatial variability of the prices, reflecting the classical patterns of the social division of urban space in Mexico City, and highlighting the internal subdivisions in each types of settlement. All in all, the very wide price brackets demonstrate the substantial pressures on the residential space in the Mexican capital.

Keywords: Mexico City, property values, housing market, population, social divisions of space

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