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# Housing Affordability in a Global Perspective

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## Abstract

This paper discusses housing affordability in cities the world over based on data from the *Land and Housing Survey in a Global Sample of Cities*. We report on the composition of the housing sector across a 200-city sample and develop two measures of housing affordability: *occupant affordability* – a sector-wide measure of the relative housing affordability for the typical household that occupies a specific dwelling, whether in the formal, informal, private or public housing sectors, and *median affordability* – a measure of the ability of the median income household in a given city to acquire a typical unit in the formal private housing sector. We also develop an OLS model that explains the variation in housing affordability and shows the effects of population size, urban extent density, land supply regulatory restrictions, and the presence of informal and public housing, on the overall city housing affordability.

**Keywords:** housing, housing affordability, informal housing, price-to-income ratio, land use regulations, global monitoring.

## Summary of Findings

1. The spectrum of the housing sector is composed of 37 percent multi-family formal private sector dwellings, 34 percent single-family private formal sector dwellings, 13 percent public sector dwellings and 15 percent informal dwellings.
2. According to the *occupant affordability*, a measure that considers all housing subsectors (formal, informal, public) the median house price-to-income ratio is 4.9, and housing affordability is not significantly different among cities with different incomes.
3. According to the *median affordability*, a measure of the affordability of the formal private housing sector, the median price-to-income ratio is 6.2, and by this standard, housing in the 200-city sample is significantly less affordable in lower income cities.
4. Within countries, housing in more productive cities tend to be less affordable.
5. Housing affordability deteriorates as city population, urban extent density, and regulatory restrictions in land supply increase.
6. The presence of informal and public housing improves the overall affordability of the housing sector.

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# Housing Affordability in a Global Perspective

## Introduction

While concerns about housing conditions and the affordability of housing are not new, the issue of affordability has been recently elevated to a ‘global urban housing crisis’ (Wetzstein 2017; Rohe 2017; King et al. 2017) characterized by unresponsive housing supply, scarcity of affordable housing, and the proliferation and persistence of precarious dwellings, in rapidly urbanizing low- and middle-income countries (Collier and Venables 2013). The situation bears important consequences for cities the world over. On the one hand, in developed countries, some of the most productive metropolitan areas face acute housing affordability challenges, which lead to serious productivity losses as the low responsiveness of housing supply makes it difficult for households to move to higher productivity locations (Chang and Moretti 2015; Glaezer and Gyourko 2003). On the other hand, in developing countries, a basic tenet of urban development whereby welfare improves as countries urbanize, and the corresponding increases in income translate into better and more housing, does not seem to hold true (Brueckner and Lall 2014). An indication of the latter is that in regions where urbanization takes place at relatively low income levels, the growth of informal housing—a clear manifestation of the lack of affordability—has been more rapid than that of the formal housing sector (Marx et al. 2013).

The current context of urbanization further exacerbates the future challenges related to housing. Almost all of the growth in the world’s urban population from 4.0 billion in 2015 to 6.3 billion in 2050, is expected to take place in low- and middle-income countries where cities will need to absorb close to 2.3 billion people (United Nations Population Division 2014, files 2 and 3). Moreover, two of the least urbanized regions—where housing conditions are already precarious, the supply of units through formal private housing sector provision is out of reach for the majority of city dwellers, and urbanization is not accompanied by the level housing investment that is observed elsewhere in global trends (World Bank 2015)—are projected to absorb almost 60 percent of the urban population growth (32.6 percent Sub-Saharan Africa and 25.6 percent in South and Central Asia). Given these projections, housing will increasingly constitute a critical issue, particularly for rapidly growing cities in these regions.

Even if policy makers are naturally concerned with this situation, their efforts to address the challenges associated with housing affordability face a major shortcoming: the lack of comparative data that could provide a global overview of housing affordability and reveal important commonalities and differences between housing sectors in different cities. This data is necessary in order to enhance our understanding and promote important cross-city learning on housing policies, with an overall ambition to contribute towards an evidence-based urban agenda aiming to improve housing affordability in cities the world over.

The aim of this paper is to contribute towards this knowledge gap. It presents findings from *The Land and Housing Survey in a Global Sample of Cities*, a worldwide two-part survey on housing affordability and land use regulations conducted during 2015-2017 through the partnership of

New York University (NYU), the United Nations Settlements Programme (UN Habitat), and the Lincoln Institute of Land Policy. The survey was conducted in a 200-city sample drawn from the universe of cities, the 4,321 self-standing cities and metropolitan areas that had populations of 100,000 or more in 2010.

Findings from the survey confirm that housing affordability is a challenge across cities in the sample, and that in rapidly urbanizing regions, informal housing—though affordable in comparison to other housing options—represents an extensive share of the overall housing sector. Two affordability measures developed in this paper, occupant affordability and median affordability, reveal house price-to-income ratios of 4.9 and 6.2, respectively, with approximately 90 percent of the cities in the sample above the typical normative standard house price-to-income ratio of 3.0. We also find that the overall affordability across housing subsectors (formal, public, informal) is not significantly different among cities with different average incomes, but that in lower income cities, housing offered by the formal private sector is significantly less affordable. Data from the survey also reveals that within countries, housing in more productive cities is less affordable. Finally, we find that across the sample, housing affordability deteriorates as city population, built-up area density, and regulatory restrictions in land supply increase. In contrast, we find that the presence of informal and public housing improves overall city housing affordability.

The remainder of the paper discusses in more detail the above findings and is structured as follows: section one provides a brief overview of the literature on the global monitoring of the housing sector; section two presents the survey objectives and methodology; section three, discusses the analytical findings from the data collected and develops two housing affordability measures. Section four section presents an OLS model that explores the variation of housing affordability and the effect of city population, built-up area density, land use regulations and the presence of informal and public housing on the overall affordability of the housing sector; section five concludes.

### **Affordability and the Measurement of the Housing Sector**

While there is a significant body of literature discussing housing and housing affordability, there is limited research comparing the performance of the housing sector across countries globally. A benchmark study in the field has been the *Housing Indicators Program*, which was initiated in 1989 by the World Bank and the United Nations Human Settlements Programme (UN Habitat). This research effort consisted in collecting empirically based, cross-country data on housing sector performance. Data on housing indicators were collected for a sample of 53 cities in both developed and developing countries. The program provided for the first time an empirical basis for the analysis of cross-country effects of policies on housing market supply conditions, documented more extensively in Malpezzi and Mayo (1997), and Angel (2000).<sup>1</sup> The main

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<sup>1</sup> Studies preceding the *Housing Indicators Program* (Malpezzi 1990; Malpezzi and Ball 1993) have shown that showed that even rough and ready methods of measuring housing policies, especially regulatory policies, provided

findings of this effort in terms of housing affordability showed that the mean reported house-price-to-income ratio of 5.0, ranging from a low of 0.9 to a high of 14.8, and that the reported median increases modestly with the level of economic development (Angel 1993).

Comparatively, using 2015 data the *Land and Housing Survey* we find an increase in the mean reported house-price-to-income ratio which is 5.4, ranging from a low of 2.3 to a high of 16.1.

More recently, a regional study that consisted of one of the few systematic assessments of spending on housing in sub-Saharan Africa (Lozano-Gracia and Young 2014) found that, across the region and income classes, household expenditures devoted to housing were low, averaging around 12 percent of the households' budget. This low share in housing expenditures is attributed to the very high levels of spending on food, which reach 60% for the poorest quintile, reflecting once again an early stage of economic development (Banerjee and Duflo 2007). This finding extends beyond the African context, with other cross-country evidence showing that households in low-income countries spend around 47% of their total budgets on food, therefore diminishing their share of income devoted to housing (Regmi et al. 2001). Lozano-Gracia and Young (2014), also indicate that in urban sub-Saharan Africa the estimated annualized rent-to-income ratio for a dwelling unit that is fully equipped with amenities such as permanent building materials, a toilet, an electricity connection is around 20 percent. This ratio is similar to that of the mean occupant affordability rent-to-income ratio measure, reported for the region in the *Land and Housing Survey*, which was 20 percent. However, evidence from cities in the region, show that even for low-income households that reside in informal housing and that their expenditure on food represents around 60% of their overall consumption, housing rents represent almost a third of nonfood expenditure (Marx et al. 2013; Gulyani and Talukdar 2008).

Another monitoring effort focusing on data from developed countries is the *Annual Demographia International Housing Affordability Survey* (Cox and Pavletich 2017). The survey covers 406 metropolitan housing markets in nine countries (Australia, Canada, China, Ireland, Japan, New Zealand, Singapore, the United Kingdom and the United States) for the third quarter of 2016. The survey includes a total of 92 major metropolitan markets (housing markets) with populations greater than 1,000,000, including five megacities: Tokyo-Yokohama, New York, Osaka-Kobe-Kyoto, Los Angeles, and London. Using a median multiple ratio approach, the survey finds that the most affordable major metropolitan markets in 2015 were in the United States, which had a moderately unaffordable rating of 3.7, followed by Japan, with a median multiple of 3.9. Major metropolitan markets were rated "seriously unaffordable," in Canada (4.2), Ireland (4.5), the United Kingdom (4.6) and Singapore (5.0). The major markets of Australia (6.4), New Zealand (9.7) and Hong Kong (19.0) were severely unaffordable.

Finally, a recent global research effort in the measurement of housing affordability was the McKinsey Global Institute (2014) study, *A Blueprint for Addressing the Global Affordable Housing Challenge*. This analysis compares income available for housing and home prices for standard units in more than 2,400 cities. The analysis is based on the McKinsey Global Institute *Cityscope* database, which covers all urban centers with more than 150,000 inhabitants in

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surprisingly robust, albeit partial, explanations of important outcomes like price-to-income and rent-to-income ratios, housing investment per capita, and so on (Malpezzi 2014).

developed countries and cities with more than 200,000 inhabitants in developing economies. For property prices, the study collated data from multiple sources. It defined a standard unit of affordable housing as the typical unit that had a minimum floor-area that was socially and politically acceptable in the local context. This definition was based on the income of the country (nominal gross national income per capita in 2012 as defined by the World Bank). Equally, the study defined set sizes of standard units for the purposes of estimating the affordability gap. The size of affordable units, were usually found to be well below median home sizes and varied according to city income.

## **The Land and Housing Survey in a Global Sample of Cities**

*The Land and Housing Survey in a Global Sample of Cities* was undertaken in a stratified sample of 200 cities, a sample that represented the universe of all 4,231 cities and metropolitan areas that had 100,000 people or more in 2010. The survey comprised the third phase of the *Monitoring Global Urban Expansion* initiative, a multi-phase research that monitors different aspects of city growth through a stratified global sample of 200 cities.<sup>2</sup> The Land and Housing Survey in a Global Sample of Cities—including two separate questionnaires:

1. *The Survey of the Regulatory Regime Governing Land and Housing* that sought to capture land ownership patterns, land-use planning practices, and the development of new subdivisions in the expansion areas of cities.
2. *The Housing Affordability Survey* that sought to measure the prices as well as the key attributes of different types of residential plots, houses, and apartments available for sale or rent in the 200-city sample, and to compare them with household incomes in these cities.

