The impacts of slum policies on households' welfare: the case of Medellin (Colombia) and Mumbai (India)

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Acknowledgments

v

Contents

Part II: The impacts of slum interventions on households' welfare

List of Figures

x

List of Tables

Preface

This dissertation deals with the evaluation of slum upgrading interventions in developing countries using two cases of studies: the *Urban Integral Projects* (UIP) in Medellin, Colombia; and the *Slum Rehabilitation Scheme* (SRS) in Mumbai, India. It contains seven different empirical papers organized in five chapters:

The inclusion of the informal city in the urban territory: a comparison between Medellin and Mumbai [Chapter 3], In Spanish: *La inclusión de la ciudad informal en el territorio urbano: una comparación entre Medellín y Mumbai*, 2010. Revise and resubmit at *Ciudad y Territorio*

The informal rental housing market in Medellin: written versus oral contracts [Chapter 4], 2011. CERNA Working Paper.

The effects of Urban Renewal Projects on the level of housing consolidation: the case of Medellin (Colombia) [Chapter 6], 2011. CERNA Working Paper.

The Slum Rehabilitation Scheme: What consequences at a city level? [Chapter 7], 2011. Jointly with Pierre-Noël Giraud. A part of this chapter has been published as: *Mumbai, des droits de construire baladeurs au service du renouvellement urbain, Etudes foncières, numéro 150 Mars-Avril*.

Moving in, selling out: the outcomes of slum rehabilitation in Mumbai [Chapter 8], 2010. Revise and resubmit at *Urban Studies*. Early drafts of this paper were presented at the International Conference on Applied Economics in Athens (August, 2010), *Réseau d'Economie et Développement Urbain Durable* in Paris (Mai 2011) and in the ENHR conference entitled *Mixité: an urban and housing issue?* in Toulouse (July 2011)

The effects of the Slum Rehabilitation Scheme in Mumbai: on household access to credit and investment in housing [Chapter 9], 2011. CERNA Working Paper.

The effects of the Slum Rehabilitation Scheme in Mumbai: on household access to improved and modern basic services [Chapter 10], 2011. CERNA Working Paper.

Introduction

1. Justification

"There has been a recognition that effective approaches must go beyond addressing the specific problems of slums —whether they are inadequate housing, infrastructure or services— and must deal with the underlying causes of poverty" The Challenge of Slums, UN-Habitat (2003a)

In the past decades the world has continued its urbanization transition. Since the year 2008 half of the world's population lives in cities and by 2020, most of the world's demographic growth will be occurring in urban areas (UN-Habitat, 2009a). This recent rural–to–urban demographic transition is mostly occurring in developing countries and is being accompanied by an urbanization of poverty. The rural poor, seeking to improve their living conditions, are urbanizing more rapidly than the population in general. By 2035, as the urban share of the urban population is projected to reach 61%, the urban share of poverty will attain the 50% mark (Ravallion, 2001). Not only is most of this urban explosion occurring in developing countries, but about half of it is being absorbed by the informal–housing sector. Slums, favelas, chawls or informal settlements, in their very diverse forms, provide a 'place to live' for those who are denied access to the formal city. In most cases entering the formal market supposes the compliance of construction standards or forced consumption of space and quality that is beyond the payment capacities of some of the population or is unconnected to their individual preferences.

While not all of the people living in slums are poor, most of the poor do live in slums. In light of this situation, slum policies play an important role in poverty–alleviation efforts at the local scale and at the national scale–as poverty becomes increasingly 'urban'. Unfortunately, slum policies have not always been articulated with poverty–reduction efforts. In the early 70's most local governments' implemented 'eviction' policies, which resulted in the demolition of housing structures and expulsion of slum dwellers without any form of compensation. This type of

policies, while literally resulting in the elimination of slums in the very short term–as communities sometimes waited for the bulldozes to leave to start reconstructing their huts–lead principally to a further impoverishment of slum households that lost the little physical capital they had in a blink of an eye.

The international community has, however, come a long way from the time in which eviction was the main slum policy implemented. The 'slum problem' has been recognized as one of the world's major development challenges and 'friendlier' slum policies have emerged in many developing world cities. In 2000, the improvement of the lives of at least 100 million slum dwellers was set as one the Millennium Development Goals (MDG) targets to be achieved by the year 2015. However, the emergence of 'friendlier' slum policies does not respond to a sudden change in the vision of slums, but is the result of a chain of events. On the one hand, local and national governments began moving away from policies that had proved to be inefficient and moved towards policies that seemed better. After years of implementation, most *Site–and–Services* programs were abandoned and replaced for titling and/or slum upgrading interventions. On the other hand, the 'slum problem' began to be recognized by policy makers as a strategic component of cities' political economy. The inclusion of slum policies in the political agenda, depending on the proportion and rights of the slum population in question, allowed some political parties to access or remain in power. On many occasions, slum policies are designed to target specific areas of concern (i.e. violent *favelas*) or strategic zones important to the city's competiveness (i.e. airports, city centers). Because of this, poverty reduction is rarely set as the main objective of slum policies and, when occurring, is an indirect result of their application.

But how can slum policies affect households' welfare? Recent empirical studies have revealed how some slum policies might have substantial welfare gains while others can lead to a reinforcement of poverty. Field (2003, 2005, 2007) found a significant increase in housing investments, a reduction of fertility and an increase in the number of working hours of beneficiary households' in Peru, following a massive titling campaign. The indirect means which produced these results reveal the complexity of human behavior under insecure tenure rights. Fertility reduction was associated with the shift in bargaining power inside the household due to the inclusion of spouses' names in ownership documents. As women had on average, lower preferences for the number of children, titling leaded indirectly to a reduction in fertility. The increase in the number of working hours was explained through the reallocation of time previously used to 'protect' dwellings–and the physical capital captured in them–to income–generating activities. On the contrary, an empirical study–which compared the welfare effects of two hypothetical slum improvement policies, *in-situ* upgrading versus upgrading and relocation–

suggested that when workplace location is held fixed–meaning that households conserve their initial jobs–relocation can be welfare reducing (Takeuchi et al. 2008).

This thesis focuses on two aspects within the vast field of policy evaluation. The first aspect, covered in **Part I** of this dissertation, comprehends an analysis of slum formation mechanisms in Medellin and Mumbai. The second aspect, covered here in **Part II**, comprehends the evaluation of the welfare effects of slum–upgrading intervention using two slum–upgrading interventions as cases of studies: the *Urban Integral Projects (UIP)* in Medellin, Colombia; and the *Slum Rehabilitation Scheme (SRS)* in Mumbai, India. The evaluation of these cases of study, as will be discussed in the Chapters following this introduction, is appealing given that both of these policies have been recognized by the international community as successful and have introduced substantial innovations in policy design. The *Slum Rehabilitation Scheme (SRS)* in Mumbai adapted the use of Additional Development Rights programs–previously used in developed countries to protect heritage buildings, avoid urban sprawl and create incentives to provide public goods- to reconstruct and rehabilitate slum settlements while shifting the burden of financing slum upgrading to the private sector. In Medellin, *Urban Integral Projects (UIP)* moved away from traditionally applied slum policies by concentrating on everything that is outside the house, instead of targeting one or more of the slum criteria defined by United Nations[1]. *UIP,* implemented in most marginalized areas of the city, involve, among others, the improvement of public amenities, neighborhood interconnectivity and mobility.

The purpose of this thesis is to try to go further and solve questions that remain unsolved in the literature related to slum policies, evaluate whether previous empirical findings are confirmed using different methodologies and analyzing different policy frameworks, and respond to specific research questions that are relevant to the local context of these two cities (i.e. stakeholders, policy's objectives). The set of questions touched upon in **Part I** and **Part II** of this dissertation includes the following: What are the magnitude and causes of post–rehabilitation residential mobility in Mumbai? What are the impacts of slum rehabilitation on households' access to credit and housing investments? What are the consequences–at the city level–of the *Slum Rehabilitation Scheme* on population density distribution? And, what are the effects of *Urban Renewal Projects* in Medellin on the level of housing consolidation?

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[1] A *slum* was defined by UN-Habitat (2009a) as an area that combines the following characteristics: inadequate access to water, inadequate access to sanitation and other infrastructure, poor structural quality in housing, overcrowding and insecure residential status.

2. Methodology

Since the empirical methodology used to solve each of the questions addressed in this dissertation is different and is outlined in each of the Chapters following this introduction, only a general description of the main sources of information is presented here. For more information on the methodology used for each empirical analysis and a comparison to existent methodologies applied in literature, please refer to **Chapter 5**.

In the case of Mumbai, given the difficulties to obtain relevant information in order to answer the research question delimited, first–hand data was collected by the author in cooperation with an NGO (the *Slum Rehabilitation Society)* and a market research company that had previous experience working in slums *(Mars Ltda.*). A household survey was carried out in nine slum pockets, four of which had already been rehabilitated and five that had already started the rehabilitation administrative procedure, but were still slums. This first–hand data is used for the analysis of the household level impacts of slum rehabilitation in Mumbai in **Chapter 8** and **9**. For the analysis of the effects of slum rehabilitation at a city level, three different sources of information were used. The first corresponds to a database of all the *SRS* projects obtained from the Slum Rehabilitation Authority of Mumbai. The second corresponds to the 'Transfer Development Rights' database obtained from the Municipal Corporation of Greater Mumbai and the third corresponds to the World Bank Transport and Urban Poverty Survey–which contained information on housing prices and surfaces–provided by the World Bank Washington.

In the case of Medellin, given the availability of good quality data at household level and the possibility of having access to it, no household survey was needed, although a number of informal meetings with the communities involved and other stakeholders were held. Household–level information was obtained from three secondary sources: the Quality of Life Survey (2004, 2005, 2006, 2007 & 2008), the Medellin *Solidaria* Survey (2008-2009) and *SISBEN* Surveys (2002, 2003, 2004, 2006 & 2010).

3. Structure of the document

This dissertation is organized in two parts (**Part I** and **Part II**) and ten Chapters. Figure 1 presents a graphic description of the dissertation structure. Preceding **Part I** is **Chapter 1**, which addresses issues that are essential for the comprehension of the context in which this thesis is placed, such as the definition of slums, the magnitude and recent evolution of slum settlements worldwide and a brief description of the historic evolution of slum policies. **Part I** entitled '*Understanding slum formation mechanisms'* is composed of three chapters. **Chapter 2** presents the literature review on slum formation covering the most recurrent myths related to slum formation

and the most recent and relevant theoretical and empirical literature related to this subject. **Chapter 3** presents a comparative analysis of slum formation and slum policies in Medellin and Mumbai. **Chapter 4** evaluates the value that informal renters give to different rental contracts in the city of Medellin, using hedonic prices techniques.

The second part of this thesis **(Part II)** entitled *'The impacts of slum interventions on households' welfare'* is composed of five chapters. It covers an evaluation of the effects of two different urban renewal interventions in Medellin on housing investments and a set of studies on the effects of the Slum Rehabilitation Scheme in Mumbai at an individual scale and at the city scale. **Chapter 5** presents a brief review of the available methodologies to evaluate slum interventions and relevant examples of slum policies evaluation. **Chapter 6** focuses on the effects of Urban Renewal Projects on the level of housing consolidation in Medellin. **Chapter 7** evaluates the achievements–in terms of slum absorption–of the Slum Rehabilitation Scheme and its consequences on population–density distribution at the city level. **Chapter 8** deals with one of the possible indirect consequences of slum rehabilitation in Mumbai: policy–induced residential mobility. **Chapter 9** seeks to evaluate one of the most recurrent myths associated to slum and titling policies: improvement in access to credit and evolution of housing investments. **Chapter 10** evaluates if expected improvements in access to modern basic services of the *SRS* policy were translated into action. Following **Chapter 10**, general conclusions and perspectives are outlined. The **Annex** at the end of this dissertation contains a set of summary statistics, product of the *SRS* household survey that were not included in the other *chapters* dealing with the policy's impacts but that could be used in future publications

While all of the papers deal with very similar research topics, each paper puts forward distinct research question and can be read on its own.

Figure 1. Structure of the document

> ### Introduction
>
> **Chapter 1**: The Challenge of Slums

> ### Part I: Understanding slum formation mechanisms
>
> **Chapter 2:** On the mechanisms of slum formation
>
> **Chapter 3:** The inclusion of the informal city in the urban territory: a comparison between Medellin and Mumbai
>
> **Chapter 4:** The informal rental housing market in Medellin: written versus oral contracts

> ### Part II: The impact of slum interventions on households' welfare
>
> **Chapter 5:** Measuring the effects of slum policies
>
> **Chapter 6:** The effects of Urban Renewal Projects on the level of housing consolidation: The case of Medellin (Colombia)
>
> **Chapter 7:** The Slum Rehabilitation Scheme: what consequences at a city level?
>
> **Chapter 8:** Moving in, Selling Out: The Outcomes of Slum Rehabilitation in Mumbai
>
> **Chapter 9:** The effects of the Slum Rehabilitation Scheme in Mumbai: on household access to credit and investment in housing
>
> **Chapter 10:** The effects of the Slum Rehabilitation Scheme in Mumbai: on household access to improved and modern basic services

> ### Conclusions and perspectives

Chapter 1
The Challenge of Slums[1]

1. Defining slums

Slums, *favelas,* bidonvilles, shantytowns, *villas miseria*, *aashwa'i* are all different names that describe one of the most common human settlements in developing cities: informal settlements. But what exactly are slums or informal settlements? The first known definition in the English language of the word *slum* appeared in the *Vocabulary of Flash Language* in 1812, where it is given as a synonym with "racket" or "criminal trade" (Davis, 2006). At this time *slum* settlements were associated with urban areas in which the poor lived under precarious sanitary conditions, an idea that is still very accurate to describe today's slums, but also referred to areas that concentrated a number of criminal activities. The stigmatization of slums as areas housing criminal populations persisted; in 1894, the US Department of Labor, in its survey entitled *The Slums of Great Cities*, defined slums as *"areas of dirty back streets especially when inhabited by a squalid and criminal population"* Davis (2006). Today the Merriam-Webster Dictionary defines *slums* as *"a densely populated usually urban area marked by crowding, dirty run-down housing, poverty, and social disorganization"* (Webster, 2011). The last definition evidences how–despite having moved away from the criminal perception of slums–there are still a number of behavioral characteristics associated with slums (*social disorganization).*

London, Manhattan, Tokyo and many of today's world–class cities were littered with slums at the time of the Industrial Revolution and the beginning of the world's urbanization (WB, 2009a). In retrospect, the appearance of slums has almost always been linked to rapid urbanization rates and early processes of urbanization. This idea has led many to think that slums are a normal step in the urbanization process, and that a higher level of urbanization and economic growth will lead to the disappearance of slums in developing cities–as was the case of today's developed cities.

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[1] Expression borrowed from UN-Habitat(2003a) Global Report on Human Settlements 2003 : The Challenge of Slums

Some theories of slum formation, including the link between rapid urbanization and slum proliferation, will be discussed in the next chapter. Figure 1 presents photographic evidence of the very similar conditions of the slums of London in 1880 and those in Mumbai today (2009).

Figure 1. London (Left, 1880) and Mumbai (Right, 2009) slums

Source: London (http://affordablehousinginstitute.org/blogs/us/2008/08/how-a-slum-dies-part-2-in-the-21st-century.html), Mumbai (Author's, Betwala Chawl)

While slums have been decorating urban areas for quite some time, it was only in 2003, with the publication of the UN-Habitat Global Report on Human Settlements, entitled *The Challenge of Slums*, that a more precise definition of the word *slum* was given. The lack of an agreed–upon definition, as explained in UN-Habitat (2003b), resulted in a lack of monitoring and reporting of slums conditions at the local and national level. Hoping to have a more universal and objective definition, an operational definition of *slums*, that accounted for the heterogeneity of informal settlements, was recommended by UN-Habitat in 2002. A *slum* was defined as an area that combines the following characteristics: inadequate access to water, inadequate access to sanitation and other infrastructure, poor structural quality in housing, overcrowding and insecure residential status. A slum household, as defined by the United Nations, is a group of individuals living under the same roof and lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, structural quality and durability of housing and security of tenure (UN-Habitat, 2009a). The first four criteria correspond to physical expressions of slums conditions (i.e. access to basic services, overcrowding and housing structure) however, the fifth, is related to the law or to the application of the law, which is more difficult to measure. A more detailed description of these indicators and their thresholds can be found in Table 1.

Table 1. UN-Habitat definition of slums

Characteristic	Indicator	Definition
Access to water	Inadequate drinking water supply	A settlement has an inadequate drinking water supply if less than 50% of households have an improved water supply: • Household connection • Access to public stand pipe • Rainwater collection With at least 20 liters/person/day available within an acceptable collection distance.
Access to sanitation	Inadequate sanitation	A settlement has inadequate sanitation if less than 50% of households have improved sanitation: • Public sewer • Septic tank • Pour-flush latrine • Ventilated improved pit latrine The excretal disposal system is considered adequate if it is private or shared by a maximum of two households.
Structural quality of housing	a. Location	Proportion of households residing on or near a hazardous site. The following locations should be considered as hazardous. • Housing in geologically hazardous zones (landslide/earthquake and flood areas) • Housing on or under garbage mountains • Housing around areas of high industrial pollution • Housing around other unprotected high–risk zones (railroads, airports, energy transmission lines)
	b. Permanency of structure	Proportion of households living in temporary and/or dilapidated structures. The following factors should be considered when placing a housing unit in these categories: • Quality of construction (materials used for wall, floor and roof) • Compliance with local building codes, standards and bylaws
Overcrowding	Overcrowding	Proportion of households with more than two persons per room. The alternative is to set a minimum standard for floor area per person (i.e. 5 square meters)
Security of Tenure	Security of tenure	• Proportion of households with formal title deeds to both land and residence. • Proportion of households with formal title deeds to either land or residence. • Proportion of households with enforceable agreements or any document as a proof of tenure.

Source: UN-Habitat (2003a)

Although the UN-Habitat definition identifies the most significant aspects of living conditions, it is, as in the case of most generalizations, incompatible with many of the local or national definitions of informal settlements. For instance, a household that complies with the UN definition of access to improved water could still be considered a slum by local authorities because it does not have a piped–water connection inside the dwelling. In Egypt, slums are known as *aashwa'i*, which literally means "random" and correspond to deteriorated zones with little or no access to basic services (UN-habitat, 2003b)]. In India three slum definitions were retained for the 2001 census: all specific areas in a town or city notified as 'slum' by state or local government, all areas recognized as 'slum' by the state or local government, housing and slum boars, which may not have been formally notified as slum under any act; and a compact area of at least 300 population or about 60-70 households that live in in precarious constructions and

overpopulated dwellings, in unhealthy environments and have bad access to infrastructures (Government of India, 2001).

At the local level, slums are delimited along with national, regional or local definitions of *minimum living standards*, national laws and urban planning. For instance, zoning, construction and land regulations–which are generally defined locally–delimit what belongs to the planned city and what does not. In some occasions housing solutions located in zones, which are considered industrial according to Master Plans, could still be considered illegal or informal even when complying with construction standards. In the same way, at the national level, private property laws define the rights and duties accorded to private property and in some cases the available forms to enforce them. Table 2 presents some examples of the issues covered in the definition of *slum* in different cities, which reveal very different visions of slums. Cities like Abidjan and Beirut do not have any definition of slums, while cities like Bangkok delimit their definition of *slum* using health, crowding, environmental and crime indicators.

Table 2. Issues covered in slum definition

	No definition	Construction materials	Temporary nature	Construction legality	Land legality	Health and hygiene	Basic infrastructure	Infrastructure	Crowding	Poverty	Low income	Environment	Compactness	Crime and violence
Abidjan	X													
Ahmedabad		X	X			X	X		X				X	
Bangkok						X			X			X		X
Barcelona	X													
Beirut	X													
Bogotá				X	X									
Cairo		X		X	X		X							
Chengdu												X		
Colombo		X	X	X	X	X	X							
Durban		X	X				X							
Havana		X				X	X	X						
Ibadan		X							X	X	X			
Jakarta				X						X				
Karachi				X										
Kolkata		X	X				X		X					
Los Angeles		X		X					X					
Lusaka				X		X		X			X			
Manila		X				X			X	X				
Mexico City	X													
Moscow	X													
Nairobi							X	X						
Naples	X													
Newark	X													
Phnom Penh				X								X		
Quito		X		X	X									
Rabat-Salé		X		X										
Rio de Janeiro		X		X	X		X	X	X					
São Paulo						X	X	X	X					
Sydney	X													

Source: UN-Habitat (2003a)

In the following sections I will briefly discuss the distribution, types and evolution of slums in developing countries. Since this subject has been treated widely in literature, I have favored a

more compact description of the challenge of slums that will help understand the context in which the research questions developed in this dissertation are situated. For a more detailed analysis, please refer to the bibliography mentioned, especially to UN-Habitat (2003a). In Section 2 a concise description of the state of the world's slums is presented along with an analysis of the evolution of slums indicators in a set of cities between 1993 and 2003. In Section 3 the evolution of the vision of slums and slum policies is presented.

2. Planet of slums[2]

Based on the *slum* definition previously discussed and a set of urban indicators, UN-Habitat estimated the slum population in 2001 at 924 million (UN-Habitat, 2003b). With most of the urbanization occurring in developing countries, between 2000 and 2010 the urban population in the developing world increased by an average of 58 million per year and the number of slum dwellers by 28 million per year; therefore, about half of the developing world's urbanization is being absorbed by the informal–housing sector (UN-Habitat, 2010). At this pace, projections suggest that the slum population will double its size to reach the two billion mark between 2030 and 2040 (UN, 2007). While, as previously discussed, these numbers might not correspond to the local or national definition of slums in most developing countries, they do serve to identify the extension of the population living with considerable shelter deprivations.

Declining proportions, increasing numbers

Figure 2 and Figure 3 present the distribution of slums by regions in 1990, 2000 and 2010. These figures reveal how the distribution of slums in the world has changed in the past two decades. In the early 1990s, it was Southern Asia followed by Eastern Asia that concentrated the highest numbers of slum dwellers in the world, having 180 and 159 million slums dwellers, respectively, but today it is Sub–Saharan Africa that is taking the lead. In fact, between 2000 and 2010 four of the world's developing regions achieved not only a reduction in the proportion of their urban population living in slums but also in the absolute number of slum dwellers. The most troubling trends are present in Sub–Saharan Africa, a region that has almost doubled its slum population in the past two decades, despite having a diminishing trend in relative values. In fact, in relative values, all of the regions except Western Asia presented a diminution in the proportion of households living in slums compared to the total urban population.