The global sample of 200 cities, drawn from the 2010 universe of cities (Figure 1), is the focus of the *Land and Housing Survey* (Figure 2). The sample was constructed with three strata in mind: world regions, city population size, and number of cities in the country. Cities were selected at random from 8 world regions in proportion to the urban population in each region. These regions are: East Asia and the Pacific, Southeast Asia, South and Central Asia, Western Asia and North Africa, Sub-Saharan Africa, Latin America and the Caribbean, Europe and Japan and Land-Rich Developed Countries. The second stratum was city population size. An equal number of cities were selected at random from 4 city population-size ranges, each range containing one-quarter of the total population of the cities in the universe. The four city population size ranges were: 100,000 - 425,677; 425,678 - 1,560,000; 1,560,001 - 5,600,000; 5,600,001 and above.

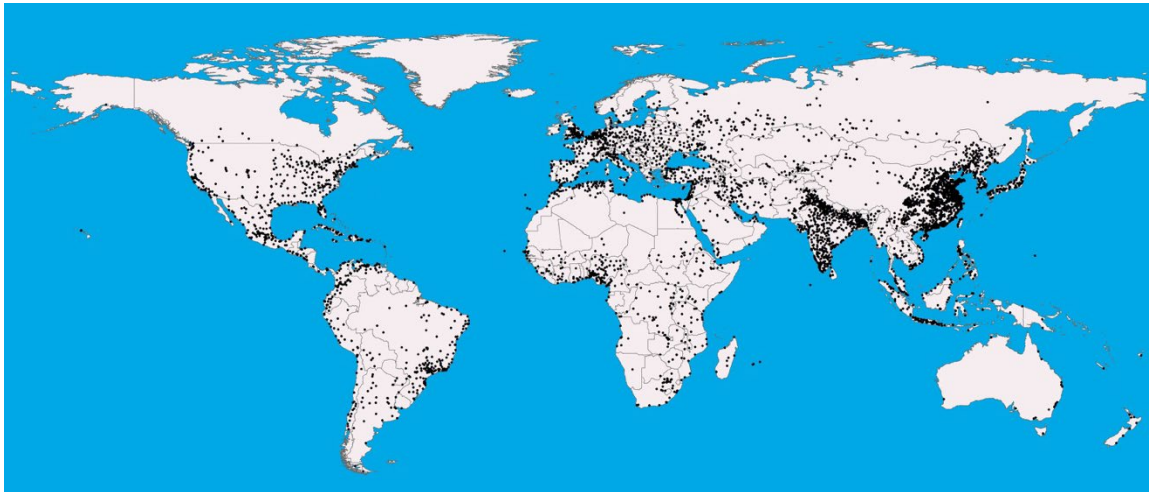
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<sup>2</sup> Together with Phase I—*The Mapping & Measurement of Global Urban Expansion*—which focuses on the mapping and measurement of key *attributes* of global urban expansion—and Phase II—*The Mapping and Measurement of Urban Layouts*—which focuses on the quality of urban layouts recently-built in urban peripheries (areas built between 1990 and 2014), *The Land and Housing Survey in a Global Sample of Cities* contributes to the collection and analysis of evidence on the quantity and quality of urban expansion, along with data on housing conditions and the rules and regulations pertaining to land use.



Finally, the sample was stratified according to the number of cities in the country. Cities were selected at random from 3 country groups, identified by the number of cities in the country, in proportion to the urban population in each group. The three number-of-cities-in-the-country groups were: 1-9 cities; 10-19 cities; and 20 or more cities.

**Figure 1: Map of the 2010 Universe of Cities, comprising a total of 4,231 cities that had 100,000 people or more in 2010.**



**Figure 2: Map of the stratified sample of 200 cities.**



### **Objectives of the Survey**

The objectives of the survey were:

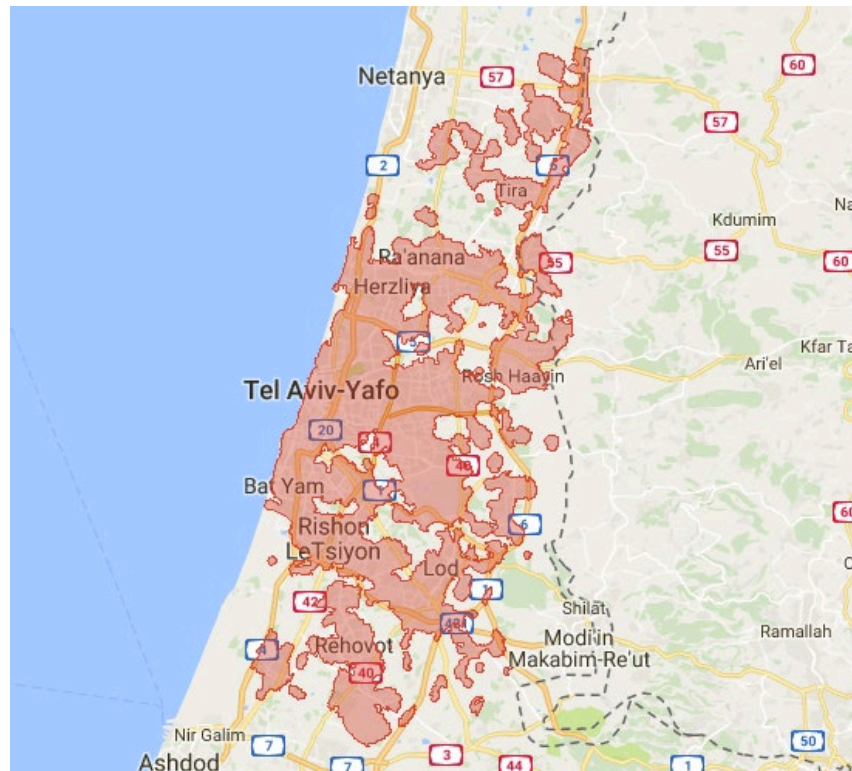
1. To produce global comparative evidence regarding housing affordability, housing conditions, and the regulations governing housing in different cities,

2. To allow cities to measure their housing sector performance against global, regional, and national norms so as to facilitate and enable housing that is more adequate, more affordable, and more accessible to jobs.
3. To provide the basis for further systematic monitoring of the housing sector in cities across the world.

### Survey Methodology

In order to analyze the housing sector in different urban contexts, data collection at the city-level was performed through two in-depth expert survey questionnaires.<sup>3</sup> The area of study for each city focused on urban metropolitan areas defined as agglomerations of contiguous built-up areas (and the open spaces in and around them) that may contain a large number of municipalities. Each survey was accompanied by urban extent maps that showed the study area of the survey as the extent of a city's build-up area circa 2014 (Figure 3).

**Figure 3: The Urban Extent of Tel Aviv, Israel circa 2014.**



The survey questionnaire was divided into 9 sections, and distributed across different dimensions

<sup>3</sup> The design of the housing affordability questionnaire evolved through an iterative process that integrated changes based on feedback on the questionnaire in its early stages. In order to account for the characteristics of the housing stock in cities of different population, size and per capita incomes, and to minimize cross-cultural differences in responses, the questionnaire was developed and tested by local experts during a pilot phase that involved a representative group of 15 cities, which accounted for city variability based on geographic region, city size, and city per capita income.

and aspects of housing units and residential plots of land including:

- (1) *Informal housing*: defined as any type of dwelling lacking formal legal title, that does not conform to building and land use standards and that it is poorly serviced by infrastructure networks and public services. This category excludes dwellings that do not satisfy building zoning and land subdivision regulations but do offer official or semi-official land sale (or long lease) documents.
- (2) *Public housing*: defined as any type of housing provided through a public subsidy housing scheme – excluding institutional housing – that is available for purchase or rent.
- (3) *Formal private multi-family housing*: defined as these residential structures produced by the formal private sector and sold at market rates that contain at least two housing units which are adjacent vertically or horizontally.
- (4) *Formal private single-family housing*: defined as these residential structures produced by the formal private sector and sold at market rates that contain a single dwelling unit in which one household resides. This category includes both detached single-family dwellings and attached single-family dwellings separated by a wall that extends from ground to roof.
- (5) *Plots in formal land subdivisions*: defined as these land subdivisions that satisfy zoning and land subdivision regulations and offer official land sale (or long lease) documents.
- (6) *Plots in informal land subdivisions*: defined as these land subdivisions that do not satisfy zoning and land subdivision regulations but do offer official or semi-official land sale (or long lease) documents.
- (7) *Plots in new squatter settlements*: defined as these land subdivisions, formed by the invasion or the illegal occupation of land without permission and without land documents, that do not satisfy zoning and land subdivision regulations and do not offer any land documents.

Additionally, a final section of the survey inquired about the mobility of households from selected points within the periphery of a city—areas of the city that were developed between 1990 and 2010—to the central business district, approximated by the location of the city hall in a given urban area.

The survey was translated in ten different languages and involved the participation of city-based researchers who completed the survey through data collection, interviews and contributions of other local housing experts (academics, municipal government, private developers, NGOs). City-based researchers were identified through an extensive network of experts provided by the New York University, UN Habitat and the Lincoln Institute of Land Policy. A database of experts in housing and land use planning in academic institutions in the cities of the sample was developed to facilitate the identification of potential respondents to the survey. In parallel, regional planning associations such as the Association of European Schools of Planning (AESOP) and the American Planning Association (APA), were contacted in order to identify potential respondents.

The role of city-based researchers was to compile and triangulate data in order to complete the survey. Data collection involved gathering primary and secondary sources and interviewing local experts from their city network, about 15 interviews per city on average. Typically, these included municipal agents, realtor associations and private developers, civil society organizations

working on housing issues, academics and other experts. In order to address the idiosyncratic nature of housing conditions in each of the cities, city-based researchers were encouraged to provide additional documentation and materials of interest, including land use plans, zoning and building regulatory documents, past studies on land use and housing in their city, and photographs of the different types of housing in each city. The photos focused on typical residential units within each subsector of the housing market in order to provide a better idea of the housing typologies existing within a city's housing stock (Figure 4).

**Figure 4: Yurt home in Ulaanbataar, Mogolia (left) and Public Housing in Suva, Fiji (right).**



Survey completion for each city took on average two months. The results from survey responses were reviewed during several stages.<sup>4</sup> For each city, a first review took place midway through completion of the survey. A second review took place upon completion of the survey. Based on data availability, a final review compared results from the survey with existing data such as census data, data from national realtor associations, web databases, and an extensive review of the literature on the housing sector for each city in the sample. Given the large variation in the sample of cities and the great number of city-based researchers involved in the survey, this three-stage review was necessary in order to ensure that the results from different cities were comparable. This was particularly challenging in cities in low-income countries, where transactions in housing are often unobserved by either governments or market entities, the dearth of data obscures a thorough understanding of the housing sector.

### **Findings of the Global Housing Affordability Survey**

Results from the survey revealed a wide variation in housing sector performance between and within cities reflecting differences in housing types, in the quantity and quality of housing, in residential amenities and densities, in prices and rents relative to household incomes, in the

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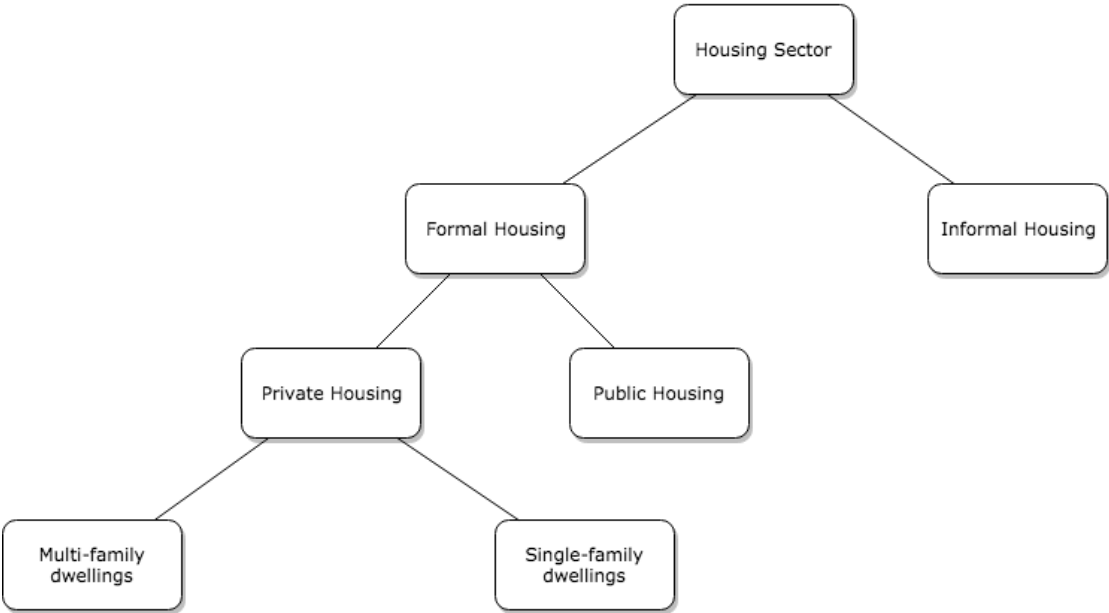
<sup>4</sup> A network of New York-based Regional Coordinators, fluent in the CBRs languages, supported the work of the CBRs in each city. Regional coordinators along with survey supervisors from NYU were responsible for facilitating the work on the ground, providing technical support and responding to questions and challenges that the city-based researchers potentially faced.

availability of housing finance, and in the regulatory regimes governing land and housing. We discuss major findings from the survey below.

**Housing Shares**

The survey sought to establish different shares of the housing subsectors that constitute the housing sector in a given city. For this purpose, the housing sector was divided into four categories that are general enough to encompass different types of the housing stock. Certainly, the housing sector in each city is much more granular, yet for the sake of comparability, we adopted four relatively broad categories: informal housing and formal housing; the formal housing sector was further divided into the public and private housing; the private housing sector was further divided into multi-family and single-family housing. Identifying estimates of these shares has been a challenging task, particularly in cities where data on the housing stock is lacking, and especially when it comes to informal housing. In these cases, respondents to the survey provided an estimate of the housing shares and substantiated their estimates through secondary sources.

**Figure 5: Repartition of the housing sector and housing subsectors considered under the Land and Housing Survey**



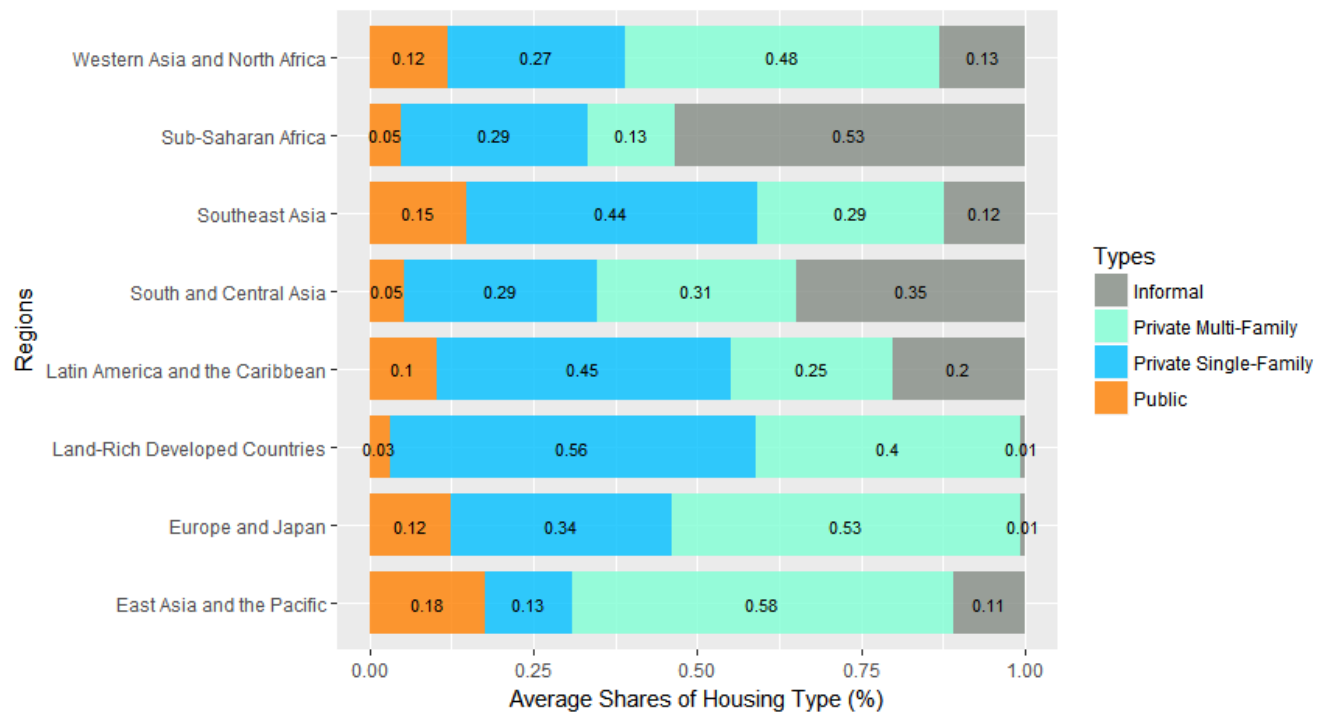
The shares of the four housing subsectors (informal, public, private formal multi-family and private formal single-family) vary among regions, with a substantial share of housing in lower income regions found in the informal housing sector.

In terms of the global estimated shares, the survey results indicate that in the formal private sector, approximately 37 percent of the total housing stock is in multi-family buildings and

approximately 34 percent in single-family housing. Public and informal housing in the global sample represents 13 percent and 15 percent respectively.

Furthermore, disaggregating by geographic region (Figure 6) and weighing the housing shares by city population, reveals significant variability in terms of the shares that each housing type occupies in the overall housing sector. Informal housing is the dominant housing type in Sub-Saharan Africa, occupying 53 percent of the housing sector. Public Housing is more common in East Asia and the Pacific accounting for 18 percent of the housing stock. Private multi-family housing is the dominant housing type in East Asia and the Pacific (58 Percent) followed by Europe and Japan (53 percent). Finally, the presence of single-family housing is very strong in Land-Rich Developed Countries, with the majority of the housing stock being devoted to this typology (56 percent). Private single-family housing is also dominant in Latin America and the Caribbean (45 percent) and Southeast Asia (44 percent).

**Figure 6: The shares of each housing type in the housing sector by geographic region.**



### Housing Affordability

The concept of housing affordability expresses the challenge each household faces in balancing the cost of its actual or potential housing, on the one hand, and its non-housing expenditures, on the other, within the constraints of its income (Stone 2006). As such, any standard of housing affordability should address, beyond the obvious question of what is affordable, to whom housing is affordable, and by what standard of affordability?<sup>5</sup>

<sup>5</sup> Stone (2006) poses similar questions but equally questions for how long housing is affordable. Based on the survey data, we cannot comment on this third question, as the survey does not provide time series data.



The literature on the measurement of housing affordability has documented three conceptual frameworks: normative, behavioral, and subjective (Li 2014).<sup>6</sup> The most commonly adopted normative approach consists in the measurement of affordability according to set standard, a certain threshold value for the limit of what is considered affordable. This normative standard of affordability usually adopts a ratio approach by measuring the relationship between household incomes and housing costs (Li 2014). Following this logic, affordability is expressed in terms of the households' income in order to assess the variability between housing or household types (Hulchanski 1995). Typically, housing is considered affordable if its purchase value does not surpass the threshold of 3.0 times the annual median household income.

But conventional price-to-income ratio approaches have often been criticized for difficulties in the ability to capture the affordability constraints of different households (Thalmann 2003), and the variation amongst households of different income levels (Chaplin and Freeman 1999).<sup>7</sup> As a result, while from a comparative cross-city perspective, this normative measure can provide an indication of affordability conditions, it is too crude an indicator to orient housing policy in one city (Bertaud 2010). For example, households may choose to reduce their consumption of housing services and hence be viewed as less burdened in terms of housing affordability, or conversely, households may consume excessive housing services and hence appear to be highly burdened (Ben-Shahar et al. 2017).

Beyond the aforementioned shortcomings and for the purposes of the *Land and Housing Survey*, we develop and report on, two housing affordability metrics: *occupant affordability* which is a relative affordability measure based on what it would cost for a household in a given city to obtain housing of a typical physical standard within a given housing subsector;<sup>8</sup> *median affordability*, which indicates the affordability of the formal private sector housing stock for the typical household in a city. Based on the above the two measures are defined as:

1. *Occupant affordability*: a sector-wide housing affordability measure that provides an indication of how affordable is a dwelling for the household that occupies the specific dwelling whether in the formal, informal, private or public housing sectors.

$$\text{Occupant affordability} = \sum_{i=1}^4 \frac{w_i \times P_i}{w_i \times Y_i} \quad (1)$$

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<sup>6</sup> For the purposes of this paper and given the research attention that it has received, we focus on the normative approach that defines a certain threshold value for the limit or norm of housing affordability.