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[2] Expression borrowed from Planet of slums (Davis, 2006)

Figure 2. Slum population by regions
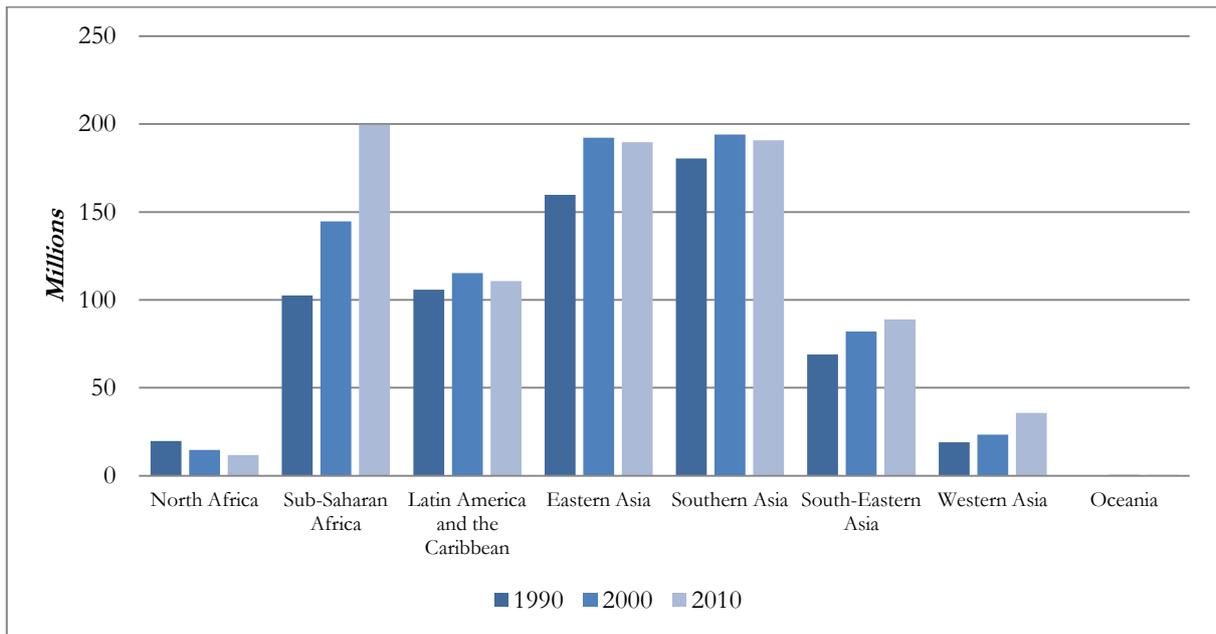
Figure 3. Proportion of the urban population living in slums by regions
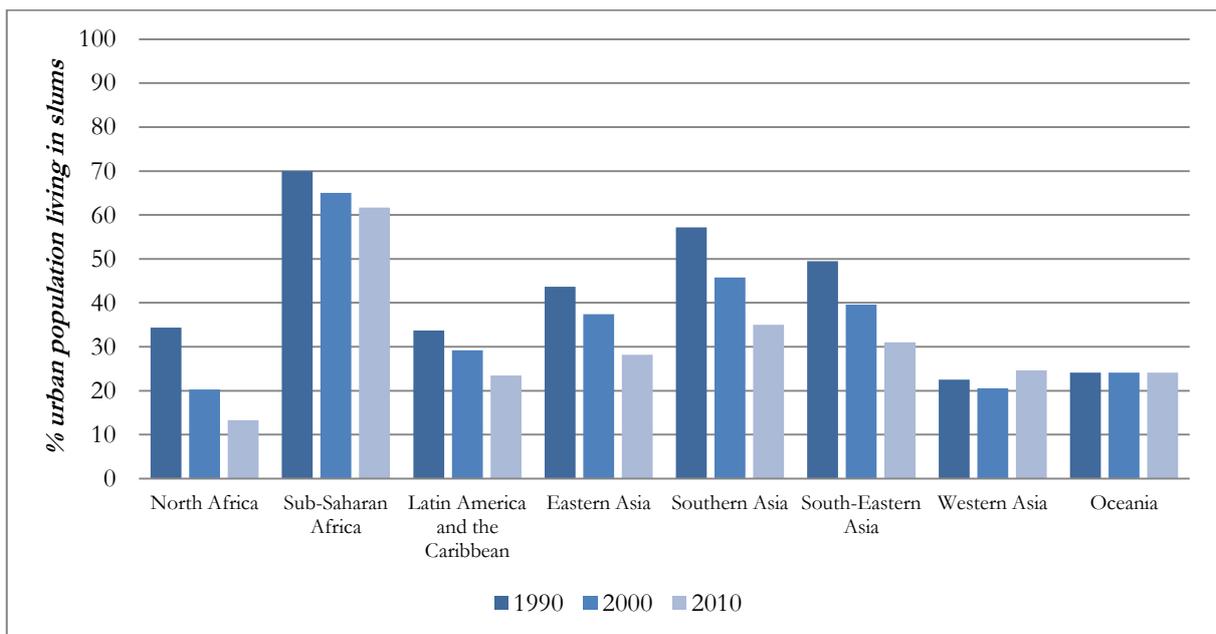
According to UN–Habitat (2010), between 2000 and 2010 a total of 227 million people living in developing–world cities achieved substantial improvements in their quality of life and were no longer considered as living in slums. The latter means that governments have not only achieved the Millennium Development Goals (MDG) Target 11 (Goal 7)–which aimed at improving the lives of at least 100 slum dwellers by 2020–five years ahead of the MDG deadlines, but they have also managed to double the target. These figures certainly leave room for optimism but need to be considered carefully. While the proportion of slums to the total urban population is declining,

the number of slum dwellers worldwide continues to grow and trends diverge from one region to another and between regions. China, India, Indonesia, Brazil and Colombia are among the most successful countries, achieving together the improvement of the living conditions of around 160 million slum dwellers. On the contrary in countries like Benin, Ethiopia, Zimbabwe and Malawi, slum prevalence remains very high and the slum population continues to increase (UN-Habitat, 2010). Furthermore, the 100 million slum dwellers' target set in 2000 for the MDG was selected as a symbolic number. At this time no accurate global estimates of the magnitude of slums existed, and it was only in 2002 that the first estimations of the 'slum problem' appeared based on the five criteria previously discussed.

Trends in urban and slum indicators 1990–2003[3]

This sub-section is based on a study done by Martinez et al. (2008) examining the evolution of multiple shelter and slum indicators in 188 cities belonging to eight different regions. Their analysis is based on the UN–Habitat Global Urban Indicators Database (GUID). Of the five UN–Habitat indicators to evaluate shelter deprivations and identify slums (see Table 1), only four are studied due to information constraints: durable structures, sufficient living area, access to safe water and access to improve sanitation. The indicator which refers to *security of tenure* was not analyzed since no data on tenure were included in the GUID. Results from their analysis are presented in Figure 4 and Figure 5.

Figure 4 presents four box-plots graphics for the indicators studied by regions in 2003[4]. It reveals considerable variations in shelter deprivation between and within regions, which confirm the notion that slums are very heterogeneous. Cities in Sub-Saharan Africa are worse off in all of the indicators when compared to the rest of the regions. A comparison of regional medians for the *durable structures* indicator suggest that in 2003 there was a relatively high proportion of households living in durable structures, with Sub-Saharan Africa being the exception. The *durable structure* box–plot also indicates considerable variations within regions, especially in the

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[3] This sub-section draws heavily from Martínez et al. (2008)

[4] The box-plot presented in Figure 4 and Figure 5 are standard box-plots in which the line in the middle of the box correspond to the median, the lower and upper hinges of the box to the 25th and 75th percentiles respectively, the upper and lower line to the upper and lower adjacent value and the dots outside the lines or whiskers to outside values.
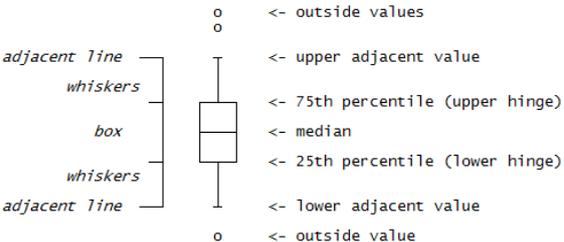
Commonwealth of Independent States (CIS) Asia, Southern Asia and Sub-Saharan Africa. The biggest variation between regions, among all indicators, is for *sufficient living area* and *access to improved sanitation.*

Figure 4. Slum indicators by regions in 2003
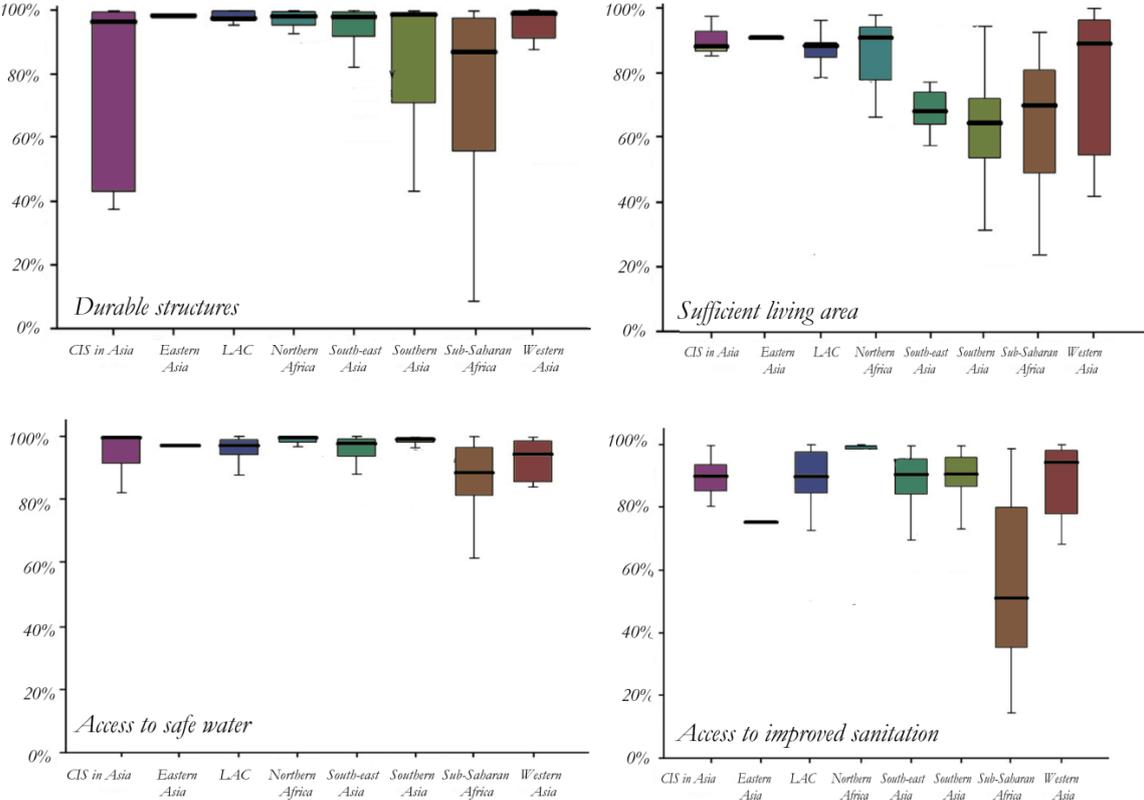
Source: adapted by author from Martinez et al. *(2008)*

Figure 5 presents the evolution of each of the studied indicators from 1990 to 2003, with all of the merged data from the regions. In all of the indicators there is a visible improvement of shelter deprivations, with median values increasing and variance decreasing. However, improvement in *access to safe water* and *access to improved sanitation*, as explained by Martinez et al. (2008), are largely being made through the use of alternative water provision and sanitation forms. When comparing *access to safe water* indicators to *access to piped water* indicators, they found that although the median *access to safe water* was above the 90% threshold for all the period of analysis, the median connection to *piped water* fluctuated between 56% and 65% in the same period.

While the evaluation of shelter deprivations in developing–world cities based on the GUID made by Martinez et al. (2008) is probably one of the most relevant studies carried out at a global level containing city-level data, it is important to consider these results carefully. First, because

not all of the information needed was available for each of the cities and for each year of analysis. If data availability is somehow correlated to the country's level of development or to the level of shelter deprivation, the analysis presented might lead to a more optimistic scenario of developing cities conditions. Second, the missing indicator, *tenure security*, is one of–if not the most–important indicators related to slums. For instance, it is possible that some of the improvements observed in access to basic services are explained by an improvement in households' *security of tenure;* as in many cases, local governments are unwilling to provide basic services to informal settlements, and formalization precedes the arrival of services. Finally, although the shelter indicators used are related to slum characteristics as defined by UN-Habitat, they are aggregated at a city level, which is useful to compare cities but confusing to evaluate the state of the world's slums and their evolution in time. Why? Because, it is possible that a given city–which has a small slum population–has very low shelter deprivations, which improve in time in formal areas, and very high shelter deprivations, which worsen in time in informal settlements; an aggregated indicator will give the idea of improving shelter deprivations but the situation underlying this "improvement" is one of increasing spatial inequalities. One example of this situation, using aggregated indicators at different levels inside the same urban area (Medellin) is presented in Box 1.

Figure 5. Evolution of a selected number of slum indicators from 1990 to 2003
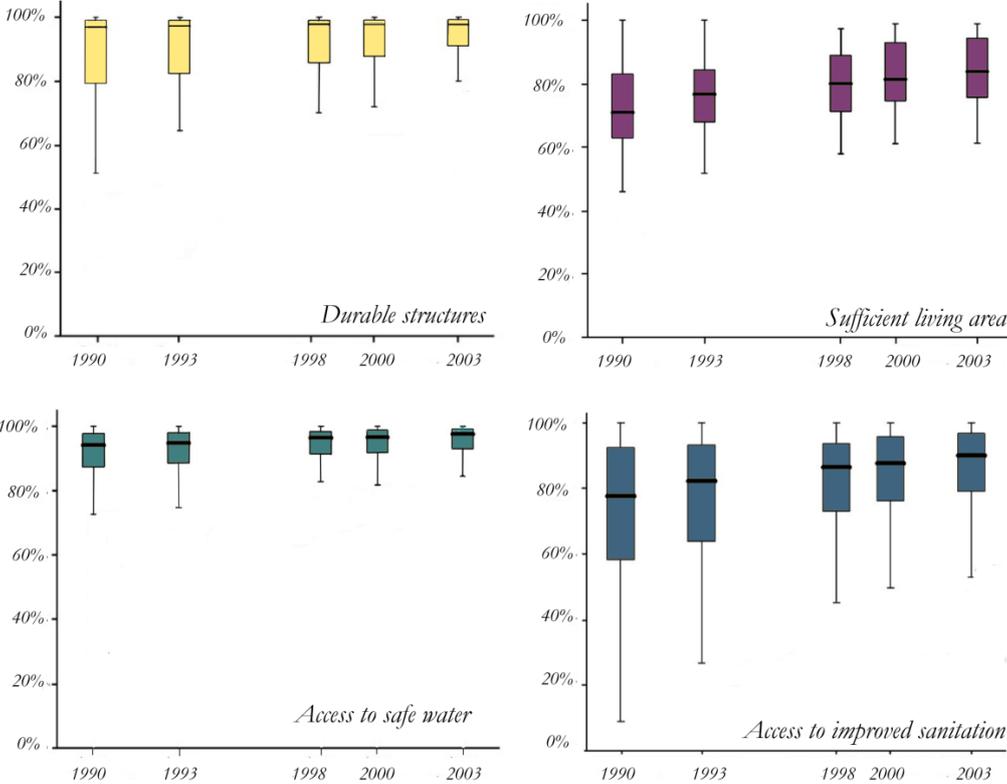
Source: adapted by author from Martinez *et al.* (2008)

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Box 1. Spatial concentration of shelter deprivations: the case of Medellin

In the following table I present an example of the spatial concentration of shelter deprivation in slums, using as an example a slum settlement in the city of Medellin. In it I compare a set of selected indicators at the city level (Medellin), at the district level (*Comuna 4)* and at the slum level (Moravia). The Moravia slum is located in the *Comuna 4*, which is a poor neighborhood centrally located in the city of Medellin. While all of the shelter indicators aggregated at a city level give a very positive idea of living conditions in the city, the reality is very different when looking at the shelter deprivation in the scale of the Moravia settlement. For instance, while the city of Medellin only has around 1.73% of its families living in houses with non–consolidated walls, this proportion rises to 2.46% in the *Comuna* 4 and to 7.72 % in the Moravia settlement.

Selected Indicators and general information	Medellín	*Comuna* 4 (District)	Moravia (slum)
Number of inhabitants	2,228,630	166,876	29,713
Number of dwellings	560,338	38,815	5,970
Number of families	564,785	39,555	6,280
Average household size	3.90	3.96	4.18
Average families per house	1.01	1.02	1.05
% dwellings with non-consolidated floor	0.99%	1.39%	4.88%
% dwellings with non-consolidated walls	1.73%	2.46%	7.72%
% dwellings without toilets inside house	0.64%	1.52%	3.88%
Average number of members per room (sleep)	1.23	1.30	2.08
% non-livable dwellings (dangerous living conditions)	8.73%	19.01%	61.51%

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Slums and poverty

"Slums and poverty are closely related and mutually reinforcing, but the relationship is not always direct or simple." UN–Habitat, 2003a[5]

Two phenomena related to today's urbanization have led to an increased concentration of the poor in urban areas. The first, introduced by Ravallion (2001) who studied cross-sectional data for 39 countries, suggest that the poor are urbanizing more rapidly than the population as a whole, which might lead to a shift in the rural–urban composition of poverty and a higher spatial concentration of the poor in cities. The second, studied by Fay and Opal (2000), suggests that the urbanization process occurring in developing countries is not always coupled with economic growth. In their study, out of 187 countries reporting annual negative growth over a period of five years, 183 experienced positive urbanization rates. As a large number of the world's rural population continues to shift to urban areas, the distribution of the poor among rural and urban areas is changing and poverty–reduction efforts need to account for these phenomena.

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[5] pp. XXVI

Baker's study (2008) on urban poverty suggests that, while the characteristics of the urban poor change between and across regions and cities, they all tend to face a number of deprivations, which affect their daily lives: limited access to the labor market, inadequate and insecure living conditions, poor infrastructure and services, risk of natural disasters and environmental hazards and spatial exclusion. Most of these deprivations correspond to the idea or definition of slums presented in the previous section. In the same way, the latest UN–Habitat (2010) report on the State of the World Cities, argues that many of the slums are spatially isolated and disconnected from the rest of the city making it difficult for their inhabitants to access the city's labor market and profit from the advantages of living in the city. The physical and social exclusion of many of the poor in some areas could lead to *spatial poverty traps.* An example of the spatial concentration of shelter deprivations can be found in Box 1.

Slums are for many the urban manifestation of poverty. However, while slums do house the greatest proportion of the urban poor, not all of the poor live in slums and not all of those who live in slums are poor. Nevertheless, with the increased urbanization of the poor and the concentration of poverty in slums, slum policies are increasingly being viewed as a way to diminish poverty. UN–Habitat (2010) states that *"Progress in improving the lives of slum dwellers will depend largely on the way governments address slums as part of the broader agenda of reducing urban poverty and inequality"*[6]. In the same way The World Bank (2009) argues that *"as urban poverty increases, the focus is shifting from villages to slums".* The higher spatial concentration of the poor in cities, and in slums, calls, on the one hand, for a higher integration of slum policies and poverty reduction efforts and, on the other hand, for a higher understanding of how slum policies can improve welfare.

3. From slum eviction to slum upgrading[7]

"Un milliard de personnes survivent dans les bidonvilles du monde, lieux de reproduction de la misère, à laquelle les gouvernements n'apportent aucune réponse adaptée » **Mike Davis, 2006**

"Les villes du Tiers monde ne souffrent pas tant d'un manque drastique d'investissement et d'emplois que d'une pénurie artificielle de droits de propriété". **Hernando De Soto, 1990**

Two authors have considerably influenced the general public view of the 'slum problem' in developing countries. The first, Mike Davis, in his book entitled *Planet of Slums*, describes slums as the catastrophic result of bad policies and bad institutions and leaves the reader with the idea that little has been done. The second, Hernando De Soto, describes slums as lands of opportunities and suggests that titling policies are the key to include poor households in the economic system.

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[6] p. 49 (Section 1)
[7] Many of the elements discussed in this section can be found in UN-Habitat(2003a), pp.128-133

While it is true that initially applied slum policies had catastrophic consequences on slum dwellers' welfare, today's policies have integrated more welfare–improving approaches, which serve both to combat the 'slum problem' and reduce poverty. The latter does not mean that there has been a complete shift from one policy to another or that a one–fits–all policy (i.e. titling) has emerged; rather, there has been a general shift of the vision of slums and of the "efficiency" of a set of policies as the *learning–by–doing* process evolved and governments or political parties realized that 'slums' could make part of their strategies to access or remain in power.

Table 3 presents predominant slum policies at different time periods, the theory or hypothesis that supported them and some of the lessons learned after years of implementation. Before the 1970s the main policy–the **laissez-faire** policy–consisted of ignoring slum settlements. Governments, based on observation of developing cities, considered slums a temporary problem related to rapid rural–to–urban migration that cease to exist with economic growth (UN-Habitat, 2003a). Slums were usually absent from city maps and master plans[8]. Many governments preferred to implement heavily subsidized social housing schemes for the poor rather than improving living conditions in slums. In the 1970s and 1980s governments decided to implement more 'active' policies, as they realized that slums were more permanent than previously thought. **Eviction** was generalized under the argument of urban renewals, large infrastructure projects, slum criminalization or enforcement of illegal encroaching. In many cases eviction was made without notice with the help of policemen who evacuated slum dwellers, followed by bulldozers that demolished housing structures. As explained by UN-Habitat (2003a) *"this approach did not solve the problem of slums: instead, it shifted them to the periphery of the cities–to rural urban fringes–where access to land was easier and planning control non-existent"[9]*.

In the late 1970s and early 1980s, a new set of policies emerged supported on the recognition of the poor to build their own homes and following the failure of both public housing schemes and eviction policies. A study made by John Turner and Robert Fichter (1972) entitled *Freedom to Build* advocated a more active enrollment of the poor in improving their housing situations (Buckley and Kalarickal, 2006). The World Bank was one of the leading institutions that supported this type of approach, on occasions, by directly financing **Site–and–Services** projects. Between 1972 and 1986, 71% of the World Bank's shelter projects were related to **Site–and–Services** and **slum upgrading**, a proportion that decreased to 15% in the 1987–2005 period. In **Site–and–Services** projects, usually, a plot of land and basic infrastructure (the provision varied

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[8] This is still the case for many of today's slums.
[9] pp. 130

from one project to another) was given to poor households. In some cases, credits or subsidies were given to households to buy materials, leaving the *freedom to build* to households.

Table 3. Evolution of slums policies

Period	Main slum policies	Vision of the slum or theory developments for policy	Lessons learned
- 1960s	*Laissez-faire*	Slums as a temporary urban problem that ceased to exist with economic development.	Slums not a temporary problem; a more active action of the state was needed to solve the 'slum problem'
			Failure of large public housing programs: it was mostly the middle class who benefited from the projects and not low-income groups.
1970s – 1980s	Eviction	State needed to have a more active role in slum elimination	Failure of policies based only on repressive actions (eviction)
	Site–and–services	Increased awareness of the right to housing.	In the case of Site–and–Services most of the plots were located in the periphery of cities, since central areas were too expensive, which isolated households from labor markets.
	Slum upgrading		
		Observations from field studies suggested that playing a more active role in providing housing solutions to the poor was needed.	It became apparent that the public sector, alone, was not able to address low-income housing needs.
1990s – 2000s	Land tenure regularization/ tenure security	Giving legal titles to slum dwellers should lead to an increased investment in housing and improve access to formal credit (De Soto)	Titling is sometimes very expensive and titles are less valuable when financial markets are not well developed.
	Slum upgrading	Need to give a more active role to slum dwellers in slum upgrading (the enabling strategy, UN-Habitat 2003b)	*In–situ* slum upgrading was preferred–when possible–to slum relocation.

Source: UN-Habitat (2003a)

Since the mid-1990s most slum policies have focused on **slum upgrading**–either through resettlement or *in–situ* upgrading–and **land tenure regularization**–largely lead by the theory developed by Hernando De Soto (1990, 2000). **Slum–upgrading** projects generally involved the improvement of one or more of a slum's shelter deprivations; some provide slums with basic services and titles, while others involve a complete reconstruction of the slum. **Land tenure regularization**, on the other hand, is designed to provide only legal titles to slum dwellers but is intended to have indirect effects on housing structures. The theory developed by De Soto (1990, 2000), suggested that housing investments in informal settlements were low, given households' insecure tenure and the possible and palpable risk of eviction without any form of compensation. Once households have legal tenure, their investment behavior is expected to change given the reduction of risk of eviction and a higher access to credit, both of which might lead to an improvement of housing structures.

These two policies have, however, suffered a considerable transformation throughout the past two decades. In the case of **slum upgrading**, the **in–situ slum upgrading** option has emerged as the better choice when compared to **slum upgrading and relocation[10]**, as the latter has proven to have a set of negative consequences on household's welfare. UN-Habitat (2003a)

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[10] Except in the cases when slums are located in areas prone to risk.

argues that *"At worst, resettlement is little better than force eviction with no attempt at consultation or consideration of the social and economic consequences of moving people to distant, often peripheral, sites with no access to urban infrastructure, services or transport"*[11].

In the case of **land tenure regularization**, it has become apparent that an improvement in tenure security, not necessarily through the provision of legal titles, is sometimes more adequate. In some cases, where cadastre systems are not well developed, titling policies can be very costly and time consuming and when financial markets are not well developed, the expected benefits of titling–as expected by De Soto–might be lower. According to Buckley and Kalarickal (2006) one of the lessons learned from years of *titling* policies is that legal tenure is not the most important first step to take in many places. Furthermore, a number of empirical and theoretical studies (Razzaz 1993, Gilbert 2002, Payne 2001, Van Gelder 2007 and Reerink and Van Gelder 2010) suggest that legal titles are not the only way to improve a household's conditions and that intermediate or semi–legal forms of tenure can also be beneficial. According to Payne (2001), alternative tenure forms–such as registered leasehold or public rental in which households are not the legal owners but do not face a constant threat of eviction–might also lead to an increase of investments in housing.

Today, a very diverse group of slum policies are being implemented in the world's slums. Some countries–like Peru–continue to lead large titling policies at the national level while other countries–like Brazil–have introduced multiple policies that range from legalizing electricity in informal settlement to establishing Special Social–Interest Zones in which land regulations are relaxed for the development of low–income housing. While years of slum–policy implementation have left the international community with a number of lessons, most of today's policies are being designed to solve specific shelter deprivations and are a highly connected to a city's or country's political economy. The following chapter, **Chapter 2**, concerns the analysis of the mechanisms of slum formation. In **Chapter 3** a discussion, very similar to the one carried out in this chapter but using the two specific cases of studies, Medellin and Mumbai, is made in which the definitions and evolution of slums and slum policies at the local scale are presented.

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[11] pp. 131

Part I
Understanding slum formation mechanisms

Chapter 2
On the mechanisms of slum formation

1. General ideas

"Squatting, like living in conventional slums, provides a solution to the housing needs of those that cannot afford, or even find, alternative formal accommodation" The Challenge of Slums, UN-Habitat (2003a)[1]

The existence of slums in cities and the evaluation of slum policies have been studied widely by economists, sociologists, town planners and international organizations (Davis 2006, UN-Habitat 2003a, WB 2009a). However, most of the literature concentrates either on the actual state of slums or on slum absorption policies (upgrading, relocation, titling) and only a small number of studies concentrate on the sources or mechanisms of slum formation (Jimenez 1985, Hoy and Jimenez 1990, Brueckner and Selod 2009 and Henderson 2009). In a logical way, slum policies, if intending to lead to slum–free scenarios, need to concentrate as much on slum formation as they do on slum absorption. Furthermore, understanding the slum–formation mechanism is essential not only for the implementation of housing policies which avoid new slum formation but for the creation of more efficient slum–absorption policies. Knowing what blocks the way for a considerable number of households to *access* formal housing and/or to *stay* in formal housing can help to design better policies adapted to slum dwellers' needs and financial capacities.

Almost every article that deals with slums suggests one or more reasons for slum existence. The most common explanations of slum formation deal with rapid urbanization, urbanization without growth, malfunctioning housing markets and/or the incapacity of cities to absorb newcomers resulting from poor city planning (UN-Habitat 2003a, Buckley and Kalarickal 2006, Kappor and le Blanc 2008, Sietchiping and Yoon 2010). In fact, most of the literature agrees on the variables affecting slum formation, but there is little consensus on how they interact or the policy implications. For instance, reinforcing construction standards serves as an entry tax for newcomers and might diminish migration (and slum formation), but makes housing much more

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[1] pp. 83

expensive for lower–income groups who might be forced to find housing accommodation in slums. As we will see further on, there is not a "single" answer for the question and the mechanisms of slum formation are rather complex.

In this chapter I will make a brief presentation of the state of literature concerning slum formation. Section 2 considers using macro–data to test some of the most common myths of slum formation: rapid urbanization and city size. Section 3 synthesizes existent theoretical economic studies to explain slum formation. In Section 4, I present recent empirical evidence on the dynamics between slum absorption and slum formation. Finally in Section 5, I introduce the next two chapters that treat–in a transversal way– some of the mechanisms of slum formation and absorption policies in Medellin (Colombia) and in Mumbai (India).

2. Macro–analysis

Rapid urbanization

UN-Habitat (2003a) explains, in a condensed model, slum formation as the result of a combination of poverty with the lack of affordable housing that forces poor people to look for other housing alternatives in the informal sector (See Figure 1). On the one hand, the concentration of the poor in cities is the result of population growth, economic stagnation and increasing inequalities. On the other hand, the lack of affordable housing is the product of inadequacies in the housing provision system. While this unidirectional model is very simplistic and does not allow visualizing the possible interactions among each of the components, it does help to identify some of the slum–formation mechanisms most commonly mentioned in literature: (1) poverty, (2) urbanization and (3) lack of affordable housing. In this sub-section we will see how both the levels of urbanization and the rate at which urbanization occurs are related to slum formation.

Rapid urbanization rates, like the ones some countries are experiencing today, can be traced back to the beginning of world urbanization at the time of the Industrial Revolution. In fact, between 1800 and 1990, the rate of urbanization for today's developed countries was 7.7%, while between 1985 and 2005 the rate of urbanization for developing countries was 7.1% (WB, 2009a). Looking back in time, developed countries also had serious problems meeting the housing needs of low–income migrants during the time of rapid urbanization. London, Paris, Melbourne, Shanghai and many of today's world–class cities were filled with filthy slums having precarious living conditions (WB, 2009a). The comparison of urbanization rates, the level of urbanization and slum incidence among countries has given the idea that slums are simple consequences of

rapid urbanization rates and that slum growth will slow down as urbanization rates decrease and the level of urbanization augments.

Figure 1. The mechanisms of slum formation – UN-Habitat
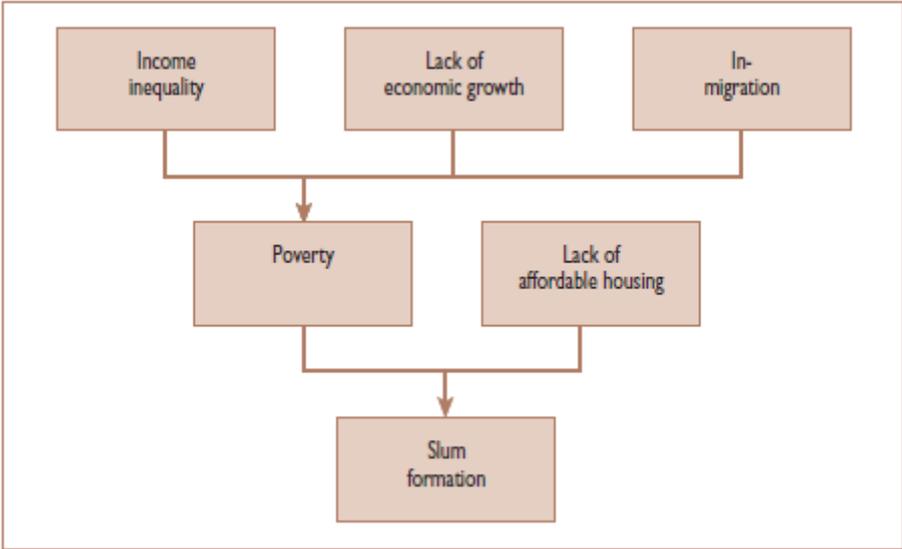
Source: UN-Habitat (2003a)

An analysis of the incidence of urbanization rates on slum formation between 1950 and 2001 revealed that–among the countries having the highest urban slum population in each developing region (exceeding 50% of the total urban population)–the urban growth rate was above three percent. On the contrary, the countries with the lowest proportion of urban slums (less than 15%) had an average growth rate between 2 and 4% for the period of analysis (UN-Habitat, 2003b). A similar analysis made by Kilroy (2008) revealed how the share of the slum population falls as the level of urbanization increases (see Figure 2). However, as he explains, the relation of causality between the share of the urban population and the share of the slum population is not established, and it is possible that some of the observed correlation can be explained by economic growth, since richer countries have generally lower slum percentages and are more urbanized than poorer countries. In the same way, a comparison between the annual growth of the slum population and the annual growth of the urban population revealed a positive correlation. Most rapidly growing countries also present the highest rates of slum formation. A plausible explanation for this, according to Kilroy (2008) is that *"rapidly-growing cities necessitate the equally–rapid expansion of public services provision, which does not occur because the fastest rates of urban growth are observed mostly in low–income countries without sufficient state capacity"[2]*.

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[2] pp. 6

Figure 2. Rapid urbanization and slum growth
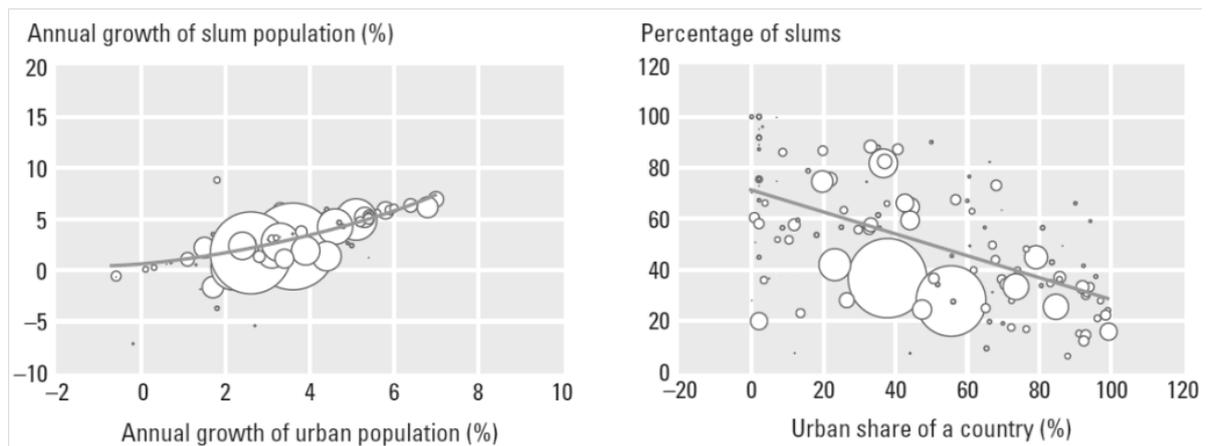
Source: Kilroy (2008)

The previous allusions can be confusing. On the one hand, slum growth is linked to urban growth, but, on the other hand, higher levels of urbanization are linked to lower slum shares to the total urban population. Does this mean that as countries pass from low to higher levels of urbanization, cities will converge to lower slum scenarios? It is not sure, since the casual link between urbanization and slum formation has not been proved and there are a lot of other variables that might also affect slum formation. For instance, it is possible that with higher economic growth and at higher levels of urbanization, a bigger proportion of the urban population is able to enter the formal–housing sector, or that more urbanized and richer countries have better housing financial instruments which allow their formal–housing markets to work better.

Two additional empirical studies evidence the difficulties of establishing causal relationships between urban growth and slum–population growth and the complexity behind slum formation. The first study, done by Lall et al. (2007) evaluates slum growth across Brazilian cities between 1980 and 2000. They find no statistically significant relationship between slum growth and the growth of the urban population and a statistically significant and negative relationship between slum growth and the growth of the formal housing stock (see Figure 3). According to them, *"(their results) suggest that slum formation is a complicated process influenced by various city characteristics, rather than simply proportional to city growth itself"[3]*. The second study, done by Sietchiping and Yoon (2010), evaluates slum incidence in Sub–Saharan Africa based on a number of indicators. They find that the initial level of slums and the level of urbanization had a positive and statistically significant effect on slum incidence in Sub–Saharan Africa.

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[3] pp. 7-8

Figure 3. Slum growth and city population growth in Brazil (left) and slum growth and formal housing stock growth in Brazil (right) between 1980 and 2000
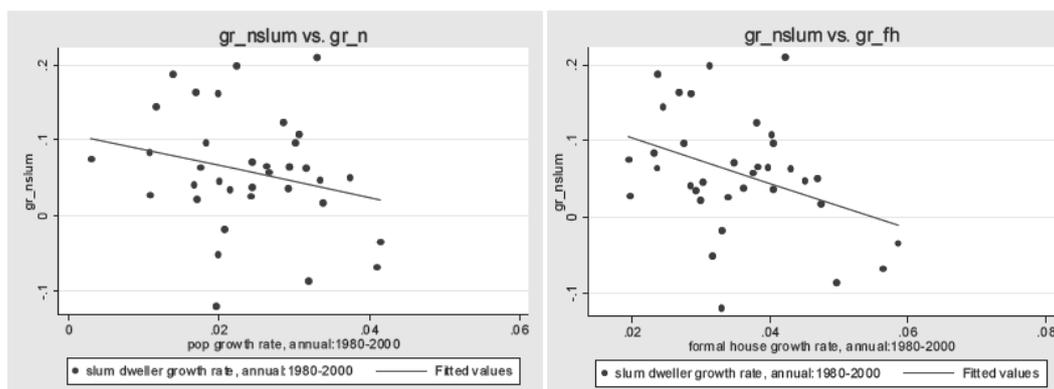
Source: Lall et al. (2007)

In conclusion, based on the current literature it is not clear the role that rapid urbanization plays in slum formation. While existing studies do suggest an existing correlation between the two, it is possible that this is due to the existing correlation between economic growth and urbanization or to the incapacity of cities at low levels of urbanization to respond to demand shocks generated by rapid urbanization. In Box 1 a brief review of the policy recommendations associated to the level of urbanization, made by the World Bank, is presented.

Capital cities, megacities and slums

As many of the world's most famous slums–*Dharavi* (Mumbai), *Kibera* (Nairobi), *Rocinha* (Rio de Janeiro)–are located in very big and important cities, the existence and proliferation of slums has, sometimes, been associated with capital cities or megacities. UN-Habitat (2003a) explains that developing megacities are frequently viewed as crowded cities with sub–standard access or basic services that have grown beyond their optimal sizes. However, empirical evidence has not been able–so far–to establish a causal relationship between large cities and slum incidence. UN-Habitat (2003b) argues that while *"smaller cities do not have the vast areas of social exclusion, informality and unhealthy living conditions of the largest cities, they do have less in the way of urban facilities and development than larger cities, and this contributes to slum incidences that may exceed those of larger cities[4]"*.

An international comparison of the proportion of unauthorized development and infrastructure deficiency in developing cities with different sizes reveals that the proportion of infrastructure deficiency decreases slightly with city size while the level of unauthorized development augments (see Figure 4). Another study–which compares access to piped water, electricity and flushing toilets–also suggests that megacities are more capable of responding to

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[4] pp.25

their inhabitants' basic needs than smaller cities, as on average, bigger cities are better serviced than smaller ones (Cohen, 2006).

Figure 4. Proportion of unauthorized development or infrastructure deficiency according to city size (1993)
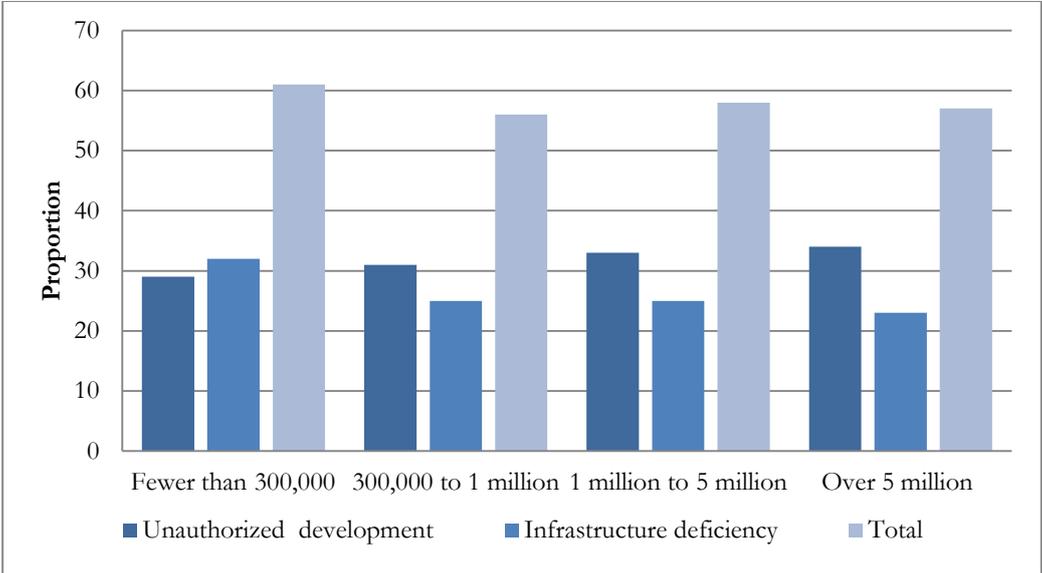
Source: adapted by the author from UN-Habitat (2003a)

An analysis of a selective number of African and Asian countries, in which slum incidence is high, indicated that the generalization of slums is not strictly related to primary cities (Un-Habitat, 2003b). In Figure 5 a comparison of the proportion of the slum population to the total urban population and the proportion of the urban population living in the capital city is presented for four different African countries. As observable, there does not seem to be a dominant pattern associating slum incidence to capital cities. In the next section we evaluate the impact of land regulations on formal housing markets and slum formation.

Figure 5. Proportion of the slum population to the total urban population and proportion of the urban population living in the capital city
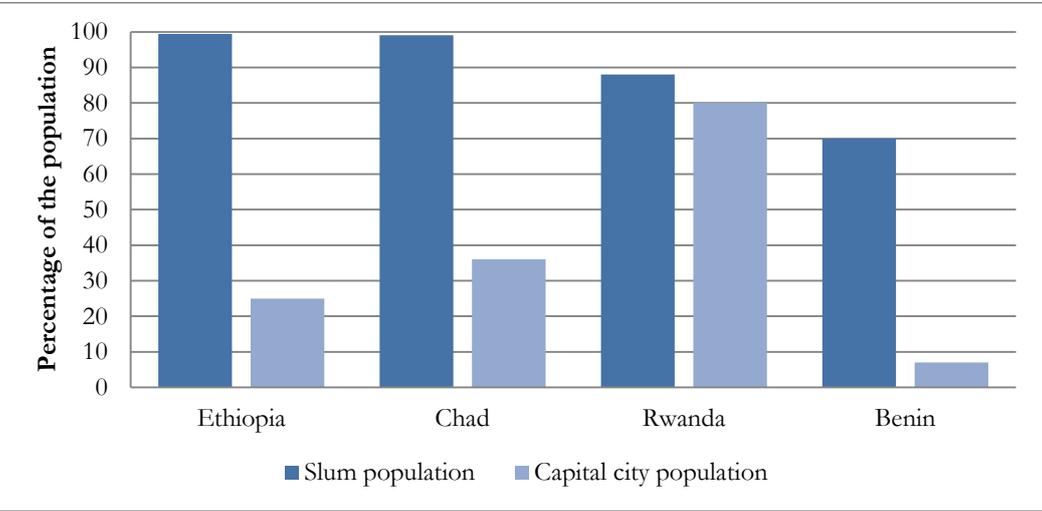
Source: adapted by the author from UN-Habitat (2003b)

Box 1. Policy recommendations for different levels of urbanization

According to the WB (2009*) "The emergence and growth of slums in the early and intermediate stages of a country's development can be explained by the interaction of functioning labor markets with dysfunctional land markets. In the rapid phase of urbanization, the labor market signals higher labor demand in urban areas, the higher demand that rises from growth in industries and services. Labor responds by moving to towns and cities."* While the causal link between urbanization and economic growth, or the inverse, has not been proved, higher levels of urbanization are in many cases associated to positive outcomes in terms of social capital accumulation, democratic accountability and improvement of the quality of life. Urbanization, if well, managed can be a positive fuel or economic development.

The World Bank in the 2009 World Development Report recommends governments to coordinate their policies according to the level of urbanization or what they call an "I" for a "D". Areas of incipient urbanization should create spatially blind institutions (people will move according to market forces). Areas of intermediate urbanization should additionally create spatially connective infrastructure (diminishing congestion effects and increasing agglomeration economies) and areas of advanced urbanization that have within city divisions (like slums) should -in addition- create spatially targeted interventions (i.e. slum upgrading).

3. Economic Theory

In this section I expose some of the most interesting theoretical developments related to slum formation. The first study, done by Henderson (2009) will serve to illustrate the general effects of regulations on the elasticity of supply of the formal–housing market in cities and how formal residents can use regulations to push some of the migrant population into the informal housing sector. The second and third studies, done by Hoy and Jimenez (1991) and Jimenez (1985) reveal the interactions between squatters, landowners and local governments that lead to squatters and formal residents compete for land within the city, with squatters squeezing the formal market. Another theoretical study that I will not discuss in this section, but that is worth highlighting, is Turnbull (2008). Turnball (2008), who develops a very similar model than Hoy and Jimenez (1991), reveals that incomplete land markets do not inexorably produce squatting equilibriums but that squatting arises from landowners' rational decision not to fully exercise their property rights.

The role of regulations in the development of the informal sector[5]

Henderson (2009) explains how traditionally urban regulations have two bases in economics. The first is to avoid neighborhood externalities or asymmetries of information that lead to a less-efficient market. For instance, zoning norms that separate industrial and residential uses of land, serve to avoid possible externalities generated by industries' noise or contamination. Construction

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[5] This sub–section is based on Henderson (2009)

standards, allow diminishing asymmetries of information for buyers, who would otherwise find it very difficult to estimate the structural quality of housing structures. These types of regulations are generally considered welfare improving.

The second type of urban regulations is referred to by Henderson (2009) as exclusionary zoning. The latter may not be welfare improving for the society, as they can be used to protect the interest of existing residents and regulate the entry of new residents to their communities. For instance, existing residents can influence the imposition of minimum lot sizes, building restrictions and open–space allocation, all of which oblige a minimum consumption of housing goods and minimum quality. In addition, existing residents can influence the introduction of costly entry procedures, which increase construction or transference costs and can make the community less attractive. A more in–depth analysis of this type of regulations in developing countries can be found in Box 2 and an example of strict land regulations in Mumbai can be found in Box 3.

But what are the effects of land–use regulations on prices and housing supply? Residential land market regulations modify the price elasticity of supply as presented in Figure 6. As Henderson explains, a non–regulated market has an *elastic supply* curve and when demand shifts from D_0 to D_1 the market equilibrium is displaced from O to A. On the contrary, a regulated land market has an *inelastic supply* curve and when demand shifts from D_0 to D_1 the market equilibrium is displaced to B, which leads to a higher unitary price and a much lower quantity response to the demand shock when compared to the demand-supply equilibrium (A) of the *elastic supply* curve.

Figure 6. Modeling the effect of regulation on prices and supply
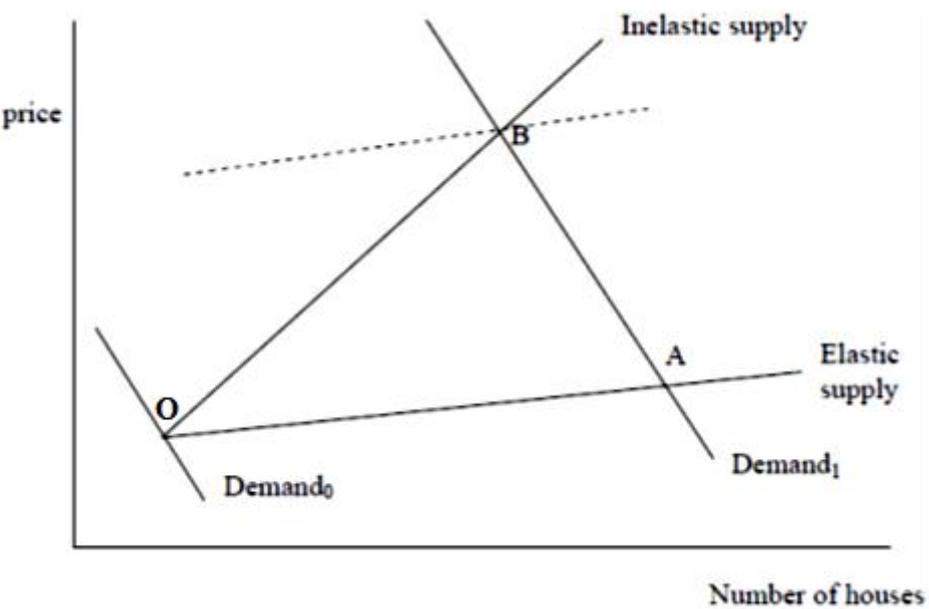
Source: Henderson (2009)

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Some empirical studies on the effects of regulation on housing prices made by Malpezzi and Mayo (1997), Mayo and Sheppard (1996) and Bertaud and Malpezzi (2001) suggest that restriction are more costly for lower–income groups since they induce "forced consumption." Restrictions have little effect on middle–and higher–income groups who anyway would demand and be willing to pay for the minimum quantities and qualities defined by regulations. Another study done by Glaeser et al. (2006) finds that the response of regulated cities to positive demand shocks are limited because the housing market is not able to expand.

Contrary to previous empirical studies on the subject, Henderson (2009) proposes to treat regulation as endogenous and uses this to explain the emergence of an informal–housing market in developing countries. A city, and its existing residents, can strategically decide to implement exclusionary regulations which discourage immigration and push the new population to the informal–housing sector. The interest of existing residents in pushing the new population to the informal–housing sector rises from the following argument: since migrants are usually poorer, their inclusion in the formal–housing sector supposes the extension of local public services that generate a fiscal burden to existing residents. If migrants live in the informal sector they will contribute to some of the city taxes (i.e. wage taxes, sales taxes) and get no services in return. Henderson's theoretical analysis reveals that if migrants can freely enter the formal sector, equilibrium leads to a larger city and lower utility for existing residents. Using the case of Brazil to evaluate empirically his theoretical development, he finds that poor migrants are more poorly served than poor residents and the first are more likely to live in stricter zoning regulating areas than the second. He also finds that cities that are both larger and more educated are more likely to reduce servicing to migrants.