<sup>7</sup> Advocates of the residual income approach, claim to rectify the shortcoming of the ratio income approach through comparing housing cost deducted income with poverty lines (see Hancock 1993). Associated with the residual income approach are the concepts of shelter poverty (Stone 1993) and housing induced poverty (Kutty 2005), which treat housing costs differently based on distinct levels of income, house size and type. New concepts of affordability have also arisen, with the development of new methodologies and upon reliance on more detailed data at the city level. However, this level of data requires consistency that is difficult to obtain, across the 200 cities of the sample.

<sup>8</sup> For similar approaches in measuring relative housing affordability see Thalmann (1999; 2003)

where  $w_i$  is the weighted share of a housing subsector,  $P_i$  is the price of housing for a given subsector and  $Y_i$  is the household income occupying a dwelling in a given subsector.

2. *Median affordability*: expressed as the median house-price-to-income ratio in a given city. This measure follows the typical median multiple approach, in that it expresses housing prices as multiple of the median household income, and provides an indication of how affordable is a dwelling in the formal private sector for the typical household living in the city.

$$\text{Median affordability} = \frac{w_1 \times P_1 + w_2 \times P_2}{\sum_{i=1}^4 w_i \times Y_i} \quad (2)$$

where  $w_1$  is the weighted share of the formal private sector in multi-family dwellings,  $P_1$  is the reported price of formal private sector multi-family dwellings,  $w_2$  is the weighted share of the formal private sector in single-family dwellings,  $P_2$  is the reported price of formal private sector single-family dwellings.

### **Measuring Affordability in the Global Sample of Cities**

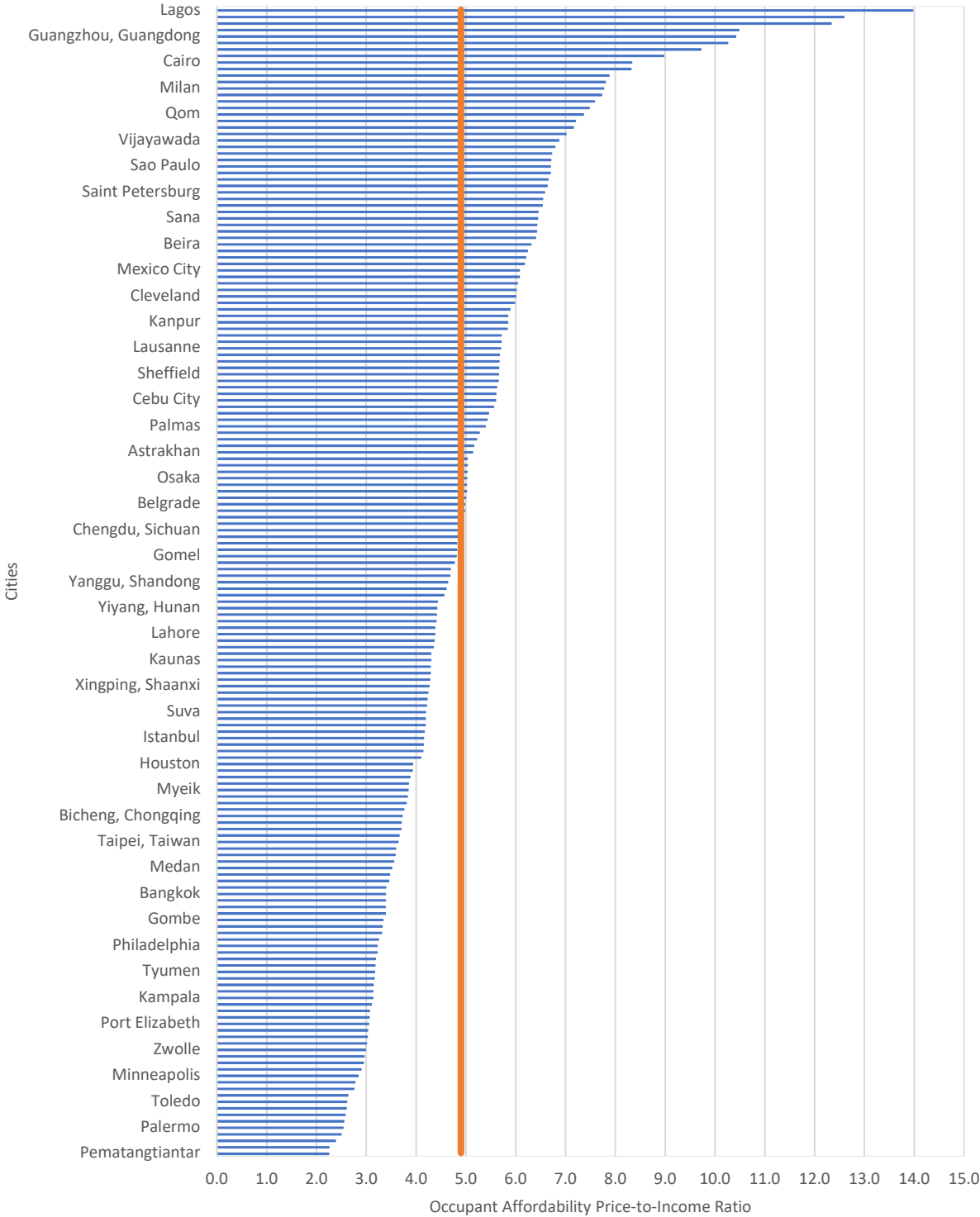
According to the above metrics of affordability we find that:

Based on the occupant affordability measure, the median price-to-income ratio is 4.9, with 90 percent of the cities in the sample being above the accepted normative standard of 3.0.

The survey's main finding is that cities across regions do face serious affordability challenges when it comes to housing. The Occupant Affordability in the city sample, determined by the median of house-price-to-income ratios was 4.9, a ratio well above what is generally considered affordable (house-price-to-annual household income ratio of 3.0). Figure 7, depicts the Occupant Affordability in the global sample of cities. The blue bars represent the sector-wide occupant affordability house-to-income ratios, for cities, in ranked order. The orange vertical line depicts the median value for occupant affordability across the sample. The y-axis of figure 7 contains fewer city names than there are horizontal bars owing to space constraints. Observations with horizontal bars extending to the right of the vertical orange line are places where the purchase of a housing unit is considered to be severely unaffordable.



**Figure 7: Occupant affordability (price-to-income ratio) of housing in the global sample of cities: the blue bars represent city price-to-income ratios; the orange line represents the median value of the sample.**

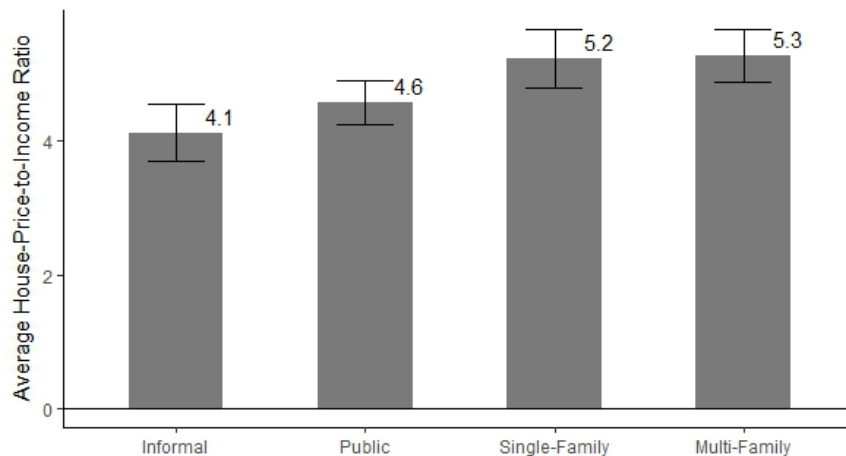


According to the occupant affordability of each housing subsector, informal housing is significantly more affordable than the formal private sector multi-family and single-family housing.

Data from the survey provides the possibility of distinguishing affordability for each segment of the overall housing sector. According to this disaggregation, the most affordable subsector across the sample was informal housing, while dwellings in the formal private sector, whether in multi-family units or single-family units, were the least affordable. Figure 8, plots the mean occupant affordability of informal housing, public housing, formal private multi-family housing and formal private single-family housing as a number of annual household incomes, for households in each segment of the housing sector.

A typical dwelling unit in the informal sector, for example, required on average 4.1 annual incomes of its occupant household. A typical dwelling unit in the public sector required 4.6 annual household incomes of its occupants. In the formal private sector, an apartment in a multi-family unit required 5.2 annual household incomes of its occupants, and single-family units required 5.3 annual household incomes of their occupants. Through a post hoc test in the Analysis of Variance (ANOVA), we notice that the differences of the price-to-income ratios are only significant between informal housing and private housing. Price-to-Income ratio is significantly lower for informal housing compared to private single-family housing ( $p=0.003$ ) and multi-family housing ( $p = 0.002$ ), but is not significantly lower than public housing.

**Figure 8: Occupant affordability shown by the average and standard error of price-to-income ratios, breakdown by housing subsector.**



Of course, the affordability of informal housing needs to be put in context. The fact that informal housing is affordable does not take into account the physical quality and the residential environment of the dwellings. Under this view, the lack of affordability is only one of the deprivations that households might face when it comes to housing. The trade-off between the affordability and housing quality is typical in the case of informal housing (Stone 2005). Each of

the deprivations in tenure security or access to services and overall housing quality are logically distinct from the lack of affordability, as most households that experience one or more of these other forms of deprivation in reality do so because they cannot afford satisfactory housing and residential environments offered through formal private sector provision (Stone 2005).

The survey data provides an indication of the degree of different deprivations associated with informal housing. For instance, according to the reported estimates, across cities with informal housing, 60 percent to 80 percent of dwellings have access to indoor household sanitation. However, this figure varies significantly for cities in different regions. In sub-Saharan Africa, the region where the majority of the housing stock is in informal housing, 14 out of the 16 cities where data is available show that access to indoor household sanitation is lacking in the majority of informal housing, with 87 percent of the informal dwellings in cities in the region reporting access to individual toilets below 40 percent.

Median affordability – measured as the ratio of the median price of the formal private sector divided by the city median household income – further compromises housing affordability in the sample of cities. Cities in less developed countries are significantly less affordable than cities in more developed countries.

The median affordability metric reveals the ability of the median income household in a given city to acquire a housing unit in the formal private housing sector. In other words, it helps determine how affordable housing produced by the private sector is for the typical household. It is of particular interest in places where the informal and public housing segments of the housing sector occupy a significant share of the housing stock.

By this standard, housing is considerably less affordable, with the global median house-price-to-income ratio increasing from 4.9 to 6.2, an increase of approximately 20 percent from the *occupant affordability* metric used earlier. This increase is to be expected since the median affordability does not encompass the more affordable housing subsectors. As informal housing and public housing have significantly lower price-to-income ratios than the formal private housing, median affordability (measured by formal price-to-income ratio) is always higher than occupant affordability (measured by total price-to-income ratio). This can be seen in figure 9, where the x-axis represents the total price-to-income ratio and the y-axis represents the formal price-to-income ratio. Cities are grouped by whether they are located in more developed countries (marked by blue triangles) or less developed countries (marked by red dots). Observations falling on the diagonal line are places where occupant affordability and median affordability are the same. The majority of observations fall above the diagonal line, indicating that the median affordability ratio is greater than the occupant affordability ratio.