The role of regulations in informal settlements or slum formation has also been recognized by international organizations. According to the World Bank "*Regulating, zoning and minimum standards are key policies levers for affecting the operation of urban land markets and particularly access to shelter and land by the poor. There is ample evidence than when formal land development parameters are not benchmarked against what the local population can afford to pay, most households (not just poor households) are excluded from access to formal land ownership*"[6] Buckley and Kalarickal (2006). UN-Habitat also points out that most urban–planning regulations in developing countries, which are generally based on the experience of developed countries, are not affordable for the majority of the population and should be redeveloped on a basis of realistic standards (UN-Habitat, 2009b).

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[6] pp.36

Theoretical models of slum formation: stable squatter equilibriums

Laquian (1973) argues that squatter communities are located on land that belongs to the government or on private land that has not been developed for a number of reasons. In the case of governmental land, land is sometimes kept outside the market for the development of future infrastructure, to avoid the installment of communities in areas prone to risk or for the creation of buffer zones that divide different land uses (i.e. space between railway lines and building constructions). In the case of private land, land can be kept from development for speculative purposes, since in the actual state their development is not sufficiently profitable. For instance, the existence of strict regulations or rental–control acts might diminish private incentives to develop land.

Jimenez (1985) and Hoy and Jimenez (1990) develop a theoretical model to explain why squatting occurs based on households' rational optimization between the formal and informal market. They suppose that rational households optimize their utility choosing between squatting and living in formal–housing constraint to the action of an external agent (government or private owners) who decides whether to enforce legal property rights and evict squatters. In equilibrium, households are indifferent between the two tenure options. Jimenez (1985) evaluates how the total number of squatters changes, under different assumptions (free entry or restricted entry), and, under a number of external changes (income growth, increased law enforcement). Hoy and Jimenez (1990) examine if private landowners' and squatters' individual strategies lead to the social optimum. I will first present what the model specification and hypothesis are for these two theoretical developments, and then, evaluate what these theoretical developments tell us about slum formation and slum policies.

The Jimenez (1985) basic model supposes that all households are alike, vacant land–which is fixed–is assumed to be owned by the government and households are price takers. The analysis focuses on behavior by the supply side of squatting. Households maximize their utility choosing between living in formal housing and being squatters according to their budget constraint, which accounts for the cost of defending squatter communities from evictions. It supposes that as the number of squatter raises, the probability of being evicted is reduced and the cost of being a squatter augments due to a congestion effect[7]. While formal owners have to pay rent, squatters

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[7] The hypothesis is that–given a fixed amount of amenities and land which yield the services to be consumed–the higher the number of squatters, the higher the congestion in using amenities and land will be. Jimenez (1985) also supposes that the additional congestion of another squatter is less where there are few squatters than where they are many.

do not, but they have to pay a cost for accessing urban services and protecting themselves from eviction. Some interesting results from his model are the following:

- An increase in squatter income has an ambiguous effect on the number of squatters. Under constant absolute–risk aversion, an increase in income leads to no change in the number of squatters.
- With entry restrictions, the number of squatters in equilibrium is smaller than in the competitive solution with no entry restrictions.
- In the coalition model with entry restrictions, an increase in government expenditures on eviction generates a new equilibrium with a bigger squatter community than the one before.

The Hoy and Jimenez (1990) article evaluates squatting and private land owners' interactions examining what the socially optimal land–management policy for squatter areas are. It is based on a game in which private land owners announce their eviction policy in the first stage, squatters decide their level of investment and eviction occurs in the second stage, based on the possibilities of development and the cost of eviction. They assume that each landowner owns several parcels of land, in which potential for development is uncertain. Each parcel is divided among homogenous squatters who have to be evicted if the parcel is to be developed. As in the case of Jimenez (1985) households decide their tenure choice (squatting versus living in formal housing) maximizing their utility. Due to transaction or bargaining costs landowners are unable to recuperate rents from squatter. Results indicate that landowners, when choosing a level of eviction, do not take into account the effect of their actions on squatters and will tend to evict over what is socially optimal. *"It is the inability of landowners to maintain flexibility in use of land while collecting some payment form squatters which prevents internalization by landowners of the benefits to land use by squatters"*[8].

A more recent theoretical development on slum formation made by Brueckner and Selod (2009) considers, contrary to Jimenez (1985) and Hoy and Jimenez (1990), that squatter settlements squeeze the formal market by using land that could otherwise be developed in the formal housing market. The model assumes that the city's land area is fixed, land is homogeneous but households can be heterogeneous (i.e. skilled and unskilled workers). All households are assumed to be renters and the city's landowners are absentee. As in the case of Jimenez (1985) and Hoy and Jimenez (1990) squatters don't have to pay rent but incur costs to defend themselves from being evicted. In the base model there is a squatter organizer that controls the squatter population, has the power to dictate defensive expenditures and plot size and whose goal

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[8] pp.80

is to maximize squatters' utility. In equilibrium no eviction occurs. The squeezing mechanism means that for a given number of squatters, increasing the quantity of land consumed increases squatters' utility but invites eviction. In the same way, a lower level of defense expenditures increases the consumption of non–housing goods but invites eviction.

Brueckner and Selod (2009) find that, under certain conditions, there is a stable squatter equilibrium in which no household gains from changing their tenure. However, when analyzing the possibility of formalizing tenure for squatters, they find the city's squatter equilibrium to be inefficient. In fact, if a transfer mechanism between winners and losers is put into action, a policy formalizing squatters provides sufficient welfare gains to compensate the losers. The winners in the case of formalization are formal housing residents and absentee landowners, the first who end up paying less rent after formalization (i.e. squeezing effect) and the second who manage to recuperate rent from their previously squatter areas. The losers are squatters who have to start paying rent to landowners and those who received defensive expenditures made by squatters. Variants of the base model, which consider uncontrolled squatter migration, suggest a higher squatter population in equilibrium than in the base model and a further worsening of formal resident's welfare due to the squeezing effect.

In the three theoretical models explored, under a certain number of conditions, a stable city's squatter equilibrium exists in which no household gains from changing tenure. While the mechanisms that lead to this equilibrium are different in each of the models, they serve to provide theoretical evidence that supports the existence of slums in cities. The three models are, as most theoretical developments, very simplistic and some of the hypothesis (i.e. migration control, city land fixed) might be far from the reality, but they bring to light some interesting ideas that relate to the causes of slum formation and policy implications for slum absorption. For instance both Hoy and Jimenez (1990) and Brueckner and Selod (2009) signal the absence of mutually accepted means to internalize the benefits of squatting land that allow transactions between squatters and landowners, as one of the possible causes of the existence of a stable and inefficient squatter equilibrium. The main hypothesis and policy implications of these three models are summarized in Table 1.

Table 1. Theoretical slum formation models

Article	Main hypothesis (non-exhaustive)	Agents	Slum formation as...	Policy implications (Results)
Jimenez (1985)	Households are indifferent between two tenure options. No negative externalities from squatters to formal residents	Households Government	-	In some cases increased eviction threats by the government can lead to an increase of the squatter population
Hoy and Jimenez (1990)	Households are indifferent between two tenure options	Households Private Owners	The absence of mutually accepted transactions between squatters and landowners	In equilibrium private owners tend to evict more than what is socially optimal
Brueckner and Selod (2009)	Households are indifferent between two tenure options. Squatting squeezes the formal sector.	Households Community organizer Absentee landowners	The absence of mutually accepted transactions between squatters and landowners	There is a Pareto improving way of escaping a city squatter equilibrium: formalizing squatters

4. The link between slum formation and slum absorption policies[9]

So far, we have been able to perceive the complexity of identifying slum formation mechanisms both in theory and based on empirical evidence at a macro–level. In this section I present one of the most innovative empirical developments present in literature which serves to establish a link between slum absorption policies and slum formation. While some counter–intuitive results have already been found in slum–formation theoretical studies (i.e. eviction could lead to higher slum formation), the work, done by Lall et al. (2007) is the first to evaluate –using empirical data–the consequences of slum policies on slum formation. Using data on Brazilian cities, they evaluate whether urban land regulations influence slum formation. The importance of this empirical study lies in the recurrent argument or myth associated with slum absorption policies. In fact, many local governments think that implemented pro–poor and slum–absorption policies in cities makes them more attractive to migration and can actually lead to a higher slum formation.

Lall et al. (2007) study two types of land regulations. The first refers to the use of zoning regulations that serve to allocate land among different land uses. The second refers to the use of special regulations that serve to lower the minimum lot size in some areas of the cities for the development of low–income housing. The latter are called Special Zones of Social Interest (ZEIS: *Zonas Especiais de Habitacao de Interesse Social).* As explained by the authors, *a priori*, the slum formation implications are ambiguous as *"if the barriers to entry are sufficiently strong, the demand on the*

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[9] This sub-section is based on Lall et al. (2007)

formal supply system will drop and slum formation may possibly slow down. However, the extent to which drop in migration is accompanied with an increase in formal housing supply remains an empirical question". Land regulation, as evaluated in the previous section, can serve as exclusionary policies inhibiting migration.

The model developed is composed of two parts. The first part comprehends the development of a housing supply–demand model based on a model used by Malpezzi and Mayo (1997). The formal housing supply model is a function of formal housing prices while the demand model is a function of average per–capita income, the number of people living in formal houses and the formal–housing price. The formal–housing model reveals the price elasticity of formal supply, which is intuitively linked to slum formation, as previously discussed in the work done by Henderson (2009).

The second part comprehends the development of a migration–and slum–formation model in which households decide (1) to which city they wish to migrate and (2) whether to live in the formal–or informal–housing sector. Some of the hypotheses made in the model are the following: The size of the formal–housing market is fixed (i.e. the number of households who buy formal houses is exogenously given). The growth of the informal–housing market and the city population are endogenously determined. In the migration model there are no migration costs and people can migrate freely across cities. The decision to migrate to a given city is affected by regulations which increase formal–housing prices or the cost of entering the city, but also depends on the income possibilities the city offers. Once migration occurs, a household's decisions to live in the informal or formal sector are given by the following assumptions:

(1) Households' willingness to pay (WTP) for a formal house is greater than an informal house.
(2) Land regulations, such as construction costs, increase the total construction cost of formal houses when compared to informal ones.
(3) Therefore, a household decides to build an informal household if the difference between the formal and informal total–construction cost is higher than the difference between households WTP for formal and informal houses.

In addition to the previous decision thresholds, Lall et al. (2007) introduce households' access to financial markets as a variable affecting the decision over housing tenure. A limited access to the credit market might also influence a household's decision to build an informal household. A **comparative–statics** analysis reveals the difficulties of establishing what the dominant effects of income growth and land regulation on slum formation are:

The effect of land regulations on slum growth is ambiguous as strict land regulations might push some of the city's population to find accommodation in the informal housing sector but might defer poor households from moving to the city.

The effect of increase in income on slum formation is also ambiguous as higher income has a positive effect on formal–housing demand and–therefore–should decrease slum formation, but the latter could generate an increase in prices due to a demand shift that might force some household to build informal houses. Curiously, in some cases, when the housing supply is inelastic and there is low–price elasticity and high–income elasticity of housing demand, economic growth can generate an increase in slum formation.

Some results from the Lall et al. (2007) study are the following:

− In all model specifications they find that cities that introduced minimum lot–size regulations experienced higher slum formation rates. In fact, city–population growth is higher than the housing–supply growth generated by pro poor–land regulations.

− In all model specifications the introduction of zoning regulation has no effect on slum–formation rates. In fact, the opposite effects on the growth of the city population and the growth of the formal housing market are of the same magnitude.

5. The mechanisms of slum formation in Medellin (Colombia) and in Mumbai (India)

In this chapter I have presented the complex mechanisms underlying slum formation and the little existent economic literature regarding this subject. We have seen how some of the myths of slum formation (i.e. rapid urbanization and megacities) are not supported on solid empirical analysis and others (i.e. the role of regulations in slum formation) rely on very complex mechanisms which are difficult to examine with the naked eye.

In the next two chapters I present an empirical analysis related to the mechanisms of slum formation in the city of Medellin and in the city of Mumbai. **Chapter 3** presents a comparative analysis of the history of slums and slum policies in Medellin and Mumbai. It serves as an introduction to the context of the empirical analysis evaluating slum–absorption policies presented in **Part II** of this dissertation. In addition, in **Chapter 3**, I present a simple framework that accounts for the economic policy affecting slum formation similar to the one developed by Henderson (2009), in which slum–inclusion or exclusion policies are fueled by a set of external factors generated by the informal housing sector. **Chapter 4**, which only analyzes the case of Medellin, evaluates households' choices between different tenure forms using hedonic–price

functions to evaluate household's willingness to pay for different rental contracts in informal settlements.

Chapter 3

The inclusion of the informal city in the urban territory: a comparison between Medellin and Mumbai

Abstract

The growth of cities in developing countries has been accompanied by the growth of an informal city on the margins of the city. This informal city generally lacks of basic urban services and generates a number of fragmentations of the urban tissue. In this article I review the history of the informal city in Medellin, Colombia and Mumbai, India; evaluating its formation and evolution. I reveal how urban policies have influenced the typology and location of the informal city and how this typology has influenced the inclusion policies implemented in these two metropolises. The comparison between the policy of *Urban Integral Projects* (*Proyectos Urbanos Integrales*, PUI; *UIP* for its initials in English) in the city of Medellin and the *Slum Rehabilitation Scheme* (SRS) in the city of Mumbai confirms the relevance of defining policies locally while -at the same time- setting forth elements that are valid globally, especially in the case of policy design and coherence.

Résumé

La croissance des villes des pays en voie de développement a été accompagnée d'une croissance de la ville informelle à la marge de la ville. Cette ville informelle manque généralement des services urbains de base et engendre des fragmentations du tissu urbain. Ce chapitre présente l'histoire de la ville informelle à Medellin, Colombie, et Mumbai, Inde ; en analysant sa formation et son évolution. Il montre comment les politiques urbaines ont influencé la typologie et la localisation de la ville informelle et comment cette typologie a influencé les politiques d'inclusion de la ville informelle actuellement appliquées dans ces deux métropoles. La comparaison de la politique des Projets Urbains Intégraux (*Proyectos Urbanos Integrales*, PUI) de la ville de Medellin et du Schéma de Réhabilitation des Bidonvilles (*Slum Rehabilitation Scheme,* SRS) de la ville de Mumbai, confirme la pertinence du niveau local pour la définition des politiques en même temps qu'elle expose des éléments qui sont valables globalement, en particulier pour la conception de la politique et sa cohérence.

1. Introduction

Urbanization in developing countries has been largely translated into a multiplication of informal settlements that are synonymous with poverty and poor sanitary conditions. *Pirate urbanizations*, slums and *pavement dwellers* are all evidence of the existing housing problems in developing cities and a example of life outside the planned city. According to the United Nations, each year 70 million new inhabitants are added to urban areas and around half of those entering developing world cities are being housed in the informal sector (UN, 2007).

In some cases, the size of the informal city can overshadow the formal city, as happens in Mumbai, India, where more than half of the inhabitants live in slums. Meanwhile in others, as happens in the city of Medellin, Colombia, the informal city becomes the focus of illegality or informality, generating perverse effects on the quality of life of the inhabitants of these settlements and the rest of the city. In the latter, informal settlements house the majority of illegal activities and groups outside the law.

Policies against informal settlements have evolved considerably since the late 1970s, a time in which the main policy followed was to evict slum dwellers without any compensation and demolish their dwellings. Advances in ideology have resulted in agreements, such as the Millennium Development Goals, which are expected to improve significantly the lives of 100 million people living in this type of settlements between 1990 and 2015. In the last decade, a number of countries and cities have led campaigns for the inclusion of the informal city, through the introduction of new urban policies. However, the recent search for more inclusive cities has generally focused on the problem (the existing informal city) and has ignored the dynamic relationship that exists among urban policies, the informal city and inclusion policies.

But, what role do urban - or the so called inclusion - policies play in the formation and evolution of the informal city? And, how can cities achieve total inclusion of the informal city in

the urban territory? To answer these questions, I carry out an historical analysis of the informal city and the urban/inclusion policies in Medellin and Mumbai. These two cities stand out for their introduction of new, innovative urban policies that, although they differ in their form; both seek the inclusion of the informal city in the urban territory. Throughout this article, I evaluate the reasons and evolution of the informal city in Medellin and Mumbai, as well as the legal and ideological developments that made the application of the current policies possible. Although it would be very difficult, given the political, economic, social and institutional context of each of these cities; to exchange policies from one city to another, a general analysis allows setting forth the elements that are globally valid, especially in the case of policy conception and coherence and in the search for the creation of a more uniform urban territory.

This article is organized in the following manner. In Section 2, a basic dynamic model is presented, which serves as a conceptual framework to analyze concepts developed in the rest of the article. In section 3 a brief analysis of the emergence and types of informal settlements in each city is provided. Section 4 evaluates the history of inclusion policies up to today's currently implemented policies. Section 5 includes a detailed analysis of the current policies and, finally, Section 6 presents discussions and conclusions.

2. Conceptual framework

The existence, magnitude and evolution of the informal city are closely related to the creation and transformation of urban policies, as well as the introduction of inclusion or exclusion policies. In Figure 1 a simple model, in which the dynamics of the informal city formation and transformation, is presented. I will refer to this model throughout the article. In the theoretical model presented, the city is observed in three moments. In Instant t, at the beginning of urban planning, authorities define what the *minimum living standards* for the formal city are, either from the establishment of an urban perimeter, urban zoning, or the definition of construction standards. Henderson (2009) explains how the society (through the city's authorities) could use exclusionary zoning which might force the new population to the informal-housing sector. The interest of existing residents in pushing the new population to the informal-housing sector rises from the following argument: since migrants are usually poorer, their inclusion in the formal housing sector supposes the extension of local public services that generate a fiscal burden to existing residents[1].

In Instant t, the existing city is divided into two: that which fulfills the minimum requirements -the formal city-and that which does not fulfill them -the informal city. By defining *minimum living standards,* local authorities also determine the cost of entering the formal city for the

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[1] For more information on Henderson's (2009) work please refer to Section 3 of Chapter 2

new population and influence housing decision between the informal city and the formal city at Instant *t+1*.

Figure 1. The dynamics between urban policies, the formal and informal city, and inclusion policies
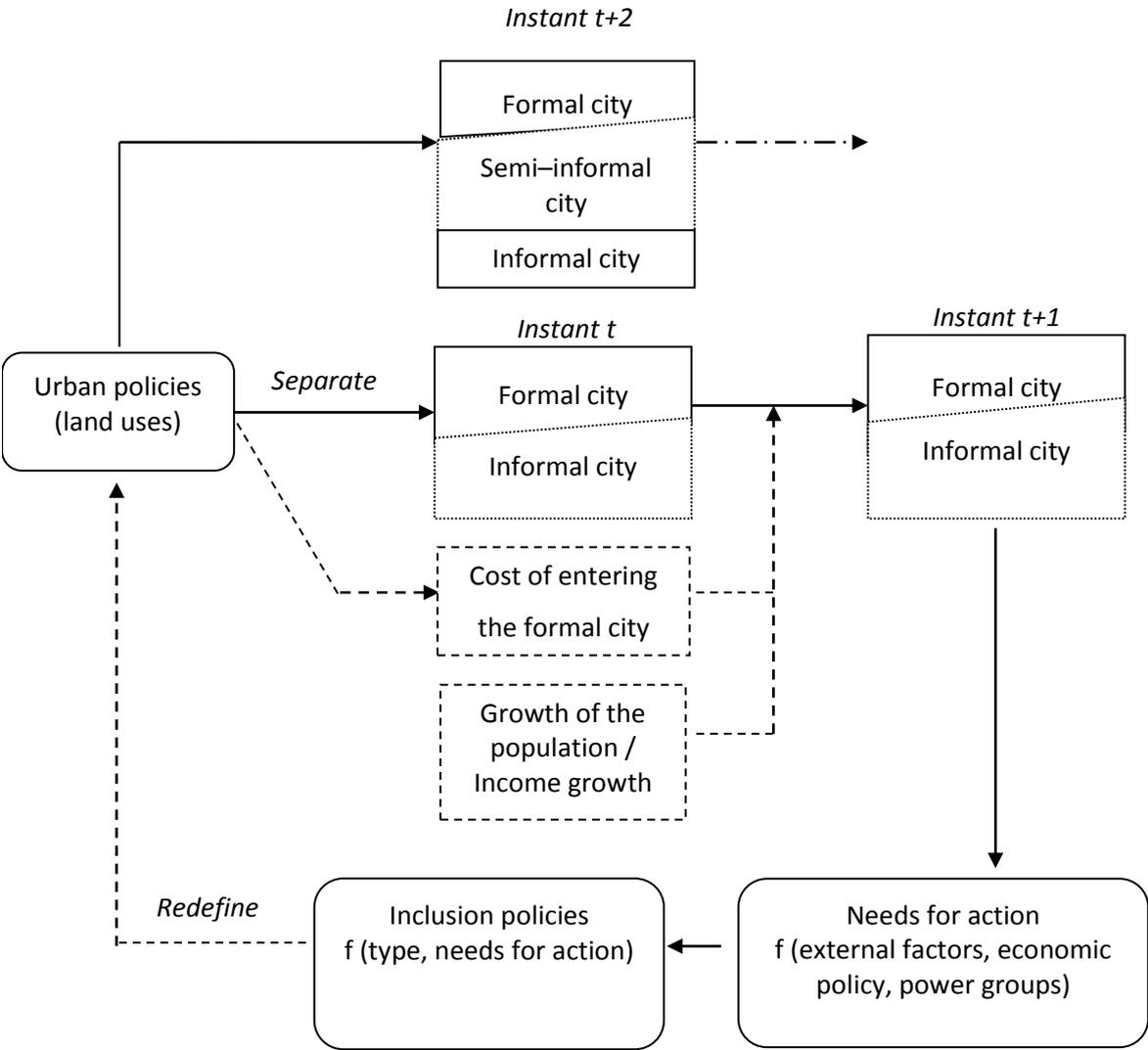
The emergence and existence of the informal city generates a number of externalities on the rest of the formal city. For instance, the generalization of the informal city can generate fiscal problems for the local authorities, who are unable to collect taxes in these areas but who do provide a number of public services[2]. One of the possibly externalities generated by the informal housing sector is discussed in the theoretical model of slum formation developed by Brueckner and Selod (2009) who argument that informal settlements squeeze the formal market by using land that could otherwise be developed in the formal housing market. These externalities and/or opportunities generate needs for action and are the precursors of inclusion or exclusion policies

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[2] Although, generally, the basic household utilities (water, sewerage and energy) are not provided to the entirety of the informal city, the majority of the cities do provide health or education services to their inhabitants.

that redefine urban policies. Local authorities can decide, for example, to legalize all those informal developers who are in the territory before a given date. The restructuring of initial urban policies in Instant *t+2*, beginning with the so-called inclusion policies has two effects. On one side, they modify the division between the formal and informal city or create new fractures within the informal city. On the other side they redefine the costs of entering the formal city, which determines the future growth of the formal and informal city.

In the following sections, I discuss how the previous dynamic has occurred in the cities of Mumbai and Medellin. The analysis of this dynamic is useful to understand the type, dispersion and magnitude of the current informal city, as well as the emergence of inclusion policies currently being implemented in these two cities. I will also show how current inclusion policies are inserted in this dynamic and which factors, besides those previously mentioned, can influence some of the components of Figure 1. For example, the implementation of decentralization processes, which award greater power to the cities regarding urban planning, allows for the implementation of inclusion policies that are relevant locally.

3. Urbanization and growth of the informal city

Medellin and Mumbai are two cities separated by several oceans with very different cultures but many things in common. Both have fulfilled fundamental roles in the economic development of their countries - Colombia and India; both have considerable topographical constraints on urban development due to their location (in the case of Medellin, these are the mountains; in the case of Mumbai, it is the ocean) and both have set the task of achieving a better inclusion of the informal city in the urban territory.

Mumbai is the largest city in India, with a population of 13 million inhabitants, and the most important economically, given its contribution to the national GDP (MCGM, 2005). Medellin, meanwhile, is the second most-important city in the country in terms of its contribution to the GDP and population, with 2.4 million inhabitants and close to 3.5 million counting the adjoining municipalities (Alcaldia de Medellin, 2006a). The urban development of these two cities has been made at the expense of the growth of the informal city, despite the fact that the manners and proportion that this informal growth has taken are different. In Mumbai, the greatest proportion of informal settlements is product of invasions of properties that belong to third parties (58% private property and 42%, the property of public entities) (Montgomery Watson and Consultants, 2001). On the contrary, in Medellin, a large part of the informal urbanization has been done through *pirate urbanizations* that have greater legitimacy in the occupation of the territory. *Pirate urbanizations* are the product of illegal land divisions made by land speculators who divide plots and sell them to poor migrants. When formed, *pirate urbanizations* generally lack basic

infrastructure but space for the construction of future roads is sometimes considered; the construction of housing structures is usually left to new occupants'.

Mumbai, restrictions of space and rights

India continues to be a rural country having only 30% of its population living in urban areas. In addition, it possesses an over-populated and highly fragmented countryside in which subsistence farming is difficult, a characteristic that makes the rural exodus inevitable (WB, 2009b). Official statistics suggest that around 46% of the migrant population possess less than 0.01 hectares (ha.) of arable land in the countryside (NSSO, 1993). Faced with this evidence, one would think that cities in India would be preparing themselves to receive masses of new inhabitants, but the reality is different. In the political discourse, the growth of the informal city is generally related to the rapid growth of the urban population, while in reality a great extent of the explosion of the informal city is the result of a series of urban policies implemented before and after the Independence, which generated a formal city that was inaccessible for lower income groups.

One of the urban policies used to curb migration is the establishment of homogeneous and extremely low Floor Space Indexes (FSIs)[3]. Strict Floor Space regulations were created under the pretext of restricting growth and decongesting cities by limiting rural-to-urban migrations. These FSI restrictions, together with Mumbai's topographic constraints, generated a bottleneck in the real-estate sector that is less able to respond to demand shocks.

Three censuses conducted in 1976, 1983 and 2000 reflect the constant growth of the informal city population in Mumbai, which rose from 2.8 million in 1976 to 4.3 million in 1983 to 6.2 million in 2000(Montgomery Watson and Consultants, 2001) (see Figure 2). As can be observed in Figure 4, in Mumbai -in contrast to the city of Medellin- the informal settlements are found dispersed throughout the city, in the poorest as well as the richest neighborhoods. The latter is explained partly by the relation that exists between Indian cultures and religions that permits a co-existence between the poor and the rich in a spatial micro-segregation, and household's preferences to live close to work and diminish transportation expenses. This co-existence between the formal and informal city, as will be seen later on, is a fundamental element for the success of the current rehabilitation policy.

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[3] Floor Space Index (FSI) is the relationship between the area constructed and the area of the terrain. For example, a single–story house that occupies all the land or a four–story building that occupies one–fourth of the land may be built on an FSI of one (1). Generally, urban construction regulations are defined not only by the FSI, but by the restriction of height (in meters of the number of floors).

Figure 2. Growth of the formal and informal city in Mumbai and Medellin
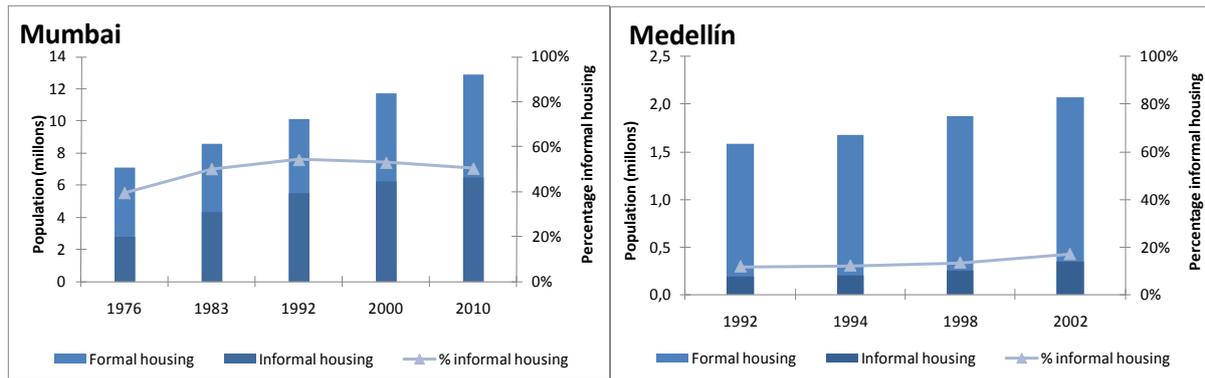
Source: Torres Tovar (2010); Montgomery Watson and Consultants (2001), MCGM (2005)

Medellin, the city at the edge of the city

The habitat situation in the case of Medellin is linked to national circumstances. Violence in the countryside has generated a migration, in which incentives to move to urban areas are not given only by income gradients but respond to risk reduction behaviors. Migration product of forced displacement has led to a reduction of productivity in the countryside and an increase of unemployment rates in cities. A number of publications have shown how both preventive and reactive displacements generate substantial losses in welfare. According to a study conducted in Medellin, Bogotá and Cali by Kirchoff and Ibáñez (2005): close to 30% of forced displaced households are unemployed. This phenomenon, external to the actions of local authorities, exacerbates the growth of the informal city in urban peripheral areas. Forced displaced household who have lost most of their physical capital are faced to a city that is not prepared to correctly absorb them. Most of them join the newly formed informal settlements or intensify overcrowding by lodging, sometimes permanently, in homes of close relatives.

The evolution of the informal city in Medellin has a particular characteristic that responds, in part, to the evolution of urban policies in Colombia and the evolution of the role of the State to solve the housing problem. As can be seen in Figure 3, beginning in the decade of the 1960s, there was a reduction of urbanization made through *pirate urbanizations,* replaced by squatter urbanization. *Squatters* or *invasiones* are the product of illegal occupation of lands, are generally less structured and consolidated when compared to *pirate urbanizations* and households living in this type of settlements usually do not have legal proof of ownership of their land or housing structures. This rupture is due, in part, to the introduction of Law 66 of 1968, which declared *pirate urbanization* to be a crime punishable by imprisonment. Later-on, the weight of urbanization made through state-level public housing decreased significantly since the 80s. The elimination of two of the main forms to access housing for the lower-income sectors (*pirate urbanizations* and public housing), is one of major contributors to the increase of invasions in the 90s.

The growth of the informal city in Medellin has been tracked by the *Departamento Administrativo de Planeación*. In 1992 around 70 informal *barrios* were identified with around 37,000 household and a population of 185,000 inhabitants. Only two years later, in 1994 89 informal settlements were identified composed of 45,000 houses and 202,500 inhabitants. In 1998 these numbers had increased to 50,000 houses and 250,000 persons (see Figure 2) and by the end of 2002, the planning department had identified 104 settlements in which some 350,000 people lived, equivalent to 18% of the population in the entire city (Torres Tovar, 2010).

Figure 3. Percentage distribution of *barrios* by type of settlement in the city of Medellin from 1948 to 1998
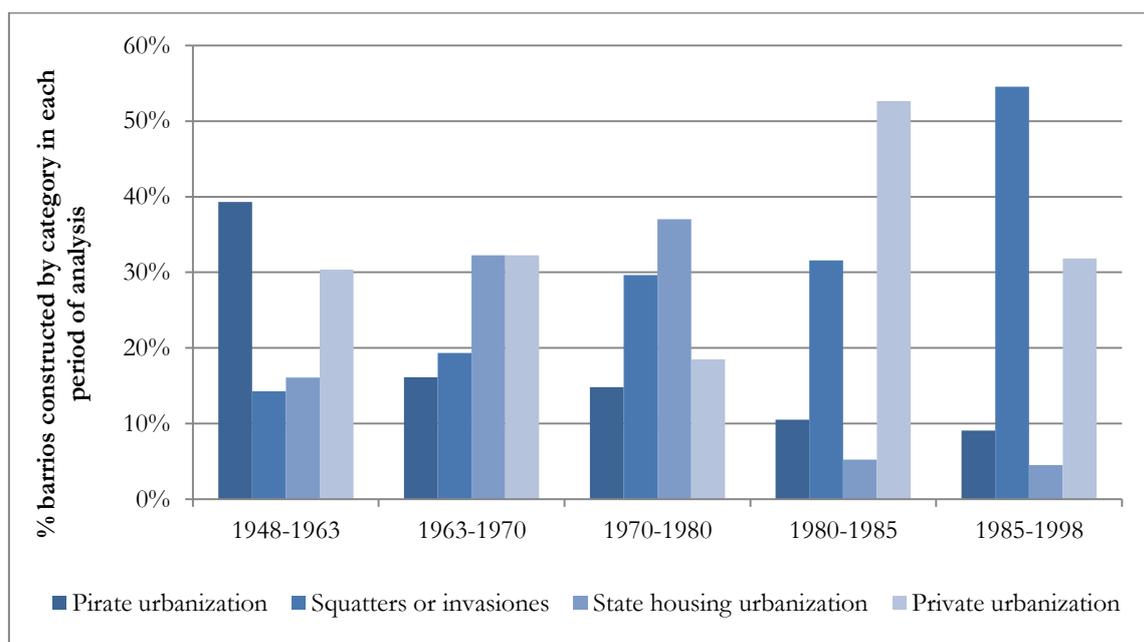
Source: Adapted by author from the Developmental Planning Unit (DPU, 2006)

Figure 4 shows the divergence of the spatial distribution of the informal city of Medellin and Mumbai. As previously mentioned, in Mumbai informal settlements are dispersed throughout the urban territory, while in Medellin, they are concentrated in the city boundaries. The current distribution of the informal city in Medellin is consistent with the implementation of various urban policies during their development. At first, urban planning consisted of defining the perimeter of the city, which made all land located just outside the perimeter cheaper, to be occupied by poor migrants through *pirate urbanizations*. The perimeter of the city, as explained by López-Peláez and González (2008) was redefined on several occasions to reach the current size, absorbing the lands adjacent to the dividing lines and integrating the previously formed *pirate urbanizations*. Although some informal settlements were formed in the center of the city of Medellin, a series of inclusion and exclusion policies contributed to their disappearance. Only a few isolated fragments, as in the case of *Moravia*, persist and retain their informal character. These policies will be discussed in the next section.

Figure 4. Distribution of informal settlements in Medellin (left) and Mumbai (right)

Pirate urbanization

Squatters

Formal urbanization
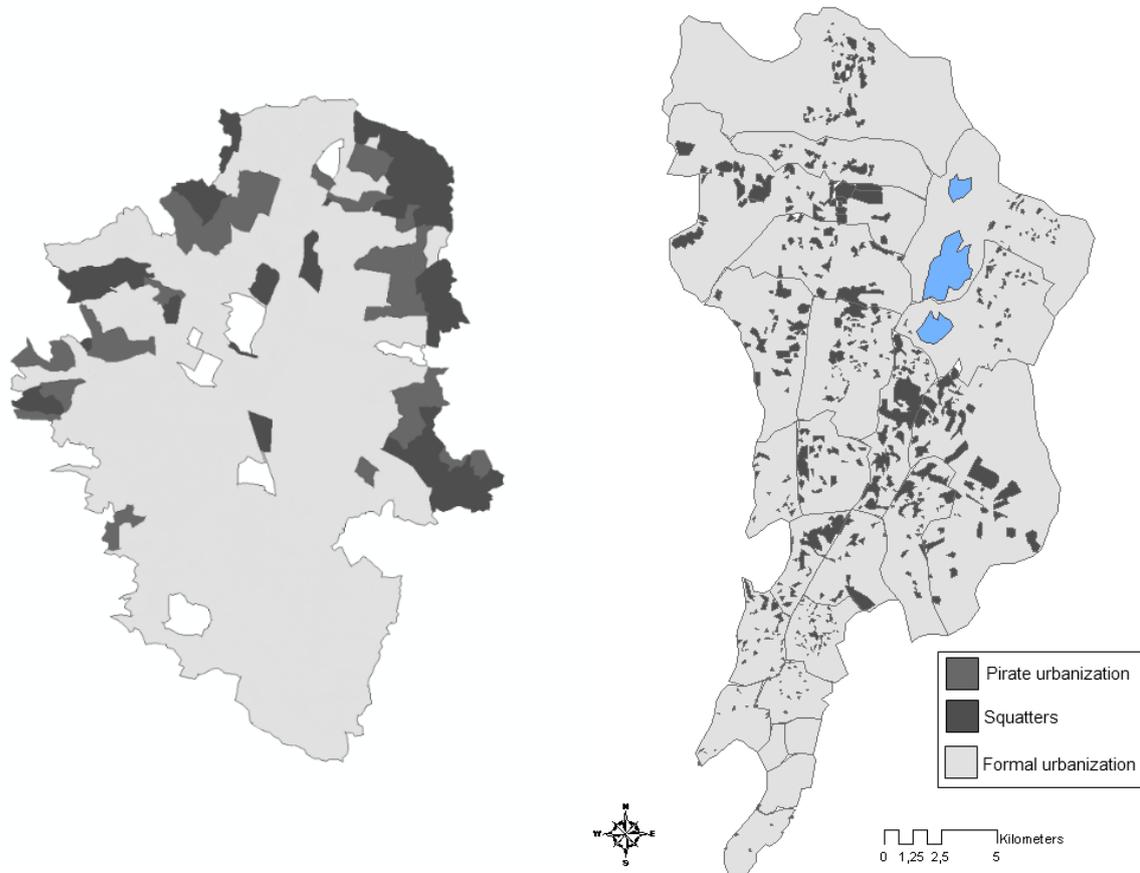
Source: adapted by author from MCGM (2005) and DPU (2006), * The area of Mumbai is approximately 1.5 times that of Medellin

Levels and types of informality

In this sub-section we will see how to ruptures of the urban territory caused by urban policies are added to other ruptures, product of the heterogeneity of preferences of the stakeholders of the city. This heterogeneity of preferences generates different forms of land appropriation and produces different levels of informality and quality of shelter.

A comparison between the two cities shows how the habitat conditions of the informal city are better in Medellin. In Mumbai, nearly 50% of the 'informal' population does not have adequate access to sanitation, 73% of them depend on communal sanitation and 28% of them relieve themselves outdoors. Only 36% of them have an organized system to collect and dispose of solid waste (Montgomery Watson and Consultants, 2001). The most vulnerable population of the informal settlements of Mumbai is, without a doubt, those who live on the street, known as *pavement dwellers*, and those living in informal settlements that have not been *notified* by the municipality, since they run the risk of being evicted at any time without receiving any type of compensation.

Table 1 describes the different types of informal settlements existing in each city. From this table it is possible to see how, as the level of informality increases, habitat conditions deteriorate. In the case of Medellin, most of the *pirate urbanizations* have a specific road structure and a greater level of consolidation than squatters. The same analysis can be made by comparing *pavement dwellers* in Mumbai to squatters, who have a better shelter conditions.

It is important to highlight two elements in Table 1. The first refers to the high correlation between the quality or condition of the habitat and the levels of informality. The settlements or populations with the highest levels of informality have the lowest habitat quality. This phenomenon has been previously studied by a number of scholars, especially De Soto (2000). Second, the 'visible' matrix of informalities (imposed by higher-level laws) is intercepted by another matrix which is more 'arbitrary'[4]. The 'arbitrary' informality matrix is generally composed of two actions: (1) the identification of the settlements on the map and (2) the definition of *semi-legality* dates. The first action is evidenced in the case of Mumbai through a mechanism called *notification*-defined by the local authorities-that determines which settlements are notified and which are not. N*otification* implies the appearance of a settlement on the city's map and presumes the provision of basic household services. The equivalent of informal settlement *notification* in Colombia is called *urban regularization. Urban regularization,* as in case of Mumbai, means the inclusion but not legalization of an informal settlement in the urban territory and serves to legitimate State action in the territory.

The second action, which I refer to as the definition of *semi-legality* dates, corresponds to a range of dates or lengths of stay in the city that somehow determines the level of informality of the families in the city. In the eyes of the authorities, the oldest informal settlements have greater legitimacy than those formed more recently. *Semi-legality* dates are almost always defined by laws, which tend to mutate over time. For example, in the case of Mumbai, the *Prime Minister's Grant Project* (PMGP) defined that only those who were on the election lists of 1985 or before could benefit from the policy; this date was redefined in 1995 with the introduction of the *Slum Rehabilitation Scheme* (SRS); its reform is being discussed to include those who arrived between 1995 and 2000. In the following section, I present how urban policies have evolved in each city and how they have shaped the creation or absorption of the informal cit. I also present the evolution of the inclusion policies and their relation to a set of needs for action.

4. Urban policies, inclusion policies and the informal city

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[4] While both the 'visible' and 'arbitrary' delimitations of the informal city are normally defined by laws, the 'visible' matrix is usually supported on higher level laws which are more permanent and require higher levels of coordination and consensus. For instance, in Colombia, we could think of the 'visible' matrix as the one defined by laws (*leyes o acuerdos*) by the legislative power and the 'arbitrary' matrix as the one defined by orders (*decretos*) by the exceccutive power.

The vision of the informal city by public authorities in both cities has evolved considerably since the 1970s when the informal settlements were stigmatized and/or reported to be the source of all urban ills; the only existing policy consisted of the eviction of the inhabitants and the demolition of the settlements.

In the case of Medellin, three elements were essential to achieve a higher recognition of informal settlements in the city and to fund inclusion actions actually being undertaken. The first of them refers to the evolution of national legislation, which gave greater autonomy and responsibility to municipalities to act in the informal city and a greater legitimacy of action by the Government in the informal settlements. The second responded to the creation of institutions and organizations capable of acting in these settlements such as *Casitas de la Providencia*. The third refers to the relationship of the informal city to violence and the vision of the city seen from within (by its citizens and leaders) and from outside (by the world). The evolution of the vision of the informal city became visible in the change in public discourse and reflected the needs for action in each historic moment (see Conceptual Framework). López (2008) explained how, beginning in the 1960s, references to the informal settlements in the public discourse changed: from *núcleos de tugurios* to *núcleos piratas*; then to *barrios subnormales* or *asentamientos de desarrollo incompleto*[5].

In Mumbai, the development of inclusive policies differs from Medellin because India is a Federal State and housing and land-use policies are defined at the State level and not by the Central Government. This division of power gives greater freedom of action to the State of Maharashtra (to which the city of Mumbai belongs) and to Mumbai city authorities. The evolution of the vision and informal-settlement policies is, in part, the product of the intervention of different groups of influence. At first, it was mostly Non-Governmental Organizations (NGOs) that promoted awareness and the urgency to act to resolve urgent sanitary problems of slum households. NGOs, like *SPARC* and *SRS*, led the first actions to provide services and improve sanitary conditions in the informal settlements. Later, interventions made by international credit agencies, notably the World Bank, and their financing of slum related projects meant the introduction of new practices that favored the inclusion of the private sector and a more indirect involvement of the public sector.

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[5] *Núcleos de tugurios* (slum pockets) to *núcleos piratas* (pirate pockets), luego a *barrios subnormales* (subnormal neighborhoods) or *asentamientos de desarrollo incompleto* (incomplete–development settlements.)

49

Table 1. Types and levels of informality

	Type	Description	Level of informality	Habitat quality
MUMBAI	*Chawls*	Apartments normally composed of a single room with a small kitchen and shared bathrooms. They were constructed by some industries to lodge workers between 1920 and 1956 and, in some cases, by port authorities and the public sector. Despite being initially designed to house only workers, little by little there was an increase in population density.	Medium	There are high degrees of overcrowding, given the densification of the rooms. The majority present dangerous structural conditions due to lack of maintenance.
	Zopadpattis or squatters	*Zopadpattis* means squatters. They represent the principal category informal housing in Mumbai. There are two kinds of squatters that define their level of informality: *notified settlements* and *non-notified settlements*.	Medium to High: Depending on the year of occupation, the ownership of the land (private or public) and if it is *notified or unnotified*	Generally, conditions improve over time. According to the law, *notified* settlements can have access to the city's public services, but-in reality-providing the services vary according to the kind of service and the relative power of each community (leaders and relations with political groups). Some of these settlements are on land that is not suitable for housing: marshes, around train tracks or in coastal zones.
	Pavement Dwellings	These are small shacks built on the sidewalks and streets, allowing their inhabitants to be closer to work. According to statistics, the population rose from 20,000 families in 1952 to 62,000 in 1961. The 1981 census identified only 22,600 families, but a study conducted later by an NGO (*SPARC*) in 1985 found around 125,000 families.	High	They are generally those that are in the worst conditions; the majority does not have any basic utilities. The structural conditions are low (waste or recycled material) and, in the most extreme cases, there is no structure.
MEDELLIN	*Pirate urbanizations*	They are the product of illegal land divisions and were the predominant form of informal land occupation before the 1968 enforcement Act. When formed they lack of basic infrastructure and the construction of housing structures was usually left to new occupants. Households usually have some proof of ownership of land.	Low to Medium	Houses are generally built in brick and cement; and the majority of settlements have roads. *Pirate urbanizations* densify as household's construct second and third floors over their houses. In most cases, additional floors are used to house relatives, although in some cases, are rented.
	Squatters or *invasiones*	They are product of illegal occupation of lands, in most of the cases land squatted belongs to the State. Squatters or *invasiones* are generally less structured and consolidated when compared to *pirate urbanizations* and households don't usually have a valid proof of ownership.	Medium to High	Generally, there is an improvement of structural conditions and access to basic utilities through time. In the case of Medellin, most invasions are found in areas of imminent risk (recoverable or non-recoverable): along streams and bodies of water, on steep slopes or on land that is unsuitable for housing (dumps).
	Tenancies or *inquilinatos*	These are multi-family houses where areas and services are shared to a greater or lesser degree. Households are generally in extreme poverty and make day to day payments to live in *inquilinatos*. In 2008, 173 tenancies were found to exist in three specific areas of the city (*FOVIMED* (the Social Interest Housing Fund of Medellin) and the Office of the Secretary of Social Development.	Medium to High	Many tenants spend a large part of the day getting money to pay for their room. The *San Lorenzo* Pilot Census showed that a room can cost between 1,000 COP and 16,000 COP per day. Living and sanitary conditions vary.
	Indigents or *Pavement dwellers*	These are inhabitants who occupy public spaces and do not possess housing. The majority live close to the Medellin River or downtown. They differ from the Mumbai *pavement dwellers* because many of them are psychoactive-substance addicts. Most of them base their livelihood on recycling or car care.	High	Since their house is the street, they usually have no basic utilities. The only way they can access these services is through the programs and care facilities provided by the Mayor's Office. Their health is usually precarious, given their living conditions and habits (drug addiction).

Sources: Mumbai (MCGM (2005)), Torres Tovar (2009), Ortiz Suárez (2009)

Table 2. Evolution of laws and policies

Period	Colombia	Medellin	Mumbai
1950-1970	Municipalities with a budget of no less than COP$ 200,000 are obligated to draw up a master urban-development plan (Law 188 of 1947) Development activities are regulated and penal sanctions are foreseen for clandestine developers (Law 66 of 1966)	Creation of the Medellin Public Utilities Company (*Empresas Públicas de* Medellin, EE.PP.): 1955 *Casitas de la Providencia* are founded with the participation of private and religious organizations that collect funds to relocate informal settlements: 1956 The EEPP *Barrios* Committee is born; it is responsible for housing improvements and connecting informal settlements to public services: 1958 Creation of the Slum-Clearance Fund, The Office of the Banking Superintendent was given the power to stop new invasions, evict illegal *barrios* in strategic points of the city and direct institutions to develop social housing: 1964	Demolition and eviction of invasion settlements: 1950-1960 No law existed for families affected by public infrastructure projects. In the best case, families were resettled in the periphery of the city: 1950-1960
1970-1980	Cities are ordered to elaborate a regulation plan to redirect city planning (Law 88 of 1974) Municipalities are authorized to create development plans in which areas of self-construction are identified (Law 61 of 1978)	The Civil Defense and the Housing Center appear for public calamities: 1971, 1974, 1979 *Casitas de la Providencia* is replaced by the Corporation for Social Housing and Development: 1975	The *Slum Improvement Plan* (SIP) is created; this includes the basic infrastructure in invasion settlements: 1970-1980 *Photopass* identification cards were given to public-land invaders
1980-1990	Instruments and tools to promote housing-improvement projects were introduced, along with the legalization of settlements and deeds for Social-Interest Housing (*Vivienda de Interés Social,* VIS), incorporating them within the urban perimeter or services (Law 9 of 1989) The role of municipalities was strengthened to define new responsibilities: (1) preparation of population inventories in high-risk areas and (2) the implementation of relocation projects, among others (Law 9 of 1989)	Amnesty that legalized informal, self-construction settlements and decriminalized the inhabitants: 1982 The city's development plan included the provision and relocation of informal settlements. Other Acts created institutions to prevent and attend disasters: 1989	The *Slum Upgrading Program* (SUP) was created; it was composed of a Site & Services Program and a public housing program that was financed in part by sales made to the middle class and the rich: 1980 The *Prime Minister's Grant Project* (PMGP) was created, financed by the central Government, based on a reconstruction in the same place and deeds: only the inhabitants of the 1985 election lists were eligible. The families had to pay the cost of constructing their houses-18 m^2 apartments: 1985-1991
1990-2000	The current housing and family-housing subsidy policy is created (Law 3 of 1991) Through the Organic Development Plan Law, the scope of planning in territorial entities is defined (Law 162 of 1994); a series of planning tools is defined through Law 388 of 1997, including the Urban Macro Projects Plan (Article 113), Partial Plans (Article 27) and the Land-Use Plans	Establishment, by order of the National Government, of the Secretary of the Metropolitan Area of Medellin, with the *PRIMED* Program (see below) developed: 1990 *PRIMED:* A pilot program financed by the National Government, the Government of Germany and the Office of the Mayor of Medellin: 1993-2000	The *Slum Redevelopment Scheme* (SRD): created the first crossed-subsidy mechanisms, based on Additional Development Rights. Only households who appeared in the 1995 electoral lists or before 1985 could benefit from the policy. Slum households had to cover around one-third of the cost (US$ 500 vs. US$ 1,500): 1991-1995 The *Slum Rehabilitation Scheme* (SRS) is created introducing a new crossed-subsidy mechanism (Transferable Development Rights). Housing is given free of charge to inhabitants: 1995-2010

Source: Medellin y Colombia: 2010 Field interviews, Betancur (2007), López-Peláez and González (2008). Mumbai: 2008, 2009 Field interviews, Risboud (2003)-Mukhija (2001)-Burra (2005)

In addition, direct financing by the central Government for projects aimed at improving the quality of life of informal city inhabitants, such as the *Prime Minister's Grant Project*-PMGP, influenced local inclusion policies. For example, through *PMGP*, the inability of slum household's to pay for the reconstruction of their houses was acknowledged and the possibility of introducing cross-subsidy mechanisms involving the private sector was evaluated. Last but not least, political parties who identified slums as vote banks introduced informal-city-programs in their campaigns. The current policy was in fact proposed during the 1995 elections by the *Shiv Sena* party, which promised to give 800,000 new houses to inhabitants of informal settlements (Burra, 1999). When *Shiv Sena* reached power it introduced the SRS and determined that only those who had a *Photopass* or who appeared in the electoral census of 1995 or before were eligible, establishing the date of *semi-legality*, which is still maintained.