**Figure 9: The formal price-to-income ratio (median affordability) plotted against total price-to-income ratio (occupant affordability) on a log scale.**

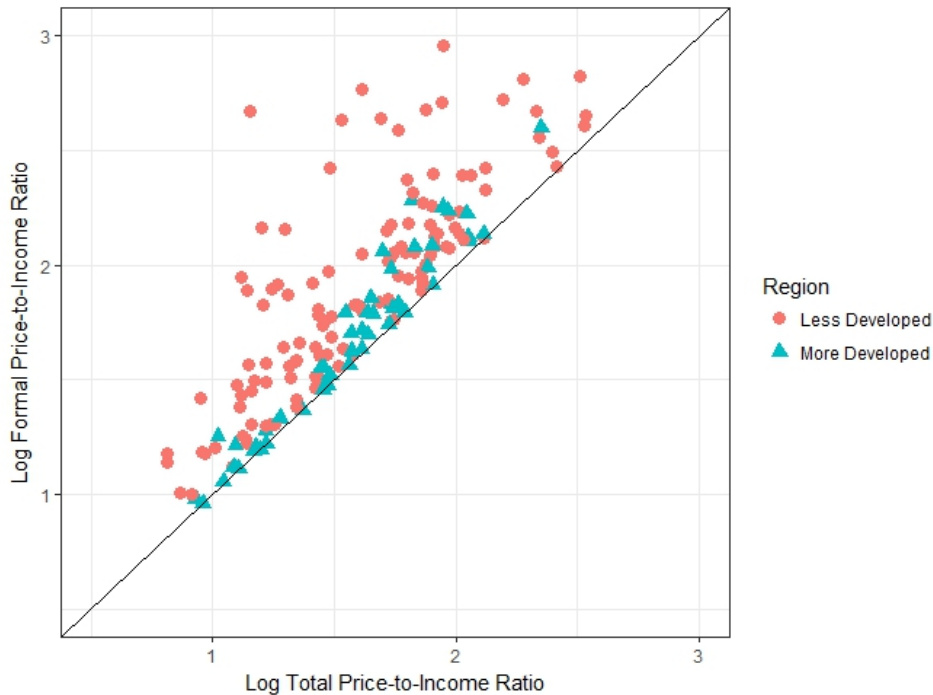


Figure 9, also shows that cities in less developed countries tend to have a higher price-to-income ratio than cities in more developed countries. The average affordability (formal price-to-income ratio) for cities in more developed countries is  $5.14 \pm 0.26$ . For cities in less developed countries, the average affordability is 28 percent higher:  $6.57 \pm 0.26$ . This difference is statistically significant ( $p < 0.001$ ).<sup>9</sup> But the overall correlation between Median Affordability and city GDP per capita is very weak ( $R^2 = .02$ ) with a slightly negative association.

Within the same country, in cities with higher GDP per capita (adjusted for national GDP per capita), housing is less affordable.

Across the sample, the association between GDP per capita and housing affordability measures is very weak, but within countries, we find that more productive cities are also more unaffordable. Subtracting national average GDP per capita from the city GDP per capita to control for national level income differences, we performed a linear regression between occupant affordability and the adjusted log GDP per capita and found a positive slope of 0.06 and an  $R^2 = .07$ . A similar regression, but this time using the Median Affordability measure as the dependent variable, gives a positive slope of 0.08 and an  $R^2 = .08$ . Although the association between variables remains

<sup>9</sup> We also examined the relationship between occupant affordability and city GDP Per Capita. The average price-to-income ratio in cities in the more developed countries is  $4.59 \pm 0.18$ . For cities in less developed countries, the average is  $5.08 \pm 0.19$ . The difference is not statistically significant ( $p = 0.14$ ). A linear regression between occupant affordability and GDP per capita generates a slope that is not significantly different from zero.

weak, it shows that within the same country, the more productive a city is, the more unaffordable housing is. This echoes the findings of earlier studies (Glaeser and Gyourko 2003) that focused in the US and explored the impact between housing affordability and city productivity and found that in highly productive metropolitan areas zoning and other land use controls, play the dominant role in making housing expensive and unaffordable. Chang and Moretti (2015) conclude that local land use regulations that restrict housing supply in dynamic labor markets have important externalities on the rest of the country. Our findings suggest that this situation is not particular to the US, but a pattern observed in the countries of the sample. While this relationship is not causal, land use and zoning regulations tend to exacerbate housing affordability levels, as we will see later.

### **A Model of Housing Affordability**

The survey results presented in the previous section provide a series of new findings concerning the composition of the housing sector, the housing affordability across the sample, in cities in developed countries and cities in less developed countries, and the affordability of housing within countries and across housing subsectors.

In this section, we explore the relationship between housing affordability and a series of independent variables. Specifically, we are interested in the effects of the presence of informal housing and public housing, of population size, the effect of urban extent density, and the effect of land use regulations restricting the supply of land, on the overall affordability of housing.

#### **Model Hypotheses**

The presence of informal housing and public housing improves overall city housing affordability.

Earlier on, we discussed the relationship between housing affordability and the presence of informal housing and public housing. Clearly, in the cities of less developed countries, the presence of informal housing is a symptom of the lack of affordability (Brueckner and Lall 2015). As a result, we can expect that the presence of informal housing in a given city would improve the overall housing affordability of the housing sector.<sup>10</sup> Similarly, the extensive presence of public housing should reduce overall city housing affordability, though we would expect to deteriorate the affordability of the private housing sector. The interest in these variables stems from the fact that the presence of informal and public housing could have both effects: on the one hand, improve overall affordability as we hypothesize, on the other deteriorate the

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<sup>10</sup> Brueckner and Selod (2009) address this issue from a theoretical perspective. They note that formal tenure and squatting represent two interlinked land uses within a single housing market; as a result, squatter settlements “squeeze” the formal market by occupying land that could be developed for formal use. In result, this would reduce the supply of land for housing and therefore increase land prices in the formal private housing sector. Yet it is unclear whether the effects for the formal private sector housing affordability would offset the improvements in housing affordability through access to informal housing.

housing affordability of the sector by constraining land supply for the formal private housing sector.

As city population increases, housing affordability deteriorates.

While the effects of city size and productivity have been extensively studied, the relationship between the cost of housing and city population has not been given much attention. As Combes et al. (2016) note larger cities, through increasing agglomeration effects are expected to become more productive, but also more expensive due to increased costs of housing, transportation, and other costs. Holly and Jones (1997), show that there is a positive correlation between the growth of population, and housing prices. The increase in demand for housing in the short run is absorbed by higher prices, since supply is fixed and property developers cannot satisfy immediately the rising demand (Arestis and González 2013). This positive relationship is especially strong in those areas that are densely populated due to the fact that the constraints regarding the availability of land for housing renders its supply more inelastic. Even if this relationship has been demonstrated in previous studies, there is little evidence on the relationship between the affordability of housing and city size. Following previous studies that estimate the elasticity of housing prices with respect to city population (Albouy 2008; Bleakley and Lin 2012; Baum-Snow and Pavan 2012), Combes et al. (2016) find that the elasticity of urban costs (including housing expenditure) increases with city population. Based on these findings, we expect to see a similar pattern across the global sample: households in larger – based on their population – cities would incur higher housing costs and face greater challenges in terms of housing affordability.

To test this hypothesis we use city population, a variable that refers to the population of a city's urban extent, described in section 3.1, circa 2014. The method for obtaining the population of an urban extent of a given city at a particular date required identifying the set of enumeration zones and their populations that fully contained that urban extent at that date, or interpolating or extrapolating the populations of these enumeration zones to estimate their populations at that date.<sup>11</sup>

Without controlling for other variables, a univariate linear regression between city population size and occupant affordability generates a significant slope of 0.06 and  $R^2$  of 0.06. Without controlling for other variables, for 10 percent increase in population size, we can expect on average 0.5 percent increase in the price-to-income ratio of occupant affordability.

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<sup>11</sup> We have sought to obtain the most detailed maps of enumeration zones for the cities in the global sample, using a number of valuable sources, including but not limited to: The Center for International Earth Science Information Network (CIESIN) at Columbia University, [www.citypopulation.de](http://www.citypopulation.de) (Brinkhoff 2016), the Chinese Academy of Sciences, and various national census bureaus.

In denser cities, housing appears to be less affordable.

Higher urban densities have been associated with greater environmental sustainability, but also, many other urban benefits including housing affordability. But while density correlates with access to services and public transportation, the argument that density will facilitate the development of more affordable housing options is contested by theoretical models Alonso (1964) and Muth (1969), and later empirical evidence showing that higher density does not lead to more affordable housing (Burton 2000) and that cities that have curbed their expansion have—with limited exceptions—failed to compensate with densification, resulting in decreased housing production than has created serious implications in terms of housing affordability (Romem, 2016). Another recent analysis of housing in Swedish cities that uses of urban population density and local land development as predictors of housing supply has shown that more densely populated cities or cities whose land has been more intensively developed tend to experience a larger degree of housing supply shortage (Ho 2015). While these measures do not distinguish the effects of natural land constraints versus regulations; however, average real house price growth and population density are often highly correlated.

In order to test for this hypothesis, we will use *Urban Extent Density* a variable that represents the ratio of the total population of a given city and its urban extent, measured in persons per hectare.

A linear regression between urban extent density and occupant affordability generates a significant slope of 0.12 and  $R^2$  of 7 percent. Without controlling for other variables, for a 10 percent increase in urban extent density, we can expect on average 1.1 percent increase in their price-to-income ratio of occupant affordability. The effect of urban extent density on the median affordability is similar to its effect on occupant affordability.

Cities that enforce regulations that limit their land supply restrict the land available for housing and therefore deteriorate housing affordability.

Land availability and the role of regulations have been central considerations in understanding housing supply and its effect on housing affordability. There is an extensive literature in both developed and developing countries discussing this literature. In higher income countries, Glaeser and Gyourko (2003) explored the impact of zoning on housing affordability and demonstrated that in some of the most productive cities in the United States the price of housing is significantly higher than construction costs. Similarly, in the United Kingdom, Cheshire and Sheppard (1989) and later, Morrison and Monk (2006) found that higher housing costs and increasing housing shortages are associated with planning and physical constraints on land availability. A later study by Gyourko and Molloy (2014) find that regulation in the US appears to be the single most important influence on the supply of homes. Looking at house prices and construction costs over the past 30 years, the authors conclude that the growing wedge between the two illustrates that the price of land has been trending upward over time. More recently, Chang and Moretti (2015) quantified the amount of spatial misallocation of labor across US cities and its aggregate costs. They traced the labor misallocation in high productivity US cities

like New York and the San Francisco Bay Area, on the stringent restrictions to new housing supply that effectively limit the number of workers who have access to such high productivity. They estimated that in the period 1964 to 2009, these constraints lowered aggregate US growth by more than 50 percent.