Table 2 presents the evolution of urban policies in both cities. In the case of Medellin, two examples allow us to outline the impact of urban policies in the location of informal settlements in this city. The first (1964) refers to a policy in which new investments and the eviction of illegal *barrios* in strategic sites of the city were ordered; this was the responsibility of the *Superintendencia Bancaria*. The second, in 1982, refers to an amnesty law that legitimized a number of informal settlements. Together, they explain the current concentration of informal settlements at the edge of the city. Later on, National Government laws gave municipalities the tools and responsibilities to act in informal settlements that allowed them to initiate programs, such as the Integral Improvement Program of Subnormal *Barrios* of Medellin (*Programa de Mejoramiento Integral de Barrios Subnormales de* Medellin, PRIMED), around the beginning of the 90s. In the same manner, *Urban Integral Projects UIP* are linked to the way in which the urban planning concept has been developed in Colombia in the Law 9 of 1989 and the Law 388 of 1997. The use of such management tools for the inclusion of the informal city in the urban area is, in turn, justified by the morphology and distribution of the informal Colombian city.

5. Social Urbanism vs. Urban Neoliberalism: two answers to a need for action

The cities of Medellin and Mumbai have led a series of informal-city inclusion policies for several decades. In the beginning, both cities concentrated on providing essential services; they then implemented more complete policies and included other essential aspects of life in the harmonic city (UN-Habitat, 2009b): spatial, social and environmental harmony. In Medellin, the introduction of *Urban Integral Projects* (UIPs) is consistent with the existence of an informal city concentrated in specific areas, the planning and institutional mechanisms at hand and the socio-

economic context of the city. In Mumbai, the high fragmentation and coexistence of the informal and the formal city allow for the implementation of cross-financing mechanisms and the cohabitation of several groups of population. In this section I present the principal characteristics of the actual inclusion policies in Medellin and Mumbai, as well as the mechanisms or needs for action that made them possible.

Medellin: Social Urbanism

Both the birth of *PRIMED*[1] and the beginning of *Urban Integral Projects* (UIPs) are largely explained by the municipal administration's search for a less violent, less spatially unequal city. According to Betancur (2007), *PRIMED* was proposed by the Office of the Secretary of the Metropolitan Area and Medellin, an entity that had been commissioned by the National Government to address the problems of violence, governance and social decomposition in the poor *barrios* of the city. Betancur (2005) explains how *PRIMED's* most pressing objective was to achieve the unification of the city through the inclusion of sub-normal *barrios* and to achieve pacific coexistence.

The conception of urban projects, in which all the components of the city are integrated, began with *PRIMED*, a program that took into account the improvement of housing conditions and ownership, employment and training, education, environment, social relations, security and governance. All these components, and a number of additional components, were also included in the formulation of the *Urban Integral Projects*. *PRIMED* achieved considerable improvement in public space and road infrastructure, the legalization of around 2,100 houses and the provision of water and sewerage to the vast majority of houses that were within the range of action. However, according to Betancur (2003), the projects did not generate a greater sense of ownership and the titling program did not achieve the expected results since the legalization processes was too complex and time consuming. *PRIMED* was ended following a number of administrative problems, but later served as the basis for the formulation and implementation of the *UIPs*.

With the arrival of Sergio Fajardo to the city's administration, the introduction of the *UIPs* found its justification in Line 3 of the 2004-2007 Develop Plan. The latter aimed to provide equal regional opportunities, provide integral intervention in the city and propitiate positive changes in the socio-cultural behavior of the population. According to *EDU* (the Medellin Urban Development Enterprise-*Empresa de Desarrollo Urbano de* Medellin), an *Urban Integral Project* is a planning instrument for physical intervention in areas characterized by high levels of

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[1] The Integral Program for Improvement of Sub–Normal Barrios in Medellín (*Programa Integral de Mejoramiento de Barrios Subnormales de Medellín, PRIMED*)

marginalization, segregation, poverty and violence (Echeverri Restrepo and Orsini, 2010). *UIP*s consider the interaction of three fundamental components to coordinate actions in a defined territory. The first, called the *institutional component*, seeks to coordinate the different policies, programs and services from the Office of the Mayor. The second, called the *community participation and public communication component*, seeks to incite the participation of communities in the projects' design, construction and appropriation. The third and last is the *physical component*, through which integral physical transformations are generated. In order to achieve a greater appropriation of new public amenities and public spaces and taking into consideration the lessons learned from *PRIMED*, the municipality decided to foster the use of enjoyable, modern architecture to arouse community pride and generate a sense of belonging.

In reality it is not accurate to refer to *UIP*s as a policy, since they are more a coordination of a set of projects in a given area expected to bring all essential urban services to the informal city. In normative terms, each *UIP* is delimited by municipal decrees based on the principles of the territorial organization defined by Law 388 of 1997 and land-use plans adopted by the Municipality of Medellin. Considering that *UIP* interventions contemplate a number of components, their correct implementation requires precise coordination of all of the Municipal Secretaries and the different levels of government. The consolidation of the Urban Development Enterprise (*Empresa de Desarrollo Urbano,* EDU) in 2002, which is in charge of designing and implementing *UIP*s, was essential for the execution of these projects since, without the EDU, *UIP*s which cover periods of four (4) to five (5) years, would not have fit in the Municipal Investment Plan, which is annual.

Table 3 shows the four *UIP*s that have or are in the process of being implemented, the population involved and the expected cost. Housing and transportation projects are generally financed by the three administrative levels (Local, Departmental and National), while interventions to improve public space and educational entities in the territory are largely financed by the Medellin municipality. This policy, therefore, requires the existence of substantial municipal budget. In the case of the city of Medellin, the generalization of *UIP*s has been possible due to the increased income of the municipality in the last two administrations. The city's income grew from around COP \$1.517 billion in 2004 to COP \$3,309 billion in 2008, equal to an increase of 118%, in the same period, investment grew 169%(Alcaldía de Medellin, 2010). The *UIP* areas of intervention coincide with the areas of the city that have the lowest levels of quality of life. Of the ten *Comunas* with the lowest values in the Indicator of Quality of Life, eight are or have been intervened through *UIP*s.

Table 3. *Urban Integral Projects, UIPs (Proyectos Urbanos Integrales, PUI)*

Name	Period	Area of Intervention	Population (inhabitants)	Human Development Index (HDI)	Total Investment (Millions of Pesos)	Investment (Pesos/per person)
Northeast UIP (*Comunas* 1 and 2)	2004-2007 2008-2011	11 *barrios*	+ than 170,000	74.80 (2006)	650,000 (2004-2007)	3,823,529
Northwest UIP (*Comunas* 5 and 6)	2008-2011	12 *barrios*	364,157	78.19 (2006)	106,765	293,184
UIP *Comuna* 13	2008-2011	10 *barrios*	134,794	77.54 (2004) 77.48 (2006)	311,333	2,309,695
Central Eastern UIP (*Comunas* 8 and 9)	2008-2011	18 *barrios*	280,000	77.54 (2006)	108,354	386,979

Sources: Alcaldia de Medellin(2006b, 2008a, 2008b, 2008c, 2008d, 2008e), EDU(2010) and Gomez Ochoa (2008)

In all the *Urban Integral Projects*, there is a stage that precedes the physical intervention, in which a series of technical and socio-economic studies are conducted to determine the principal requirements of the sector, as well as to make consultations with the population. In this way, the designs fit the characteristics and needs of each one of the areas of intervention. One of the principal innovations of the interventions that have been made in the poor barrios is the way in which urban infrastructures have been adapted to the pre-existing conditions of the terrain, such as the installation of the two Metrocable systems and the escalators in Comuna 13.

Table 4 presents a list of interventions made (or foreseen) in the different *UIP*s of the city. During Sergio Fajardo's period as Mayor (2004-2007), the principal components of *UIP*s were education and public space, while the implementation and management of the housing component was still under construction. The latter has been furthered explored by the current administration with the creation of the Medellin Housing Institute (Instituto de Vivienda de Medellin, ISVIMED), which is in charge of orienting social housing investment policies and planning.

Mumbai: Urban Neoliberalism

With more than half of the city living in precarious sanitary conditions in informal settlements, the reality of the city of Mumbai is quite different from that world-class city imagined by its leaders[2]. Mumbai's current rehabilitation policy (*Slum Rehabilitation Scheme,* SRS) was preceded by three different policies, namely the *Slum Upgrading Program* (1985-1991)*, the Prime Minister's Grant Project* (1985-1991), and the *Slum Redevelopment Scheme* (1991-1995), which, in spite of not being successful, served as the basis to establish the current policy (Mukhija, 2001). From these policies, the municipal government acknowledged the necessity to improve financing

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[2] *Vision Mumbai*: Seeking to make Mumbai a world–class city, similar to Shanghai

mechanisms, to have greater private-sector intervention, and to improve projects approval procedures.

Table 4. Components of *Urban Integral Interventions UIP*s

		Northeast (*Comunas* 1 and 2)	Northwest (*Comunas* 5 and 6)	*Comuna* 13	Central Eastern
Environment	Linear parks	X	X	X	X
Public Space	Urban walkways	X		X	X
	Improvement or construction of sidewalks	X			
	Pedestrian bridges	X		X	
	Neighborhood (*barrio*) parks	X	X	X	X
	Improvement or construction of bridges or streets			X	X
Mobility and connectivity	Integrated Transportation System				X
	Bus depot				X
Housing	New housing				X
	Relocation of at-risk families	X*	X	X	
	Relocation of families affected by infrastructure projects	X	X		
	Titling		X		X
	Housing improvements	X*	X		X
Education, Recreation and Sports	Parks or sports units	X	X	X	X
	Library parks	X	X	X	X
	Kindergartens		X		X
	Schools		X	X	X
	Cultural centers		X		X
Training and work	*Centro de Desarrollo Empresarial (CEDEZO)*	X		X	
	Formalization of employment				
Salud y Nutrición	Health centers		X	X	X
	School restaurants			X	
	Community homes			X	
Government	Immediate Attention Centers (*CAI*) (Police)		X		X
	Houses of Justice			X	X

*Some authors prefer to leave the *Juan Bobo* Housing, which relocated a group of families that lived in an area of risk and improved the housing of others, out of the Northeast *UIP*.

Source: Alcaldia de Medellin(2006b, 2008a, 2008b, 2008c, 2008d, 2008e) and EDU(2010).

Thus, the previous *Slum Redevelopment Scheme* was replaced in 1995 and the *Slum Rehabilitation Scheme* (SRS) was created under the command of the *Slum Rehabilitation Authority* (SRA), an independent institution created in 1990. The SRS introduced a set of financial mechanisms based on Additional Development Rights, in the form of Additional Development Rights (ADR) and Transfer Development Rights (TDR), that allowed the public sector to switch the burden of financing slum rehabilitation to the private sector The policy works in the following manner: first, a builder or developer reaches an agreement with a slum community and collects the signatures of at least 70% of the eligible families. Then the project is sent to the responsible authority (SRA) and follows a number of administrative procedures in which the amount of ADR and TDR that the project will generate are confirmed, construction plans are approved, and the eligibility of the households who signed is validated (see Figure 5). Once the project is approved by the SRA, slum households are housed in transit camps; houses are demolished and new apartments are built, following standardized procedures. Once construction is completed,

cooperatives are formed and apartments are assigned to the families; each family receives a free apartment with ownership documents. The builder or developer is compensated through the two previously mentioned incentives. If there is sufficient space for the construction of more apartments on the land where the informal settlement was, ADRs are awarded to build additional apartments units and sell them in the regular real-estate market. However, there is a limit (equal to 2.5) to the FSI that may not be exceeded and builders are not allowed to surpass this limit. When this happens Transfer Development Rights are given to the builder which he can sell (or use for himself) in the TDR market of the city and be used by another builder to construct additional built-up area[3].

Figure 5. Financing mechanisms of the Mumbai SRS policy
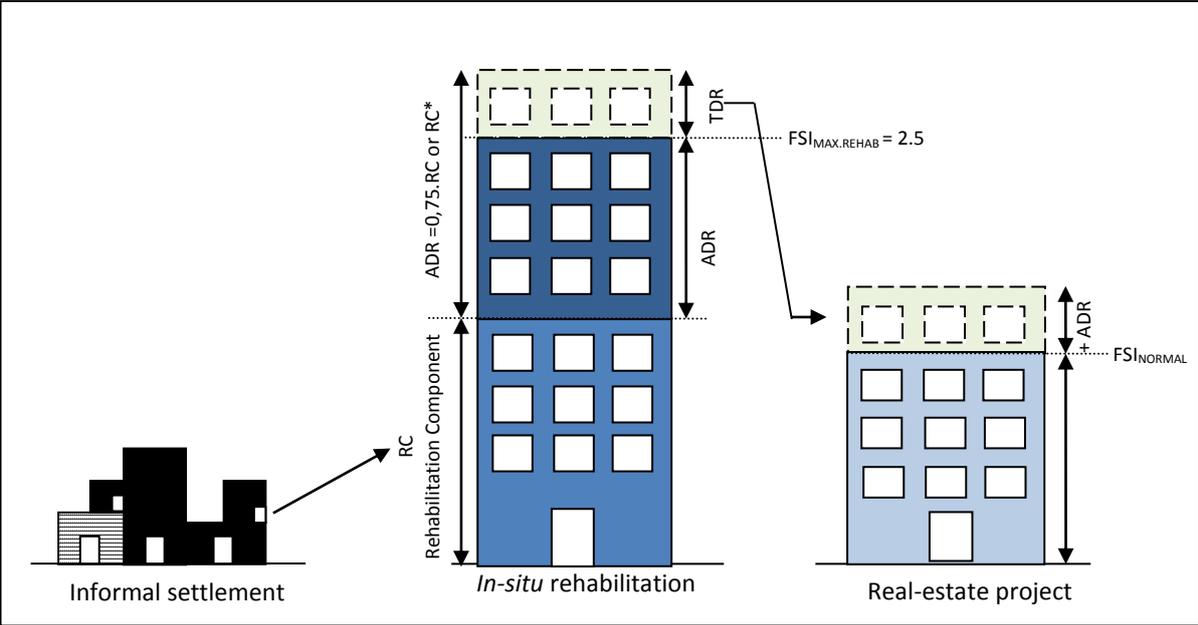
In Figure 6 I present a summary of the achievement of the SRS. Between 1995 and June 2009, the policy had achieved an inclusion of around 150,000 families, the equivalent of a small city. Nevertheless, this number is insufficient compared to the total number of families that remain in informal settlements. Occupation certificates in Figure 6 refers to the total number of households that have been rehabilitated (received occupation certificates), proposed refers to the total number of households that would be rehabilitated if proposed SRS projects were completed and the informal settlements category refers to the total number of households who were living in slums at the beginning of the policy.

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[3] TDRs can only be used to the north of the generating Project and outside *Island City*

Figure 6. Housing solutions constructed and proposed under SRS
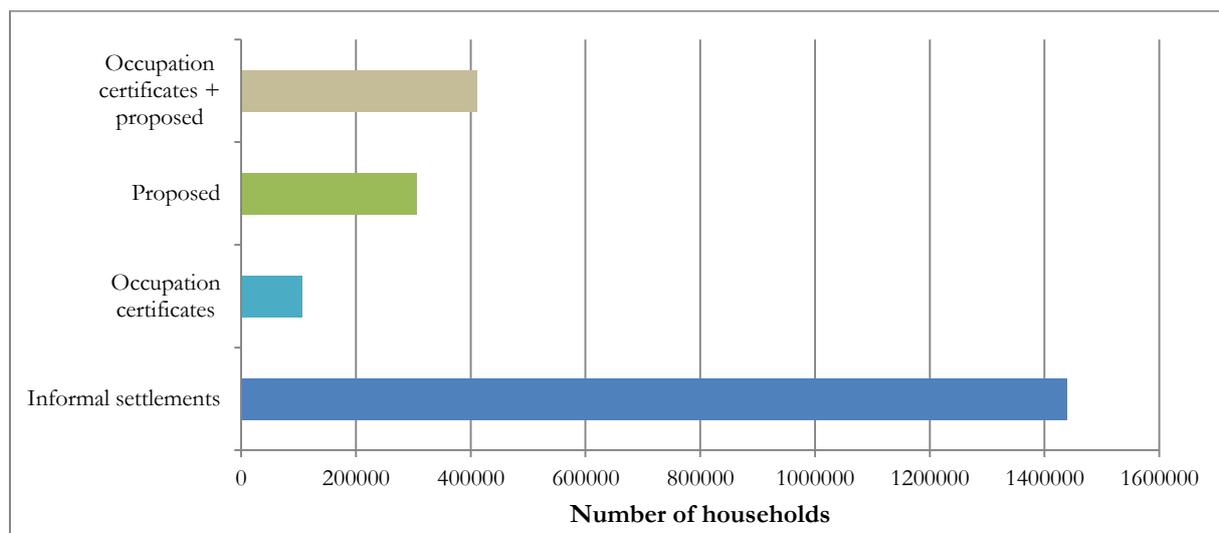
Source: Adapter by author from data provided by the *Slum Rehabilitation Authority*, 2009

6. Discussion and conclusions

The analysis of the evolution and type of informal settlements, as well as the history of inclusion policies in Medellin and Mumbai, are essential for the understanding of current inclusion policies. In Medellin, the constant reconfiguration of the urban perimeter during the urbanization process along with the expulsion or absorption of informal settlements located in strategic areas generated a divided city. The poorest located in the cheapest areas on the periphery of the city which unfortunately represent high risks for the human settlements. In Mumbai, on the other hand, decades of strict land urban policies to "decongest" the city generated one of the highest population densities in the world and are without a doubt, one of the principal causes of the explosion and generalization of the informal city. These two examples show how urban policies influence the formation, type and distribution of the informal city in the urban territory and, at the same time, these three components are, among others, fundamental to design and apply inclusion policies.

Table 5 shows a parallel of the informal-habitat situation in both cities, as well as the principle characteristics of currently applied inclusion policies. The standardization of the policy in Mumbai allows local authorities to have standardized procedures and greater control over the quality and form of the housing solutions generated, but cannot respond to the heterogeneous needs of the population (See **Chapter 8:** Moving in, Selling out). On the contrary, *UIP*s, as they are being applied today, serve to respond to the meet the needs of the heterogeneous territories, but require the existence of substantial financial capacities at the local level and a high degree of institutional development to coordinate the implementation of a large number of projects in a

given area. Furthermore, since they are not supported in a given policy future implementation of *UIP* will depend on the decision of the next politician in office.

Table 5. The informal city and inclusion policies in Medellin and Mumbai

	Medellin	Mumbai
Main policy	*Urban Integral Projects* (UIPs)	*Slum Rehabilitation Scheme* (SRS)
Type of informal city chosen	Invasions, *Pirate urbanizations,* some formal low-income settlements	Invasions before 1995
Predominant characteristics of the informal city	High-risk zones	Some in areas of risk (flooding, coastlines)
	Access to public services depends on the degree of consolidation	Precarious sanitary conditions
	Spatially concentrated	Spatially disperse and mixed in with the formal city
	Linked to phenomena of violence and illegal activities	
	Disintegrated social network	Each settlement is composed of relatively uniform communities
Priorities and objectives	Improve public space, relocate families in non-recoverable risk areas, decrease inequality and integrate the informal city in the urban territory	Improve housing conditions and access to public services
Criteria to choose areas or groups of beneficiaries	Quality-of-Life Index	Dates of *semi-legality*
Spatiality	Areas of action defined by the municipality and supported in technical and socio-economic studies	Slum pockets rehabilitation is defined by market forces
Financing	Mainly public (Municipal, Departmental or National), although some works are financed with loans from international credit organizations	Private
Components*	Environment Public Space Mobility and connectivity Housing Education, recreation and sports Training and work Health and nutrition Access to Justice and/or Safety equipment	Housing Education
Application	Specialized and individual (case by case)	Standardized
Design	Specialized	Standardized

*Components vary from one *UIP* to another

Although the policies of Medellin and Mumbai have been internationally recognized as being successful and the possibility of applying similar policies in other cities has been dicussed, it is important to keep in mind an element that is fundamental in the global search to include the informal city in the urban territory: **coherency.** The previous analysis revealed how the application and generalization of inclusion policies must depend on the conditions of the informal habitat in each city and the governance system of each city or country. Thus, the analysis of effectiveness of each policy should be understood within the context of each city and the specific objectives established by the public powers, although a comparison of the two policies studied in this article allows the development of some concepts that are valid globally. I will now present five points that I believe to be essential to initiate reconsider or strengthen inclusion policies in developing countries cities.

First, any inclusion policy must be preceded by a **recognition and inventory of the informal city in ALL its forms.** As I have previously presented, in the case of Mumbai and Medellin, there are a number of informal cities that range from *pavement dwellers* to *pirate urbanizations* and each one possesses different priorities for action. Table 5 shows how informal settlements that house the majority of the informal-city population in Medellin is characterized by being in areas with steep slopes, at the periphery of the city, and are historically areas of "no law" for which proper inclusion of these areas requires more than just a simple housing policy or improving access to basic services.

For some authors and policy makers the recognition of the informal city can be regarded as a policy itself since it gives a place to the informal city in the language of the city. This recognition can range from a simple census of the informal city population to the demarcation of these settlements in the urban map. For example, *notification* actions (in Mumbai) or *urban regularization* (in Colombia) allow for informal settlements to be included in the city's official map. The latter is sometimes fundamental to justify the state or the municipality's action in these areas. The recognition of the informal city is a fundamental step for local authorities to act, even if their actions do not lead to a true inclusion of the informal city.

Second, any inclusion policy should seek to use **the current structure of the city as a starting point** or in some way build on what has been built. Medellin's authorities have taken advantage of the concentration and segregation of its informal settlements to coordinate integral policies in pre-defined areas. In the same way, Mumbai's municipality has managed to take advantage of one of the causes of the existence and generalization of the informal city: low Floor Space Indexes (FSIs) while using the co-existence of the informal city and the formal city as foundation for cross-subsidizing schemes.

Third, any inclusion policy needs a clear definition of **power structure and distribution, and cities duties and responsibilities** related to urban planning and housing. Comparing the two cases of studies presented, it is possible to see how the federal organization of power in India has led to the emergence of inclusion policies adapted to each city. On the contrary, in Colombia inclusion actions and instruments have been previously determined by the central government and cities adapt them to act locally. In both cases, a greater autonomy in urban planning has allowed cities to design and implement policies that respond to local problems and incitations. In the Colombian case, the strengthening of the urban-planning capability of cities during the past 15 years was essential for the establishment of local Land-Use Plans (*Planes de Ordenamiento Territorial, POT*) in the city of Medellin and for the implementation of the current *UIP*s. Furthermore, urban planning laws developed between 1989 and 1998 not only gave

municipalities responsibilities, but also provided them with instruments allowing them to shape city's growth.

In the case of the *UIP*s, which are really a coordination of state actions in a specific area, components such as education and transportation that are clearly defined by law as a responsibility of the municipality have been carried out successfully, while components with schizophrenic responsibilities -as in the case of housing- have presented a number of difficulties. The recent creation of the Medellin Housing Institute (*Instituto de Vivienda de* Medellin, *ISVIMED*) responds to the need to have a local-level housing policy that is consistent with the circumstances of the city and adaptable to *UIP*s. A correct definition of powers and responsibilities makes it easier to translate needs that are visible to local authorities, and would be more difficult to identify by the national government, into inclusion policies.

Fourth, experience shows how **any inclusion policy generates new fragmentations of the informal habitat** since it creates new subdivisions in the levels of informality. For example, both in the case of the Moravia in Medellin as well as in the SRS policy in Mumbai, dates have been established that define, who-from among the inhabitants of the informal city-has the right to benefit from inclusion policies. The latter is clearly related to the so-called *Right to the City*, subject that due to its extensions I have decided not to discuss in this article.

Finally, any policy that seeks total inclusion of the informal city in the urban territory must be composed of two parts. The first seeks the harmonious **inclusion of existing informal settlements**, according to its needs and priorities. The second seeks to **avoid new exclusions** through the creation of parallel systems to access housing and basic urban services for the low-income populations.

The previous points are -in my opinion- essential to transform cities of developing countries into harmonious cities, but they are not sufficient. The cases of studies of Mumbai and Medellin reveal that it takes considerable public will to promote these changes. If not, how can we explain that other cities in India or Colombia-which have the same priorities and capabilities, have not applied similar inclusion policies? This so-called political will might be in reality led by private interests or collective concerns, which I have referred in this article as *needs for action* (Section 1). In Mumbai, informal settlements have been seen as vote banks by many political parties, who have made inclusion policies one more strategy to access or remain in power. In Medellin, the expansion of violence from the so-called "no law" areas into the rest of the city made these sectors become priority areas for action.

Chapter 4

The informal rental housing market in Medellin:
written versus oral contracts

Abstract

In this article I evaluate, using hedonic prices, the risk premium associated to oral rental contracts when compared to written rental contracts in informal settlements in the city of Medellin. Economic theory suggests that households having oral rental arrangements have a higher risk of being evicted when compared to households having written rental controls, who can more easily exercise their rights. I use a household's survey carried out by the Mayor's office in the city of Medellin containing 10,373 households, among which 3,372 are renters, and a qualitative survey carried out by the author. Results from hedonic regressions suggest a difference of 21% in the rental value of identical housing units when passing from oral to written contracts. The qualitative survey evidenced clear differences in household's perceived risk of eviction, confirming the hypothesis of a 'risk premium'. Oral rental tenants reported having a higher perceived risk of being evicted without a valid reasons and a higher risk of being expulsed before the agreed duration of stay, when compared to written rental tenants. However, results also suggested that a higher proportion of oral rental tenants had some relationship to the landlord. If related landlords consider less risky to have oral contracts with relatives –given that a 'social' contract already exists between the two parts- the written contract dummy in the hedonic price equation might be capturing both a 'risk premium' as well as a ' relative premium effect'. Therefore the risk prime associated with having oral rental contracts is probably higher than the one measured using hedonic prices.

Résumé

Cet article évalue, à partir des prix hédoniques, la prime de risque associée aux contrats de location oraux comparé aux contrats de location écrits dans la ville de Medellin. La théorie économique suggère que les ménages ayant un contrat oral ont un plus grand risque d'être expulsées comparés aux ménages ayant un contrat écrit qui peuvent plus facilement exercer leurs droits. J'utilise un enquête effectué par le bureau de la Mairie de la ville de Medellin portant sur 10,373 ménages parmi lesquels 3372 sont des locataires, et une enquête qualitative réalisé par l'auteur. Les résultats des régressions hédoniques suggèrent une différence de 21% de la valeur locative des logements identiques entre un contrat oral à un contrat écrit. L'enquête qualitative montre des différences considérables dans le risque perçu par les ménages ayant différent type de contrats de location, ce qui confirme l'hypothèse d'existence d'une prime de risque. Les locataires ayant un contrat oral ont déclaré avoir un plus grand sentiment de risque d'être expulsés par rapport aux locataires ayant un contrat écrit. Cependant, les résultats de l'enquête qualitative ont également suggéré qu'une plus grande proportion de locataires ayant un contrat oral avait une certaine relation personnelle (de parents, amicale) avec le propriétaire. Si les propriétaires considèrent moins risqué d'avoir des contrats oraux avec des personnes qui leur sont proches – étant donné qu'un contrat 'social' existe déjà entre les deux parties, la variable muette dans l'équation de prix hédoniques peut capturer la 'prime de risque' ainsi qu'un effet de réduction de risque due aux contrats 'sociaux' préexistants. Par conséquent, les risques associés aux contrats de location oraux sont probablement encore plus élevés que ceux mesurés en utilisant la fonction des prix hédoniques.

1. Introduction

In the past two decades many local governments as well as other authorities at different levels of governance have recognized the need to solve the 'slum problem' and implement a number of inclusive slum policies. Moving away from eviction and *laissez-faire* policies, titling and slum upgrading policies have taken the lead. The latter is both due to the recognition of the 'slum problem' at a national and international level as the results of political strategic behavior of policy makers who acknowledge potential votes hidden in slum pockets. Generally slum or informal housing policies are targeted both at diminishing the proportion of slums in a given city as well as improving household's living conditions. However, the measurement of the welfare effects of slum policies is not always easy and some slum policies have proven to have serious negative welfare effects. For example, two studies carried out in Mumbai show that relocating slum dwellers to distant areas might have serious consequences on their incomes and increase considerably transportation costs (Vaquier, 2010; Takeuchi et al., 2008).

In some cases the use of hedonic regressions techniques or discrete location choice models has been used to identify how household's value housing characteristics such as tenure and to determine welfare effects of different slum policies (Friedman *et al.* 1988; Aiga and Umenai, 2002; Takeuchi *et al.* 2008). Hedonic price functions, widely used in environmental economics to uncover the market price of environmental goods, were first used in informal housing studies by Jimenez (1984) and by Friedman *et al.* (1988) to determine how urban household's valued tenure security in the Philippines. By comparing informal owners and renters to formal owners and renters, they were able to measure the risk premium associated with informality. Friedman *et al.* (1988) found a risk premium of 11% for renters and 23% for owners and confirmed the idea that

risks associated with living in informal settlements were not the same for owners and renters[1]. The differences in risk premiums for different tenure arrangements was explained in the following way: while renters had to support the cost of moving when evicted, owners also had to face the loss of physical capital made in form of housing investments. A more recent study, by Kapoor and Le Blanc (2008), found that once observed characteristics of the dwellings where accounted for, the prime risk associated with informality in the city of Pune (India) was 35%. Lanjouw and Levy (2002), who used a different methodology, in which households were asked to estimate the value of their homes with and without titles, find a 23.4% difference in value between titled houses and non-titled houses in Ecuador.

Payne (2001) argues that the conceptual binary division of the city between the informal and the formal housing sector is generally incomplete since there is a very diverse range and complexity of tenure systems in developing countries. For instance, in many cities, the informal sector can be home to both *pavement dwellers* - who live in the open and have no housing structures – and *squatter* 'owners' – who, while having little or no legal documents to prove their ownership, usually have more or less consolidated structures and a certain access to basic services. Figure 1 presents a possible typology of tenure categories existing in developing countries' cities and their related tenure security. The purpose of this article is to compare the two shaded categories in Figure 1: *squatter* tenants with written contracts versus *squatter* tenants with oral contracts. The initial hypothesis is that, in the same way that squatter houses are assumed to be less valuable than identical formal houses, households' having oral rental arrangements are expected to pay lower rents when compared to household's having written rental arrangements. Although in legal terms, both informal written and oral rental contracts have no value, written contracts can have higher social value and squatter owners (renters) who make written rental agreements might be more willing to maintain their 'promises' than those who make oral rental agreements. In fact a number of recent studies in experimental economics show how, when individuals sign and agree to follow a certain behavior prior to the realization of a given event, they are more likely to keep their 'promises' (Charnes and Dufwenberg 2006, Vanberg 2008, Jacquemet 2009). Vanberg (2008) results suggest that people have a preference for 'promise' keeping and a 'promise' creates a contractual obligation toward the person to whom it is made. However, no empirical or experimental analysis has been done so far to evaluate 'promise' keeping comparing written to oral agreements.

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[1] Households in informal settlements generally consider themselves to be the owners of their property even when the land in which they are located belongs to a third party.

Figure 1. Tenure security of different tenure categories
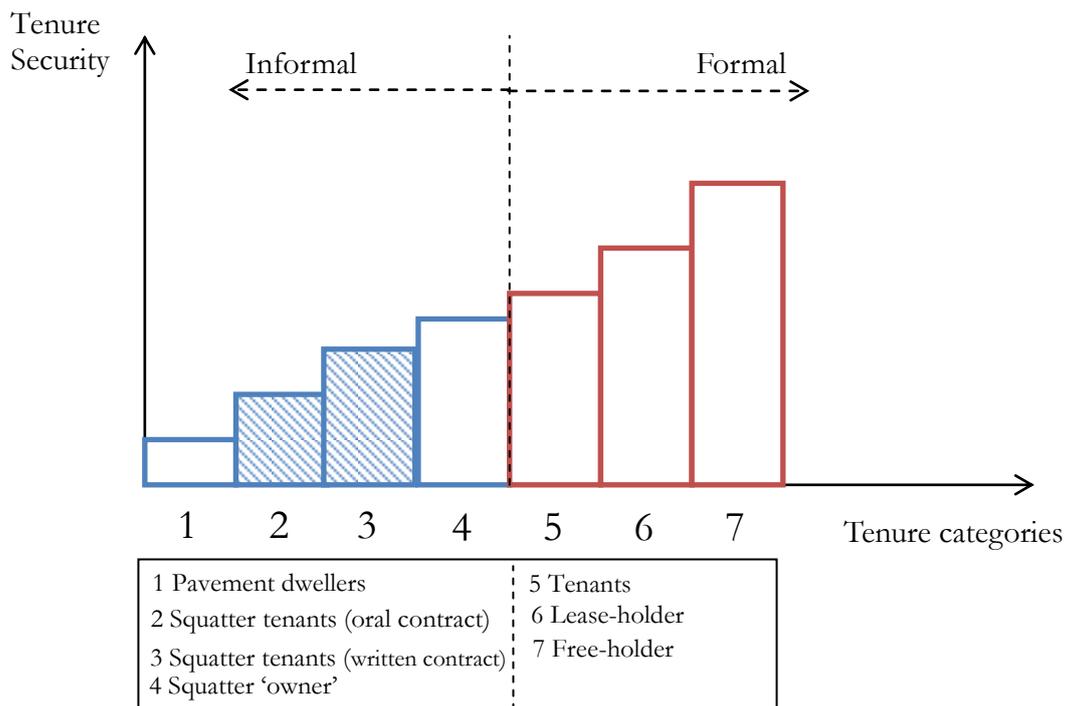
Source: modified by author from Payne (2001)

The goal of this paper is to evaluate, by using hedonic prices regression, how poor households value different rental contracts in the city of Medellin (Colombia). While my analysis is very similar to the one done by Friedman *et al.* (1988), Jimenez (1984) and close to the one done by Kapoor and Le Blanc (2008) it is the first to evaluate the value of different rental arrangements. Furthermore, contrary to previous literature, I control for a large set of neighborhood characteristics and carry out a qualitative survey to identify differences between the perceived risk of eviction for households with oral and written rental arrangements. For the hedonic prices analysis I use an extensive household survey carried out by the Mayor's office between 2008 and 2009 containing 10,332 households, among which 3,372 are renters and a qualitative survey carried out by the author. In the survey, all households were asked a very complete questionnaire, which included among others, a large number of housing, household's and neighborhood's variables. In addition, all renters were asked if their rental contracts were written or oral. Since the household survey made by the Mayor's office was meant to cover the poorest of the poor, who are over-represented in informally formed neighborhoods our analysis can be seen as a comparison between different forms of rental contracts in the informal housing sector.

The research question developed in this article is important since the distribution effects of slum policies (between the poor and the poorer) can vary according to the pre-existent fragmentations of the informal city. For instance, titling policies which give higher tenure security

to owners might have monetary consequences for tenants, and these consequences might be different according to the type of rental contract they have. The purpose of this paper is, on the one hand, to extend existing literature on the risks associated to different formal and informal tenure systems in developing countries and, on the other hand, to provide evidence that could help to have a better understanding of the different mechanisms available for the poor that provide informal assurances based on social contracts that have no legal value. Findings from the hedonic prices analysis suggest that informal housing tenants value differently written and oral contracts and that the difference in value might be associated to a premium risk of having less secured rental social contract.

This article is organized as follows. Section 2 briefly describes the formation and evolution of the informal housing market in the city of Medellin. Section 3 presents the data and methodology used for the empirical analysis. Section 4 shows results from the hedonic price analysis and the qualitative study and Section 5 outlines the conclusions.

2. Medellin: violence, poverty and spatial inequalities

The city of Medellin is located in the Aburra Valley in the middle of the Andes Mountains. With a population of 2.4 million inside the city limits and 3.5 million when considering the metropolitan area, it is the second largest city in Colombia (Alcaldía de Medellin, 2006a). Medellin is the capital of the Department of Antioquia which produces around 15% of Colombia's GDP (Torres Tovar, 2009). The city of Medellin has been known nationally for its industrial development and is home to many of the country's most important industries; however, it has also been recognized as one of the most violent cities in the world.

A series of informal settlements censuses have been carried out in the city. In 1992, 70 informal settlements were identified composed of 37,000 housing units housing around 185,000 persons. In 1994, the planning departments registered 87 informal settlements with approximately 202,500 inhabitants. By the end of 2002 the total number of informal settlements raised to 104 with around 350,000 inhabitants, the equivalent of 18% of the total city population (Torres Tovar, 2010). Informal settlements in Medellin, unlike other developing cities like Mumbai (India), are spatially concentrated and most of them are located at the periphery of the city. Almost all of the informal settlements have access to basic services and have achieved a certain degree of consolidation. However, given that a considerable proportion of the population living in these settlements were forced to migrate to the city due to violence[2], the levels of unemployment are very high: 59% of the household's earn less than the minimum legal salary,

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[2] In Colombia this phenomenon is called forced displacement (*desplazamiento forzado*)

71% live in extreme poverty conditions and 68% of the families have female head of household (Alcaldía de Medellín, 2001). Historically these settlements have been marginalized and excluded from the city and concentrate many of the illegal activities and violent crimes of the urban areas.

Figure 2 shows the distribution of informal settlements in the city of Medellin and how they are mostly concentrated in the city boundaries. The actual distribution of the informal city in Medellin is consistent with the implementation of various urban policies during the city's development. At first, urban planning in the city of Medellin consisted of defining the perimeter of the urban area, which made all land located just outside the perimeter, cheaper, to be occupied by informal settlements. The perimeter of the city, as explained by López-Peláez and González (2008) was redefined on several occasions to reach the current size, absorbing the lands adjacent to the dividing lines and integrating the previously formed informal settlements. Although some informal neighborhoods were formed in the center of the city of Medellin, a series of inclusion and exclusion policies contributed to their disappearance and only a few isolated fragments, as in the case of *Moravia*, persist and retain their informal character.

Figure 2. Distribution of informal settlements in Medellin
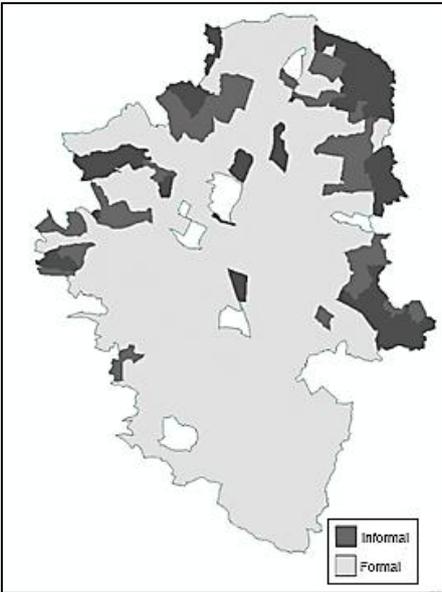
Source: adapted by author from DPU (2006)

3. Data and methodology

Medellin Solidaria

The data used for this study is supported on a Baseline Survey collected for the *Medellin Solidaria* program of the Mayor's Office of Medellin. *Medellin Solidaria* program is intended to bring all of the government's social services to the poorest of the poor. All household's having

children and belonging to the SISBEN 1 category are eligible to enter the program. SISBEN is an identification system, implemented by the Colombian government and authorities at different governance levels, that serves to identify potential beneficiaries of social programs. It is based on the collection and updating of household level data at a national level. The results of each household survey are used to create an aggregate indicator and determine if a given household belongs to the SISBEN category, and if they do to determine to wish SISBEN strata they belong to. SISBEN 1 household represent the poorest of the poor.

In the first year of the *Medellin Solidaria* households' belonging to SISBEN 1 strata and to *Familias en Accion*[3] program were visited. During the first visit households agreed or not to enter the program and following their agreement a second visit was done in which the Baseline Survey was carried out. The Baseline Survey, used for my empirical analysis, covers a number of subjects such as housing, education, labor, health and security, nutrition and access to justice. It is this Baseline Survey that I use for the hedonic regression analysis.

Figure 3 shows household's covered by the survey in the 2008 and 2009 cohorts. From this figure it is evident that the survey is not representative of the city of Medellin, however, the distribution of households matches the distribution of informal settlements and corresponds to the locations in which the poor live, which is the interest of this study. Overall 10,332 households were surveyed among which 3,372 are renters. While the hedonic prices analysis concentrates on renters, information from the complete database – both owners and renters – is used to construct neighborhood variables.

For the qualitative analysis 30 households and 30 replace households, selected randomly from the *Medellin Solidaria* database, were called and asked a number of questions about their contracts and their perceived risk of eviction by landowners. Half of the households sampled said to have oral contracts in the *Medellin Solidaria* survey and the other half said to have written contracts. The questionnaire used can be found in Annex II. During the telephonic survey, only four households refused to take the survey arguing they didn't have time to answer or that the head of household (or his spouse) was not home.

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[3] Familias en Acción is a program of the National government that gives nutrition and education subsidies to children of families belonging to the SISBEN 1 strata, displaced families or families belonging to ethnic minorities.

Figure 3. *Medellin Solidaria* 2008 and 2009 cohorts
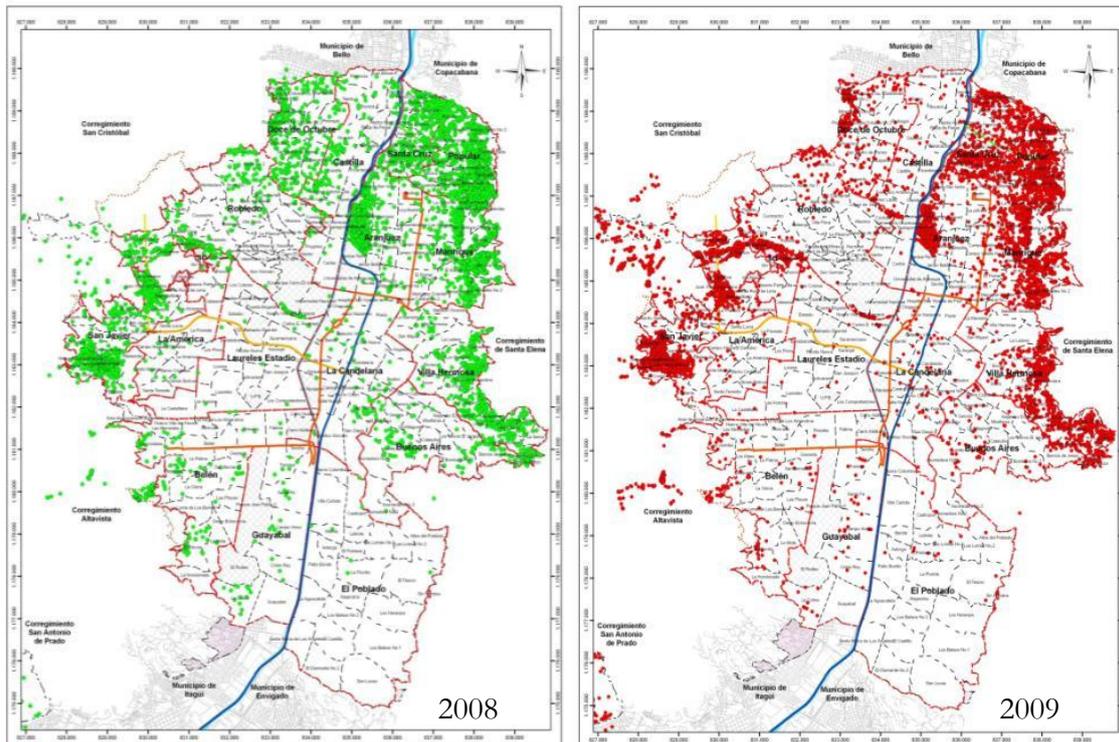
Source: Alcaldía de Medellin (2009)

Hedonic prices

The hedonic prices methodology was first introduced by Rosen (1974), based on Lancaster (1966) work, who assumed that heterogeneous products, like housing, were valued for the utility of each of the product's attributes. Under this approach, the price of a house is the results of household's willingness to pay for each of the dwelling's characteristic, the spatial location and the surrounding environment. Rosen's model is executed in two stages: the first-stage and the second-stage. Assuming competitive housing markets[4] the first-stage hedonic prices methodology allows for the identification of the willingness-to-pay of the average household for each of the attributes present in the hedonic equation. In the second-stage, which is rarely used due to a number of problems, hedonic prices analysis allows recovering structural demand parameters for individual housing characteristics. Given the apparent simplicity of this methodology, hedonic price models have been widely used in environmental economics and in public policy's analysis to evaluate how households' value the proximity of environmental goods (i.e. parks, water bodies)

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[4] The competitive market assumption can be justified by the reality of the low-end segment of the housing market in Medellin, which is the object of this study. Contrary to other cities in which land in which squatters is own by a very small number of economic agents, squatters in Medellin are in land that has either been sold (in an informal manner) to squatter 'owners' or belongs to a diverse number of private agents. While information in the informal housing sector is rarely published in newspapers, there are a number of informal sources of information which poor households use to find their homes.

or urban interventions such as new metro-lines (Garrod, G.D. *et al.* 1992; Netusil, 2005; Ihlanfeldt 2007; Gibbons, S. and Machin, S. 2008).

The use of hedonic prices for empirical research, has however, been criticized due to a number of limitations inherent to hedonic models that are rarely taken into account by researchers. One of the most common critiques is that, by defining a specific functional form, researchers restrain demand to a specific demand form. For instance, in reality households might be willing to pay more for one more room when they have 2 rooms than when they have 4 rooms. In the same way, families having children might assign more value to a marginal increase in space (or rooms) than those who don't have children. One of the possibilities for not restraining the hedonic analysis to a specific functional form and allowing preferences to be flexible is to use non-parametric distributions. Recent work done by Bajari and Kahn (2005) and Lall and Lundberg (2008) uses non-parametric approaches to recover structural demand parameters and explain tastes as functions of households' characteristics.

For my analysis I use the standard model presented in equation [1] in which the rental price ($rent$) and number of $rooms$ are in log while the rest of the variables are not transformed. Similar models have been used in literature by Netusil (2005), Ihlanfeldt (2007) and Guttery (2002). A Box-Cox transformation as well as a log-linear specification, in which the variable $rooms$ is linear but $rent$ is still in log, was also used with similar results. A non-parametric approach using Generalized Additive Models (GAMs) was also used with very similar results. Variables like the distance to city center and the number of rooms proved to have significant gains when using GAMs when compared to linear models, showing that preferences for this attributes are not linear. However, since the variable of interest $w\_contract$ is binary and the hedonic price analysis considered in this paper is not intended to recover structural demand parameters (second-stage), for simplification purposes I rely on the standard model specification ([1]) for the rest of the analysis.

$$log(rent) = \beta_0 + \beta_1 w\_contract + \beta_2 log(rooms) + \sum \beta_i X_i + \sum \beta_j Y_j + \varepsilon \quad [1]$$

In [1] $\sum \beta_i X_i$ is a vector of housing characteristics such as the predominant material of walls and the type of structure. $\sum \beta_j Y_j$ is a vector of neighborhood characteristics that account for the socio-economic characteristics of the neighborhood in which the house is located as well as other elements that might have consequences on the rental value. $w\_contract$ is a dummy variable equal to 1 if the household living in the dwelling has an written rental arrangement and 0 otherwise. In order to avoid problems arising from multicollinearity, which occurs when

independent variables are highly correlated, I have restrained the number of independent variables included in the model. For instance, since piped water provision, electricity and sanitary conditions are all provided by the same company in the city of Medellin and are highly correlated I only include in the model the existence of connection to piped water. A description of each of the variables used in the hedonic price regression is present in Table 1.