While the empirical evidence is less extensive, recent research has shown that in developing countries, many cities fail to address the housing challenges associated with population growth, often due to unresponsive land use regulations that restrict land supply and push a large number of households towards informal housing (Lozano-Gracia and Young 2014). When regulatory standards are appropriate for a given household income, they function as a form of mental shorthand that reduces costs (Collier and Venables, 2013). In contrast, when the regulatory framework does not respond to the actual conditions, standards act very much like an implicit tax on housing, particularly for low-income households, who, because of these regulations, have to pay higher costs for properties that remain outside of the ambit of legal transactions (Bertaud 2010; Glaeser, Gyourko, and Saks 2005; Buckley et al. 2016). As Collier and Venables (2013: 6) rightly question: “How out of line were the standards of the 1947 British Town and Country Planning Act with African incomes?” They respond by showing that current per capita income in the region is less than a twentieth of the British incomes in 1970.

In order to explore the effect of regulations on housing affordability we develop a variable representing enforced containment. This variable represents a combined binary indicator of the existence of enforced land use containment regulations at the periphery of a city. The variable seeks to determine whether containing the expansion of land in a given city is an explicit goal of the zoning and land use plan, and whether containment is strictly enforced through the use of a greenbelt, an urban growth boundary, through quotas on the amount of land that can be converted to urban use, or by defining quotas on the issuance of building permits. Data for this variable comes from the regulatory component of *The Land and Housing Survey in a Global Sample of Cities* that focused on the rules and regulations governing the development of new residential land and housing and their enforcement.

### **Modelling Occupant Affordability**

We apply a multiple linear regression where the dependent variable is occupant affordability for each housing type, in each city of the global sample. The independent variables are city population size, urban extent density (person/hectare), and enforced containment, an indicator of regulatory restrictions in the supply of land. The model is tested in a logarithmic form:

$$\begin{aligned} \ln(\text{Occupant Affordability}) & \\ &= \beta_0 + \beta_1(\text{share informal}) + \beta_2(\text{share public}) + \beta_3 \cdot \ln(\text{population}) + \beta_4 \\ &\cdot \ln(\text{urban extent density}) + \beta_5(\text{enforced containment}) + \varepsilon \end{aligned} \tag{3}$$

The model confirms our hypotheses. Controlling for other variables, occupant affordability price-to-income ratio is on average 38 percent lower for the informal housing sector, and 15 percent lower for the public housing sector compared to the other housing types. All rest being



equal, for a 10 percent increase in city population size, we expect to see on average 0.3 percent increase in the price-to-income ratio of occupant affordability. For a 10 percent increase in urban extent density, we expect to see 0.8 percent increase in the price-to-income ratio of occupant affordability. For a city with enforced containment, we expect the price-to-income ratio to be 1.6 percent higher on average. The effects of urban extent density and regulation are strong after controlling for other variables. Interestingly, the adjusted GDP per capita could not fit into the model after controlling for other variables as it has a relatively weaker effect on price-to-income ratio.

**Figure 10: Parameter estimates of independent variables in the model shown with standard error (SE), and p-values**

**Dependent Variable: Log occupant affordability**

<b>Independent Variables</b>	<b>beta (SE), p-value</b>	
Housing Sector Type: Informal	-0.48 (0.05), <0.001	***
Housing Sector Type: Public	-0.16 (0.05), <0.001	***
Log Population Size circa 2015	0.03 (0.01), 0.015	*
Log Urban Extent Density circa 2015	0.09 (0.03), 0.002	***
Regulation: Enforced Containment	0.16 (0.04), <0.001	***
<i>Intercept</i>	0.98 (0.18), <0.001	***
Total Observations	568	
Adjusted R <sup>2</sup>	0.18	

The significance level is shown as: \*<0.05, \*\*\*<0.001.

## Conclusion

The paper presented findings from the *Land and Housing Survey* in a global sample of 200 cities. The main finding of the survey confirms the previously raised concerns about housing affordability in cities. Based on the two affordability measures that we developed, there is a global housing affordability crisis that the formal private housing market alone is failing to confront. Globally, we estimate that using the occupant affordability measure, which specifies how affordable a dwelling is for the household that occupies that dwelling, the house price-to-income ratio is 4.9. Using the median affordability measure, a metric of the affordability of the private formal housing sector, the median house price-to-income ratio is 6.2.

Our findings confirm earlier studies and show that housing affordability deteriorates as cities face increases in population and the density of their urban extent. Our findings also confirm that the imposition of restrictions in the supply of land affect housing supply and overall housing affordability. Finally, the presence of informal housing and public housing improve the overall affordability of housing. However, the affordability of the informal housing sector should not be considered independently of the housing quality and the deprivations that households occupying a dwelling in the informal sector face. The degree of deprivation in terms of housing quality

varies significantly amongst cities. While, the survey did not seek to collect detailed data on the qualitative characteristics of different dwellings and subsectors, it did provide a general indication that reveals the extent of deprivation in regards to access to services when it comes to informal housing.

The results of this global survey cannot provide specific policy recommendations at the city level, but they do offer a set of broader policy implications for cities. Perhaps the main policy implication for cities in less developed countries, where the majority of future urban population growth will occur, has to do with the importance of making land available for housing. This in turn requires planning ahead for the future expansion of urban areas. As Angel et al. (2005) note: “the key issue facing public sector decision-makers—at the local, national and international levels—is not whether or not urban expansion will take place, but rather what is likely to be the scale of urban expansion and what needs to be done now to adequately prepare for it...the message is quite clear, developing country cities should be making serious plans for urban expansion, including planning for where this expansion would be most easily accommodated, how infrastructure to accommodate and serve the projected expansion is to be provided and paid for, and how this can be done with minimum environmental impact,” (Angel et al. 2005, 91).

In parallel, cities globally need to carefully review the set of regulations that affect housing supply and housing affordability. When considering how to most effectively address housing affordability concerns, the first step must be to reflect on how regulations affect the use of and access to housing. Almost all cities have rules governing land use and population density. Such regulations determine the availability of land for housing. Changing some of these regulations is in principle costless since such regulations control behavior but do not mandate public expenditures.

Finally, the housing affordability crisis cannot be addressed unless it considers all segments of the housing stock—including public housing and informal housing, that are now the only housing options affordable to large segments of the urban population—while creating conditions for the private housing sector to reach further down-market. Under this view, an important part of the housing challenge requires balancing new development with the existing urban fabric. Housing plays a special role in this process because it determines which kinds of spatial arrangements will regulate the city's productive structure and its ability to generate inclusive growth (Buckley et al. 2016). When housing policy is not seen within such broader urban perspective, it can lead to outcomes that remain unaffordable.

Further research based on data from the survey will focus on more elaborate models and examine more closely the predictors of housing affordability. In particular, we aim to investigate in more detail the effect of land use and zoning regulations, as well as other land supply bottlenecks, including the time that it takes to convert rural land on the periphery of cities to urban use, and their effects on housing prices, land prices, and the overall affordability of housing.

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## Appendix A: the Housing Affordability Survey Questionnaire

<b>The Land and Housing Survey in the Global Sample of Cities</b> <b>The Affordability Survey</b>						
Initiated and Conducted by The NYU Urban Expansion Program In Partnership with:						
The United Nations Human Settlements Programme (UN-Habitat), and The Lincoln Institute of Land Policy						
<b>Introduction to the Survey</b>	The survey focuses on all the housing sub-markets in your city, namely on all residential plots or dwelling units now being offered for sale or rent on the market (by private companies, clandestine land developers, squatters, or by public institutions).  If the survey asks about a type of housing or development that does not exist in your city, you can skip that particular section.  The affordability survey seeks answers for the average value across the entire city or metropolitan area, not just the <i>Expansion Area</i> . We are also interested in the <u>range</u> of prices. The lower part of the range should refer to housing units or plots that are available in significant quantities, i.e. are not hard to find.					
<b>Section 1: Housing types and their Share in the overall supply of Housing in the City or Metropolitan Area</b>						
<b>Share of this type of dwelling in total housing market in the city (excluding institutional housing)</b>		<b>Share (%)</b>	<b>Minimum</b>	<b>Maximum</b>		
1.1	Estimated share of dwellings in the formal sector that are public housing					
1.2	Estimated share of dwellings in the formal sector that are private housing					
1.3	Estimated share of private housing units that is in multi-family dwellings					
1.4	Estimated share of private housing units that are in single-family homes					
1.5	Estimated share of dwellings in the formal sector					
1.6	Estimated share of dwellings in the informal sector (slums and squatter settlements)					
<b>Dwelling Unit or Plot Type Available for Sale</b>		<b>Typical/Average Price per Square Meter</b>	<b>Minimum Price per Square Meter</b>	<b>Maximum Price per Square Meter</b>	<b>Minimum price per square meter on the urban periphery</b>	
1.7	Dwelling unit in public housing					
1.8	Apartment in private multi-family building					
1.9	Private single-family homes					
1.10	Dwelling unit in the informal sector (slums and squatter settlements)					
1.11	Plot in fully-serviced formal land subdivision					
1.12	Plot in minimally-serviced (informal) land subdivision					
1.13	Plot in slum/squatter settlement					
<b>Dwelling Unit or Plot Type Available for Rent</b>		<b>Typical/Average Rent per Square Meter</b>	<b>Minimum Rent per Square Meter</b>	<b>Maximum Rent per Square Meter</b>	<b>Minimum rent per square meter on the urban periphery</b>	
1.14	Dwelling unit in public housing					
1.15	Apartment in private multi-family building					
1.16	Private single-family homes					
1.17	Dwelling unit in the informal sector					
Note: The remaining sections all refer to different housing types. If a given housing type is not available in your city, simply skip the section.						
<b>Section 2: Dwelling Unit in Public Housing offered for sale or rent</b>						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
2.1	Of public housing units in multi-family dwellings					
2.2	Of units with bathroom and toilet inside unit					
2.3	Of units with municipal water Supply					
2.4	Of units with water Supply from wells					
2.5	Of units with paved Road in front of Building					
2.6	Of units that Satisfy Municipal Building Regulations					
2.7	Of units with legal ownership documents					
<b>Features and Attributes</b>			<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>	
2.10	Living Area of Dwelling Unit? (square meters)					
2.11	Sale Price of Dwelling Unit?					
2.12	Monthly Household Income of Buyers?					
2.13	Age of Buyers?					
2.14	Is financing available?					
2.15	Down Payment (percent)					

2.16	Monthly Payment					
2.17	Number of years to repay loan					
2.18	Interest Rate fixed or variable? (Fixed = 1, Variable = 2)					
2.19	Interest rate (percent)					
2.20	Are units available for rent? (Yes/No)			-	-	
2.21	If yes, monthly Household Income of renters					
2.22	Age of renters					
2.23	Monthly rent					
<b>Section 3: Apartments in private multi-family buildings offered for sale or rent</b>						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
3.1	Of units with bathroom and toilet inside unit					
3.2	Of units with municipal water Supply					
3.3	Of units with water Supply from wells					
3.4	Of units with paved Road in front of Building					
3.5	Of units that Satisfy Municipal Building Regulations					
3.6	Of units with legal ownership documents					
<b>Features and Attributes</b>				<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>
3.10	Living Area of Dwelling Unit? (square meters)					
3.11	Sale Price of Dwelling Unit?					
3.12	Monthly Household Income of Buyers?					
3.13	Age of Buyers?					
3.14	Is financing available?					
3.15	Down Payment (percent)					
3.16	Monthly Payment					
3.17	Number of years to repay loan					
3.18	Interest Rate fixed or variable? (Fixed = 1, Variable = 2)					
3.19	Interest rate (percent)					
3.20	Are units available for rent? (Yes/No)				-	-
3.21	If yes, monthly Household Income of renters					
3.22	Age of renters					
3.23	Monthly rent					
<b>Section 4: Private Dwelling Units in Single-family homes on individual plots of land offered for sale (or long lease) or for monthly rent</b>						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
4.1	Of units with bathroom and toilet inside unit					
4.2	Of units with municipal water Supply					
4.3	Of units with water Supply from wells					
4.4	Of units with paved Road in front of Building					
4.5	Of units that Satisfy Municipal Building Regulations					
4.6	Of units with legal ownership documents					
<b>Features and Attributes</b>				<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>
4.7	Living Area of Dwelling Unit? (square meters)					
4.8	Plot area (square mters)					
4.9	Sale Price of Dwelling Unit					
<b>Note: The sale price of a dwelling unit is typically composed of four components: (1) the construction cost of the house; (2) the cost of the plot, including the installation of infrastructure; and (3) other costs, e.g. permits, taxes, and financing; and (4) profit.</b>						
4.10	The share of the sale price paid for the construction of the house					
4.11	The share of the sale price paid for land and infrastructure services					
4.12	Monthly Household Income of Buyers?					
4.13	Age of Buyers?					
4.14	Is financing available?					
4.15	Down Payment (percent)					
4.16	Monthly Payment					
4.17	Number of years to repay loan					
4.18	Interest Rate fixed or variable? (Fixed = 1, Variable = 2)					
4.19	Interest rate (percent)					
4.20	Are units available for rent? (Yes/No)				-	-
4.21	If yes, monthly Household Income of renters					
4.22	Age of renters					
4.23	Monthly rent					
<b>Section 5: Dwelling Unit in the Informal Sector (slums and squatter settlements) offered for sale or for monthly rent</b>						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
5.1	Of units with bathroom and toilet inside unit					
5.2	Of units with municipal water Supply					
5.3	Of units with water Supply from wells					
5.4	Of units with water supply from water trucks					
5.5	Of units with paved Road in front of Building					



5.6	Of units with legal ownership documents					
<b>Features and Attributes</b>				<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>
5.10	Living Area of Dwelling Unit? (square meters)					
5.11	Plot area (square meters)					
5.12	Sale Price of Dwelling Unit					
5.13	Monthly Household Income of Buyers?					
5.14	Age of Buyers?					
5.15	Are units available for rent? (Yes/No)				-	-
5.16	If yes, monthly Household Income of renters					
5.17	Age of renters					
5.18	Monthly rent					
<b>Section 6: Plots in Formal Residential Land Subdivisions offered for sale (or long lease)</b>						
Note: "Formal" means that such subdivisions satisfy zoning and land subdivision regulations and offer official land sale (or long lease) documents.						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
6.1	Of plots with municipal water Supply					
6.2	Of plots connected to municipal sewerage network					
6.3	Of plots with water Supply from wells					
6.4	Of plots with paved Road in front of Building					
6.5	Of plots that Satisfy Municipal Land Subdivision Regulations					
6.6	Of plots with legal ownership documents					
<b>Features and Attributes</b>				<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>
6.7	Plot area (square meters)					
6.8	Sale Price of plot					
6.9	Monthly Household Income of Buyers?					
6.1	Age of Buyers?					
6.11	Is financing (of any kind) available?					
6.12	Down Payment (percent)					
6.13	Monthly Payment					
6.14	Number of years to repay loan					
6.15	Interest Rate fixed or variable? (Fixed = 1, Variable = 2, choose one)					
6.16	Interest rate (percent)					
6.17	Typical house Area in these subdivisions (Square Meters)					
6.18	Typical construction Cost per Square Meter					
<b>Section 7: Plots in Informal Residential Land Subdivisions offered for sale (or long lease)</b>						
Note: "Informal" means that such land subdivisions do not satisfy zoning and land subdivision regulations but do offer official or semi-official land sale (or long lease) documents.						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
7.1	Of plots with municipal water Supply					
7.2	Of plots connected to municipal sewerage network					
7.3	Of plots with water Supply from wells					
7.4	Of plots with paved Road in front of Building					
7.5	Of plots with legal ownership documents					
<b>Features and Attributes</b>				<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>
7.6	Plot area (square meters)					
7.7	Sale Price of plot					
7.8	Monthly Household Income of Buyers?					
7.9	Age of Buyers?					
7.10	Is financing (of any kind) available?					
7.11	Down Payment (percent)					
7.12	Monthly Payment					
7.13	Number of years to repay loan					
7.14	Interest Rate fixed or variable? (Fixed = 1, Variable = 2, choose one)					
7.15	Interest rate (percent)					
7.16	Typical house Area in these subdivisions (Square Meters)					
7.17	Typical construction Cost per Square Meter					
<b>Section 8: Plots in New Squatter Settlements offered for sale</b>						
Note: "Squatter settlements" refer to land subdivisions, formed by the invasion or the illegal occupation of land without permission and without land documents, that do not satisfy zoning and land subdivision regulations and do not offer any land documents.						
<b>Estimated Shares</b>		<b>0-20%</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>80-100%</b>
8.1	Of plots with municipal water Supply					
8.2	Of plots connected to municipal sewerage network					
8.3	Of plots with water Supply from wells					
8.4	Of plots with paved Road in front of Building					
8.5	Of plots with legal ownership documents					
<b>Features and Attributes</b>				<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>
8.6	Plot area (square meters)					

8.7	Sale Price of plot				
8.8	Monthly Household Income of Buyers?				
8.9	Age of Buyers?				
8.10	Is financing (of any kind) available?				
8.11	Down Payment (percent)				
8.12	Monthly Payment				
8.13	Number of years to repay loan				
8.14	Interest Rate fixed or variable? (Fixed = 1, Variable = 2, choose one)				
8.15	Interest rate (percent)				
8.16	Typical house Area in these settlements (Square Meters)				
8.17	Typical construction Cost per Square Meter				
<b>Section 9: Access to the City Center (City Hall)</b>					
Note: This section seeks to determine how accessible are residential areas that were built recently (1990-2015) to jobs, assuming that the center of gravity of jobs is City Hall (main municipality or administration building of the central city in the metropolitan area)					
<b>Mode, time, and cost of commuting during rush hour</b>		<b>Typical/Average</b>	<b>Range: From</b>	<b>Range: To</b>	<b>Comments</b>
Travel time to City Hall by car from					
9.1	Location 1:				
9.2	Location 2:				
9.3	Location 3:				
9.4	Location 4:				
Travel time to City Hall by two-wheeler from					
9.5	Location 1:				
9.6	Location 2:				
9.7	Location 3:				
9.8	Location 4:				
Travel time to City Hall by public transit from					
9.9	Location 1:				
9.10	Location 2:				
9.11	Location 3:				
9.12	Location 4:				
Cost of travel to City Hall by public transit from					
9.13	Location 1:				
9.14	Location 2:				
9.15	Location 3:				
9.16	Location 4:				

## Appendix B: the Housing Affordability Survey Questionnaire

NYU STERN



URBANIZATION  
PROJECT

### The Land and Housing Survey in the Global Sample of Cities *The Regulatory Survey*

Initiated and Conducted by The NYU Urban Expansion Program  
In Partnership with:

The United Nations Human Settlements Programme (UN-Habitat), and  
The Lincoln Institute of Land Policy

#### CONTACT INFORMATION FOR RESPONDENT

First Name	
Last Name	
Position	
Organization	
Telephone	
Email	

#### INTRODUCTION TO THE SURVEY

The survey has three parts. The first part asks questions about **property ownership and rights** in the expansion areas of the city, the second part focuses on **land use regulations**, and the third part focuses on the **subdivision of land** into residential plots.

We are interested in the single answer that applies to all or most of the land in the *Expansion Area*. If a single answer does not apply to approximately 80% of the land in the expansion area, we will ask you to write a short note explaining the situation in your city.

If a question does not make sense to you, we want to understand why so that we obtain accurate information for your city.

**PART I:  
LAND OWNERSHIP, LAND TRANSACTIONS, AND PROPERTY RIGHTS IN THE EXPANSION AREA**

**Land Ownership**

**1.0** Ownership of land in the expansion area is (checkone):

- Mostly private=1
- Mostly tribal/customary=2
- Mostly by ruralcommunes=3
- Mostly public (government ministries, agenciesand institutions)=4
- Mostly public (municipal) = 5
- Nationalized=6
- No answer applies to all or most of the expansion area=7
- Notes:

**1.1** The land registry/cadaster on the urban periphery is:

- Complete=1,
- Incomplete=2,
- NonQQQexistent=3
- No answer applies to all or most of the urban periphery=4 Notes:

<p><b>1.2</b> Contractual agreements regarding land transactions on the urban periphery are:</p>	<p>Always binding=1</p> <p>Mostly binding=2</p> <p>Notbinding=3</p> <p>No answer applies to all or most of the urban periphery=4</p> <p>Notes:</p>
<p><b>1.3</b> Land in the following types of ownership can be leased for private residential development for long periods (check all that apply):</p> <p>Tribal/customary (Yes/No)</p> <p>Rural communes (Yes/No)</p> <p>Nationalized land (Yes/No)</p> <p>Land owned by government ministries, agencies and institutions (Yes/No)</p> <p>Municipal land (Yes/No)</p> <p>Other(Specify)</p>	<p>1.3.1 (If yes), _____ years</p> <p>1.3.2 (If yes), _____ years</p> <p>1.3.3 (If yes), _____ years</p> <p>1.3.4 (If yes), _____ years</p> <p>1.3.5 (If yes), _____ years</p> <p>1.3.6 (If Other), _____ years</p>
<p><b>Government Land Acquisition for Urban Development</b></p> <p><b>2.0</b> During the last decade, land acquisition for urban development on the urban periphery by government (in all its forms) has been:</p>	<p>Extensive or very extensive=1</p> <p>Common=2</p> <p>Infrequent and sporadic=3</p> <p>Minimal or non-existent=4</p>

<p><b>2.1</b> During the last decade, land development on the urban periphery was:</p>	<p>All or mostly on land acquired by the government=1</p> <p>Partially on land acquired by the government=2</p> <p>Never or almost never on land acquired by the government=3</p> <p>No answer applies to all or most of the urban periphery=4</p> <p>Notes:</p>
<p><b>2.2</b> During the last decade, land for urban development on the urban periphery was acquired by the government through:</p>	<p>Formal market transactions=1</p> <p>Expropriation with compensation at land market values=2</p> <p>Expropriation with deferred compensation=3 Expropriation with partial compensation=4 Expropriation without compensation=5</p> <p>No answer applies to all or most of the urban periphery=6</p> <p>Notes:</p>

<b>Squatter Settlements</b>	
<b>3.0</b> Were there any new squatter settlements on the urban periphery in the last decade? (If answer is 'None', mark it and then skip to question 4. If answer is 'Few' or 'Many', fill in 3.1 to 3.4)	None=1 Few=2 Many=3
<b>3.1</b> In your opinion, compared to earlier years, the formation of new squatter settlements is:	Increasing=1 Staying the same=2 Declining=3
<b>3.2</b> If there were new settlements in the last decade, they were located:	All on public lands = 1 Mostly on public lands = 2 On customary lands = 3 On both public and private lands = 4 Mostly on private lands = 5
<b>3.3</b> What is the most prevalent type of squatter settlement?	Organized invasion by Group of Squatters = 1 Gradual unorganized infiltration by Individual Squatter Families = 2 Area occupied Illegally by Some Squatters, land subdivided into plots, and then plots sold = 3 Other Types of Squatting = 4

<p><b>3.4</b> How often during the last decade have squatter settlements been demolished and their residents evicted?          (If answer is 'Never', mark it and then skip to question 4.0.          If answer is 'Rarely' or 'Often' or 'Very Often', fill in 3.4.1 to 3.4.4)</p>	<p>Never=1          Rarely=2          Often=3          Very Often=4</p>
<p>3.4.1 Does demolition and eviction require a court order?</p>	<p>Yes/No</p>
<p>3.4.2 Is notice of the plan to demolish given in advance?</p>	<p>Yes/No</p>
<p>3.4.3 Are resettlement areas being offered?</p>	<p>Yes/No</p>
<p>3.4.4 Are there compensation packages offered to evictees?</p>	<p>Yes/No</p>

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Notes:

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**PART II:  
LAND USE REGULATION IN THE EXPANSION AREA**

<p><b>Respect for Land Use Restrictions</b></p> <p><b>4.0</b> Is there a well publicized and well understood zoning and land use plan in force, which shows where urban development is not allowed, and what areas need to be reserved for public works and public open spaces?</p>	<p>Yes/No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p>
<p><b>4.1</b> Are there consultations with the public at early and middle stages of the plan making process? (If answer is 'No', mark it and then skip to question 4.2. If answer is 'Yes', fill in 4.1.1 and 4.1.2)</p> <p><b>4.1.1</b> Were there public hearings prior to approving the plan?</p> <p><b>4.1.2</b> Did the public affect any changes in the plan?</p>	<p>Yes/No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p> <p>Yes/No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p> <p>Yes/No</p>
<p><b>4.2</b> What is the typical time between plan revisions in the expansion area?</p> <p>Note: if the plan is revised every X months, the answer is X/12 years.</p>	<p>_____ Years</p>

<p><b>4.3</b> Is the zoning and land use plan respected:</p> <p>By private developers</p> <p>By government agencies</p>	<p>Never=1 Sometimes = 2 Always = 3</p> <p>Never=1 Sometimes = 2 Always = 3</p>
<p><b>Urban Containment Policies</b></p> <p><b>5.0</b> Is containing the expansion of the city an explicit goal of the zoning and land use plan?</p>	<p>Yes/No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p>
<p><b>5.1</b> Are regulations that prohibit development on specific plots in the expansion area respected:</p> <p>By private developers</p> <p>By government agencies</p>	<p>Never=1 Sometimes = 2 Always = 3</p> <p>Never=1 Sometimes = 2 Always = 3</p>

<p><b>5.2</b> If the plan does seek to limit the expansion of the city, is it by using any of the following containment strategies? (check all that apply):</p>	<p>Creating a green belt = 1</p> <p>Setting an urban growth boundary = 2</p> <p>Defining quotas on the amount of land that can be converted to urban use = 3</p> <p>Defining quotas on the issue of building permits = 4</p> <p>No answer applies to all or most of the expansion area = 5</p> <p>Notes:</p>
<p><b>5.3</b> How long does it typically take to convert rural land on the urban periphery to urban use?</p> <p>A large scale land assembly _____ months</p> <p>A single plot of rural land _____ months</p> <p>Note: If the city converts land every X years, then the answer is X/12 years.</p>	

Notes:

**PART III:  
SUBDIVISION OF LAND ON THE URBAN PERIPHERY**

Note: The answers to the following questions pertain to new residential land subdivisions at the neighborhood level, typically of the order of city blocks or a 200-unit land subdivision project, excluding arterial roads or inter-city roads.

**Responsibility for Street Layout & Construction**

6.1 When land is converted to urban use, who designs the street layout and the subdivision of land into plots?

Municipality=1  
Other government agency=2  
Private developers=3  
No answer applies to all or most of the expansion area=4  
Notes:

6.2 Who constructs infrastructure services (roads, water supply, sewerage, drainage etc.)?

Municipality=1  
Other government agency=2  
Private developers=3  
No answer applies to all or most of the expansion area =4  
Notes:

**Minimum Street Width**

7.0 Do land subdivision regulations mandate a minimum street width in front of residential plots? (If answer is 'No', mark it and then skip to question 8.0. If answer is 'Yes', fill in 7.0.1)

Yes/No  
No answer applies to all or most of the expansion area  
Notes:

7.0.1 If YES, specify minimum street width in meters:

\_\_\_\_\_ meters

<p><b>Share of Subdivided Land in Plots for Sale</b></p> <p><b>8.0</b> When a typical project is subdivided into plots, what share of the land is in plots that can be sold?</p> <p>What share of the land is in other uses (streets, open spaces, public facilities, public land reserves, etc.)?</p> <p>Note: The two should add up to 100%</p>	<p>Share of land in plots: _____%</p> <p>Other uses: _____%</p> <p>Notes (additional comments about 6.0 to 8.0):</p>
<p><b>Restrictions on Plot Size</b></p> <p><b>9.0</b> Do residential land subdivision regulations mandate a minimum plot size? (If answer is ‘No’, mark it and then skip to question 9.1. If answer is ‘Yes’, fill in 9.0.1)</p> <p>9.0.1 If YES, specify minimum plot size:</p>	<p>Yes/No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p> <p>_____ square meters</p>
<p><b>9.1</b> Is there a maximum plot size? (If answer is ‘No’, mark it and then skip to question 10.0. If answer is ‘Yes’, fill in 9.1.1)</p> <p>9.1.1 If YES, specify maximum plot size:</p>	<p>Yes/No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p> <p>_____ square meters</p>



<p><b>11.0 Restrictions on Building Size</b></p> <p>Are there limitations on the maximum sizes of residential buildings? (If answer is 'No', mark it and then skip to question 11.1. If answer is 'Yes', fill in 11.0.1)</p> <p>11.0.1 If YES, check all that apply:</p> <p>If 1, what is the maximum Floor Area Ratio (FAR) allowed? If</p> <p>2, what is the maximum height allowed in meters?</p> <p>If 3, what is the maximum number of dwellings per hectare allowed?</p> <p>If 4, what is the maximum plot coverage allowed?</p>	<p>Yes/ No</p> <p>No answer applies to all or most of the expansion area</p> <p>Notes:</p> <p>Maximum Floor Area Ratio (FAR) = 1</p> <p>Maximum building height = 2</p> <p>Maximum number of dwelling units per hectare = 3</p> <p>Maximum plot coverage = 4</p> <p>Other = 5 Specify:</p> <p>FAR _____</p> <p>_____ meters</p> <p>_____</p> <p>_____ %</p>
<p><b>11.1</b> How often are there violations of the maximum building size regulations?</p>	<p>Rarely/Frequently</p>

<p><b>Restrictions on Multi-Family Buildings</b></p> <p><b>12.1</b> What is the share of residential area in the expansion area where construction of multi-family buildings is allowed: (If answer is 'None of the area', mark it and then skip to question 13.0. For all other answers, fill in 12.0.1 to 12.0.4)</p> <p>If multi-family buildings are allowed:</p> <p>12.1.1 Can single-family units be internally subdivided into multi-family units?</p> <p>12.1.2 Can additional dwelling units be added over time to single-family units?</p> <p>12.1.3 Can additional floors be added over time to existing buildings?</p> <p>12.1.4 Is mixed use of plots (for residences and workplaces) allowed?</p>	<p>All of the area: 1 Most of the area = 2</p> <p>Around half of the area = 3 A</p> <p>small share of the area = 4</p> <p>None of the area = 5</p> <p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p>
<p><b>Average Time to Obtain all Permits for a Typical 200-unit Land Subdivision</b></p> <p><b>13.0</b> What is the <i>typical</i> time (in months) needed to obtain all the necessary permits for a 200-unit land subdivision on land already converted to urban use?</p>	<p>_____ months</p>



<p><b>13.1</b> Once land subdivision is approved, what is the <i>typical</i> additional time required to get all building permits?</p>	<p>_____ months</p>
<p><b>13.2</b> Type of subdivision that you are referring to (Check one):</p>	<p>_____ Individual dwelling units on individual plots of land</p> <p>Multi_____ family structures</p>
<p><b>Illegal Subdivisions and Sale of Residential Plots</b></p>	
<p><b>14.0</b> How common is it, during the last ten years for land brokers to buy rural land, subdivide it into plots and sell plots (with no services or with minimal services) that do not conform to land use regulations or to land subdivision regulations? (If answer is 'Never', mark it and then skip to question 15.0. For all other answers, fill in 14.0.1 to 14.0.4)</p>	<p>Never = 1</p> <p>Rarely = 2</p> <p>Often = 3</p>
<p>14.0.1 If yes (2 or 3), what is the typical plot size in these subdivisions?</p>	<p>_____ square meters</p>
<p>14.0.2. If yes (2 or 3), what is the typical street width in these subdivisions?</p>	<p>_____ meters</p>
<p>14.1.3 If yes (2 or 3) what is the typical number of plots in such subdivisions</p>	<p>_____ plots in typical subdivision</p>
<p>14.1.4 What was the largest subdivision completed in the last decade?</p>	<p>_____ plots in largest subdivision</p>