Table 1. Variables used in the hedonic price regression

Name	Description
Dependent variable	
log ($rent$)	log of Monthly rent in pesos
Independent variable of interest	
$w\_contract$	Type of rental arrangement (0 if oral contract 1 if written contract)
Independent variables (housing)	
log($rooms$)	log of number of rooms
mat_w	Predominant material walls; 1 if consolidated 0 otherwise
mat_fl	Predominant material floor; 1 if consolidated 0 otherwise
$type\_str\_d$	Type of structure (dummies for: house or apartment, room, other)
bs_water	Individual access to piped water (1 yes, 0 no)
bs_gas	Individual connection to gas (1 yes, 0 no)
no_risk	Natural risk menace (1 if no risk reported 0 if other risks reported)
$dist$	Distance to center of the city in kilometers (San Antonio Metro Station)
Independent variables (neighborhood)	
m_rooms	Average number of rooms in neighborhood
$sh\_informal$	Share of informal housing in the neighborhood (owner households not having sufficient
sh_consol	Share of households living in a consolidated house in neighborhood
sh_bs_gas	Share of households having individual connection to gas in neighborhood
sh_risk	Share of households reporting no natural risk at neighborhood
$sh\_highereduc$	Share of households with higher education* in neighborhood
sh_ethnic	Share of households belonging to one ethnic group in neighborhood
$sh\_displaced$	Share of displaced households in neighborhood
sh_health_acces	Share of households reporting difficulties to access health centers in neighborhood
$crime$	Homicide rate (Homicides/population) per neighborhood in 2009
$zones\_d$	Zone* dummies

*Head of Household with higher education, ** Medellin urban area is divided in 6 zones, which in turn are divided in 16 districts (*comunas*) which in turn are divided in neighborhoods (*barrios*). The city has 16 *comunas* and 249 official barrios.

Written contracts

The `w_contract` variable, included in the hedonic price model, is intended to capture household's willingness-to-pay for written contracts. However, the economic meaning captured by this variable can be subject to a number of discussions. The existing literature concerning our subject assumes that the informal dummy variable coefficients captures the premium risk associated to informality. In the studies made by Jimenez(1984) and Friedman *et al.* (1988), squatter dummies' coefficients are interpreted as the value that squatter renters or owners are willing to pay to avoid the risk of being evicted and the costs associated to it. In our case, since all of the population observed is in the informal housing market an initial assumption is that the `w_contract` captures the 'premium risk' associated to different type of rental agreements. This 'premium risk' equal to the risks faced by the squatter owner or faced by the squatter tenant, when making an oral contract agreement[5]. For instance, if we suppose than an oral contract agreement has less social contractual value[6] than written contracts, squatter owners face a higher risk of not being paid by tenants when having oral contract agreements. In the same way, squatter tenants with oral contracts might face a higher risk of being evicted without a just cause or of being forced to move due to an abrupt increase in rent. However, the economic interpretation and the measurement of the 'premium risk' can be subject to a number of biases. Here I discuss three of the possible sources of bias specific to the research question discussed in this article.

The first source of bias, according to Kapoor and Le Blanc (2008), is due to the existence of missing housing or neighborhood variables. If unobserved variables are on average worse in informal neighborhoods, a hedonic equation including a dummy for the informal sector will capture unobserved differences and show a negative coefficient for this variable. In our case if oral contract neighborhoods are on average worse than written contract neighborhoods, the dummy for written contracts will absorb these differences. In order to avoid this selection bias I have controlled for a number of neighborhood characteristics and introduced zone dummies that should capture the effects mentioned by Kapoor and Le Blanc (2008). Furthermore a spatial distribution analysis of households by type of contract using Geographical Information Systems GIS (see Figure 4) provides evidence against a spatial segregation of household's depending on their tenure contracts. Figure 4 also confirms that most of the households used in our analysis live in informal neighborhoods and our hedonic analysis between different types of contracts should be viewed as an analysis of fragmentations inside the informal city that lead to different levels of tenure security.

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[5] In equilibrium the risk faced by the squatter tenant and the squatter owner are the same
[6] The contractual value will be given by the specific social context in which the contract is done and the existing informal mechanisms (i.e. informal law, gangs) in which contracts are supported.

Figure 4. Spatial distribution of households with rental status according to rental arrangement, and spatial distribution of informal settlements in the city of Medellin
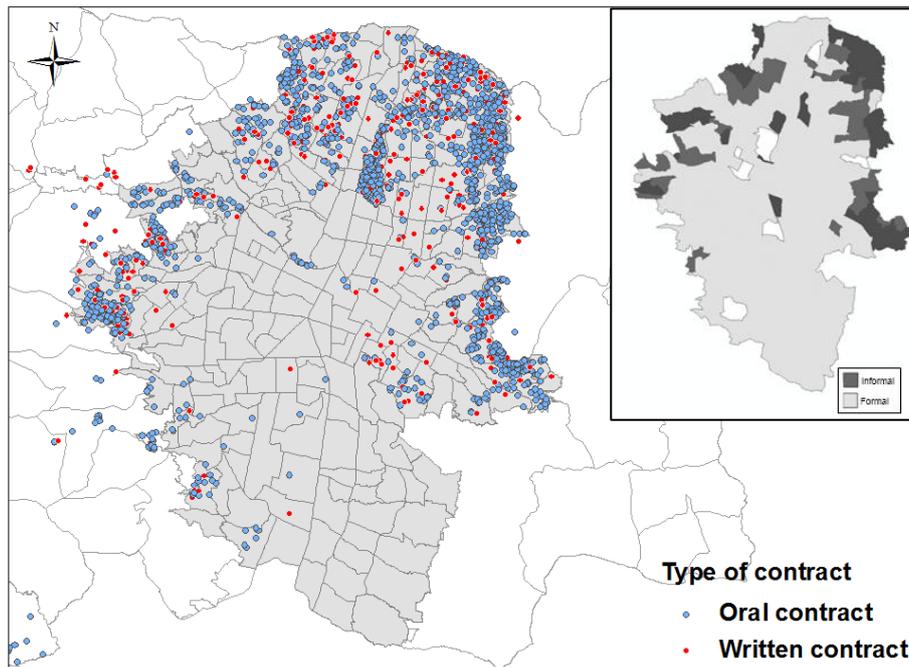
The second source of bias, for which I cannot control for given the information available, is that it is possible that oral contracts are done with a higher probability when the landlord is related to the tenant (i.e. close friends or family). If this is the case, the risk faced by closely-related landlords (and closely-related tenants) when making an oral contracts might be lower since a 'social' contract between the two parties already exists. Therefore the coefficient for written contracts in the hedonic equation might be capturing both the 'risk premium' effect and the 'relative premium effect'. Since the hedonic analysis presented in this article uses oral contracts as a proxy for the 'risk premium' associated with less valuable social contracts, if the second source of bias is presents, the willingness to pay for written contracts will be underestimated.

Finally, the third source of bias concerns the possible endogeneity of some of the housing attributes considered, and especially of the variable of interest. This problem arises as renters can simultaneously choose their monthly rent and housing surface, or their monthly rent and the type of contract. Since these two choices are bounded by specific personal characteristic of the tenant, it is possible to observe a correlation between the error term and these variables. This issue, while common to most hedonic prices analysis, is rarely solved in literature and has not been treated by either of the authors who made similar studies. Since the database I use is very rich I tried using Instrumental Variable (IV) techniques to solve this problem. The mean number of households with oral contracts in the neighborhood (excluding the observation), the ability to read and write of the head of household and a dummy variable indicating if the tenant had a bank account,

among others, were selected as possible candidates for IVs. These variables, while correlated with the *w_contract* dummy had no effect on the rental value. However, results from IV tests indicated that the variables were too weak and weak instruments techniques produced limited results. Therefore, the existence of an estimation bias due to the existence of endogeneity remains one of the limitations of my study.

Summary statistics

Table 2 presents summary statistics for housing, neighborhood and socio-economic characteristics. A comparison between owners and renters is presented in the first two columns and a comparison between oral contract renters and written contract renters is presented in the last two columns. Standard errors are presented in parenthesis and the statistical significance of the differences in means between renters and owners, and oral contract renters and written contract renters is marked with asterisks. The comparison between owners and renters shows how on average, a higher proportion of renters belongs to the forced displacement category. Renters also have on average less family members than owners; however, this could be due to the overrepresentation of forced displaced households in our sample, in which not in all occasions do all family members move to the city. Difference in mean income between renters and owners is not significant.

The comparison of housing, neighborhood and socio-economic characteristic of households with oral and written rental contracts yields the following results. On average renters who have written contracts live in bigger and more consolidated houses and are located in more consolidated and more educated neighborhoods. The average monthly rent paid by a household's having an oral rental agreement is 136,648 COP compared to 187,793 COP of those having written contract agreements. Difference in means is very significant. Figure 5 and Figure 6[7] evidences how, in spite of the large differences between the two rental value means, there are a

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[7] The box-plot presented in Figure 5 and Figure 6 are standard box-plots in which the line in the middle of the box correspond to the median, the lower and upper hinges of the box to the 25th and 75th percentiles respectively, the upper and lower line to the upper and lower adjacent value and the dots outside the lines or whiskers to outside values.
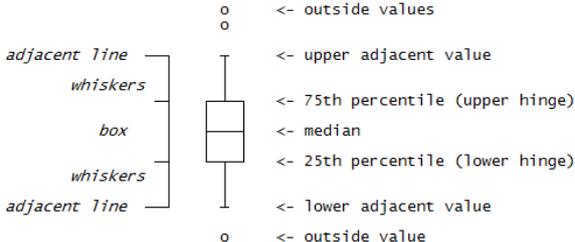
number of values for which oral and written contracts overlap. The same is true for household income.

Figure 5. Box-plot of monthly rental value against type of contract
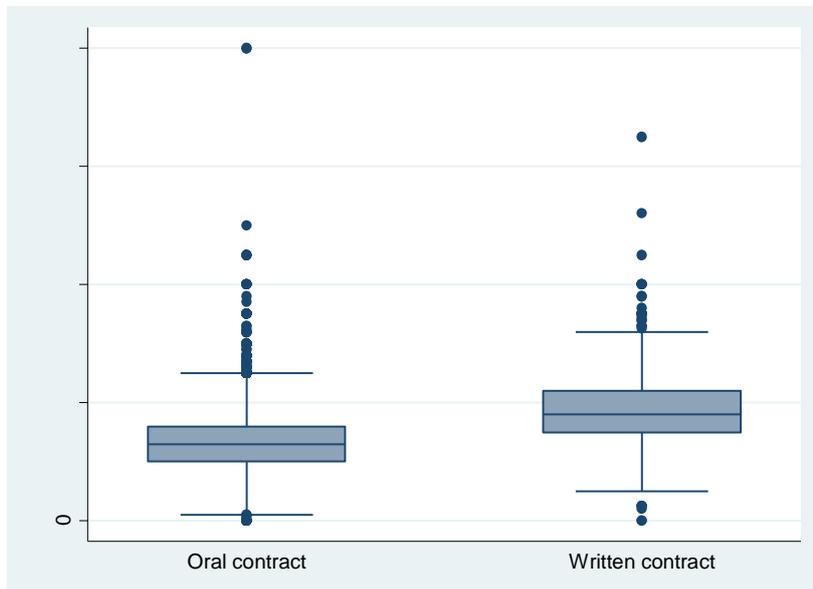
Figure 6. Box-plot of monthly income against type of contract
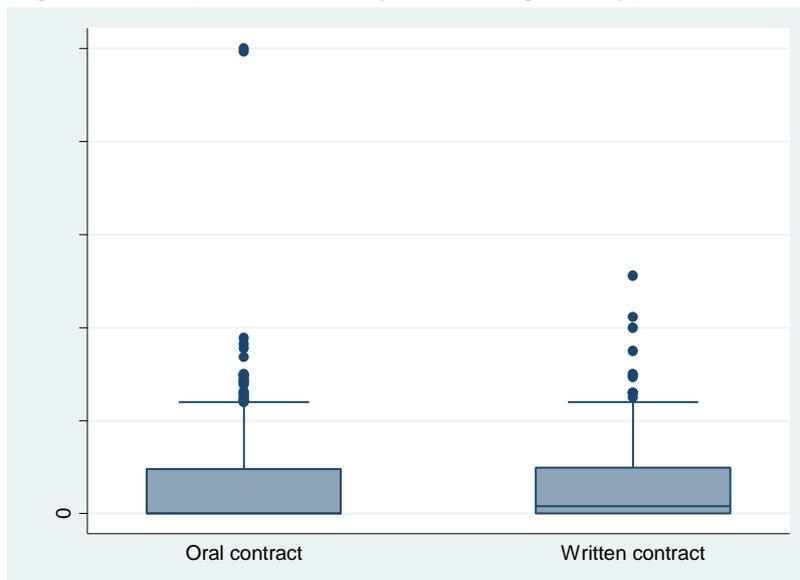
Table 2. Summary statistics

		RENTERS (1)	OWNERS (2)	WRITTEN CONTRACT (3)	ORAL CONTRACT (4)
Housing	*rent*			187793***	136648
				(3087)	(1169)
	rooms	2,625***	2,795	2,964***	2,560
		(0,020)	(0,014)	(0,048)	(0,022)
	mat_w	0,912***	0,800	0,980***	0,899
		(0,005)	(0,005)	(0,006)	(0,006)
	mat_fl	0,944***	0,875	0,985***	0,936
		(0,004)	(0,004)	(0,005)	(0,005)
	type_str_1	0,884***	0,913	0,938***	0,874
		(0,006)	(0,003)	(0,010)	(0,006)
	type_str_2	0,112***	0,077	0,062***	0,121
		(0,005)	(0,003)	(0,010)	(0,006)
	type_str_3	0,004***	0,010	0,000*	0,005
		(0,001)	(0,001)	(0,000)	(0,001)
	bs_water	0,970***	0,952	0,995***	0,966
		(0,003)	(0,003)	(0,003)	(0,003)
	bs_wastedisp	0,977***	0,958	0,989***	0,974
		(0,003)	(0,002)	(0,004)	(0,003)
	bs_gas	0,455	0,483	0,444	0,457
		(0,009)	(0,006)	(0,021)	(0,009)
	bs_electricity	0,992	0,990	0,995	0,991
		(0,002)	(0,001)	(0,003)	(0,002)
	no_risk	0,798***	0,679	0,862***	0,786
		(0,007)	(0,006)	(0,015)	(0,008)
	dist	6,021-		5,889*	6,047
		(0,034)		(0,083)	(0,037)
Neighborhood	*m_rooms*	2,768***	2,725	2,868***	2,749
		(0,006)	(0,003)	(0,017)	(0,006)
	sh_informal	0,085***	0,110	0,074***	0,087
		(0,001)	(0,001)	(0,003)	(0,001)
	sh_consol	0,846***	0,804	0,890***	0,837
		(0,002)	(0,002)	(0,005)	(0,003)
	sh_bs_gas	0,476	0,473	0,466	0,478
		(0,004)	(0,003)	(0,011)	(0,005)
	sh_no_risk	0,751***	0,701	0,795***	0,742
		(0,003)	(0,001)	(0,006)	(0,003)
	sh_highereduc	0,122***	0,114	0,133***	0,120
		(0,001)	(0,001)	(0,004)	(0,001)
	sh_etnic	0,961***	0,955	0,966***	0,960
		(0,001)	(0,001)	(0,002)	(0,001)
	sh_displaced	0,590***	0,378	0,636***	0,581
		(0,006)	(0,004)	(0,015)	(0,007)
	crime	0,001	0,001	0,001	0,001
		(0,000)	(0,000)	(0,000)	(0,000)
Socio-economic	*household size*	3,598***	3,778	3,684	3,581
		(0,032)	(0,023)	(0,078)	(0,035)
	income (COP)	234983	241206	283113***	225334
		(6019)	(4470)	(16299)	(6429)
	displaced	0,654***	0,345	0,703***	0,645
		(0,008)	(0,006)	(0,020)	(0,009)
	gender (Female)	0,474	0,467	0,424**	0,484
		(0,009)	(0,006)	(0,021)	(0,010)
	high Education	0,128***	0,111	0,159**	0,122
		(0,006)	(0,004)	(0,016)	(0,006)
	n	7001	3372	550	2822

Stand. Error in parentheses, * p<.10, ** p<.05, *** p<.01, absent variables: written contract, type of structure 1 and zone 1.

4. Results

Hedonic prices

Results from the two hedonic models used, with and without neighborhood controls, are presented in Table 3. Robust standard errors are presented in parenthesis and a plot containing leverage and normalized square residuals can be found in Annex I. In both of the models all of the coefficients have the expected signs. For **_housing attributes_**, I find that bigger houses who have floors and walls made of consolidated materials have higher rents that smaller and less consolidated households. An increase of distance to the city center, measured by the distance, in kilometers, of each dwelling to the San Antonio Metro station, diminishes rental value. The absence of reported natural risk is found to have a positive and significant effect on rent. On the contrary access to piped water is found to be not significant; however, this could be due to the generalization of water provision in the city[8]. Individual connection to the gas network was initially found to have a negative but not significant effect – in the model without neighborhood variables – and then found to have a positive and significant effect – in the model with neighborhood variables. The latter might be due to the correlation between the individual access to the gas network variable and the share of access to the gas network in the neighborhood.

For **_neighborhood attributes_** I find some of the coefficients to be non-significantly different from zero. The share of informal houses in the neighborhood, the share of consolidated houses and the crime rate seem to have no effect on rental value. Furthermore, a positive discrimination for ethnic neighborhoods and towards forced displaced neighborhoods was found. However, the latter might be due to the high proportion of displaced households in the database which might have preferences to live in neighborhoods overrepresented by displaced households. Households also value living in neighborhood with low incidence of natural risks, with a higher share of educated households and good access to health care facilities.

In both of the regressions the coefficient for written contracts is positive and very significant. The latter is expected to capture the premium risk associated to informal rental contracts of the average households. In terms of magnitude the coefficient for written contract is considerably smaller when I control for neighborhood characteristics. While in the first model, the rental value of a house when passing from oral to written rental contract increases by 26.56%, in the second model, the estimated increase in rental value is 18.23%. The latter confirms Kapoor and Le Blanc (2008) expressed concerns about unobserved characteristics that differ between informal and

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[8] In Colombia the constitution defines that all household have the right to have access to water and services even when living informal settlements.

formal neighborhoods and suggests that in the case of Medellin, oral contract households are on average located in less valuable neighborhoods than written contract households.

Table 3. OLS Results hedonic price models

	WITHOUT Neighborhood (1)	WITH Neighborhood (2)
w_contract	0.236***	0.167***
	(0.028)	(0.031)
log(rooms)	0.300***	0.238***
	(0.035)	(0.031)
mat_w	0.534***	0.385***
	(0.106)	(0.104)
mat_fl	0.237*	0.255*
	(0.138)	(0.139)
type_str_2 (room)	0.0604	0.00757
	(0.054)	(0.052)
type_str_3 (other)	0.477***	0.389***
	(0.114)	(0.095)
bs_water	0.0647	0.0594
	(0.129)	(0.149)
bs_gas	-0.0121	0.0408**
	(0.026)	(0.020)
no_risk	0.266***	0.171***
	(0.047)	(0.047)
dist	-0.0322***	-0.0547***
	(0.005)	(0.007)
m_rooms		0.128**
		(0.055)
m_informal		-0.172
		(0.240)
m_consol		0.0964
		(0.237)
m_bs_gas		-0.209**
		(0.103)
sh_no_risk		0.879***
		(0.223)
Sh_highereduc		0.379**
		(0.176)
sh_ethnic		0.288*
		(0.171)
sh_displaced		0.129**
		(0.054)
sh_health_acces		-3.861***
		(1.063)
crime		3.661
		(16.029)
zone_2		-0.0962
		(0.066)
zone_3		-0.541**
		(0.259)
zone_4		-0.102**
		(0.045)
zone_5		-0.149**
		(0.069)
zone_6		0.170***
		(0.056)
_cons	10.65***	9.750***
	(0.175)	(0.371)
n	3169	3002
adj. R2	0.17	0.23

Stand. Error in parentheses, * p<.10, ** p<.05, *** p<.01, absent variables: oral contract, type of structure 1 and zone 1.

Qualitative analysis

The previous analysis of the value of different tenure arrangements using hedonic prices confirms the initial hypothesis: *"households having oral rental arrangements pay less for identical houses than household's having written rental arrangements"*. However, since the information available in the *Medellin Solidaria* database doesn't allow determining what the real differences between oral and written contracts are, I carried out a telephonic survey in which households were asked about their contract arrangements and their perceived risk of eviction. A group of 30 households and 30 replace households were randomly selected from the *Medellin Solidaria* database with half of them having oral contract arrangements and half of them having written contract arrangements. Only four households who were contacted refused to answer the questionnaire arguing that they didn't have enough time or were on the way out. These households were replaced by 4 replace households from the replace list. The questionnaire used can be found in Annex II. Although the random sample selected to carry out the telephonic survey was initially intended to have half of tenants with oral contracts and half with written contracts, the final sample had 40% of tenants with written contracts and 53% with oral contracts and 7% who did not knew the type of contract they had. This difference can be explained by residential mobility.

All households were asked to state the clauses of their oral or written contract agreements and to answer if they though it was likely to be forced to leave their houses given a number of reasons (i.e. increase rent, ended agreement, expulsion without a valid reason). Table 4 presents the different contract clauses according to type of rental contract and the expressed risk of being forced to leave. As expected, households having oral contract have a higher perception of risk of eviction when compared to household having written contracts. The differences between the perceived risks are especially significant for the case of expulsion without valid reason as 44% of households having oral contract thought they were very likely to be evicted without a valid reason and none of households with written contract expressed a perceived risk of being evicted without a valid reason. In terms of contract clauses I found that in most of the written contract's agreements the provision of a guarantor was requested and an initial time of stay was agreed between tenants and landowners, the contrary is observed for the case of oral contract's agreements. Furthermore, only a quarter of oral contract's surveyed households said to have discussed or agreed on the maximum increase in rent from one year to another when making oral agreements and only half of written contract households did so. The latter brings to light that while there are visible differences in the risks faced by written contract tenants and oral contract tenants; both of them face risks associated to informality.

Table 4. Contract clauses and expressed perception of risk

	Type of contract		
	WRITTEN	ORAL	DON'T KNOW
Risks of being forced to leave			
Very likely landowner increases rent beyond payment	25.0%	37.5%	0.0%
Very likely landowner ends contract prior to agreement	25.0%	37.5%	50.0%
Very likely of being evicted without a valid reason	0.0%	43.8%	50.0%
Contract clauses			
Guarantor requested	58.3%	6.3%	100.0%
Initial guarantee of payment requested	9.1%	12.5%	100.0%
Maximum increase in rent from one year to another agreed	50.0%	25.0%	0.0%
Initial time of stay defined	91.7%	37.5%	50.0%
N	12	16	2

In Table 5 other results from the qualitative household survey are presented. I find that a larger proportion of households having oral contracts have some sort of relationship with landowner, in these cases the landowner is usually a close family member of the tenant. As previously mentioned if oral contracts are done with a higher probability between tenants and landlords who are related and landlords (tenants) consider less risky to have oral agreements with relatives or friends, the differences in risks associated to previously existent 'social' contracts (i.e. friendship) will be captured in the hedonic price equation. Therefore, the dummy variable of written contracts in the hedonic equation could be capturing both the 'risk effect and the 'relative premium effect'. Given the information available in the *Medellin Solidaria* database, I am unable to separate both of the effects in the hedonic price regression and it is possible that some of the value captured by the written contract dummy might be unrelated to the prime risk of having insecure rental contracts.

Other information that evidences the differences between the two types of contracts is the form of payment of monthly rent. Almost all households who have oral rental contracts pay in cash and none of them make transfers to landowners' bank accounts. In addition, most of oral contract households are not aware of the time needed to make a notice of leaving their houses to the landlord and vice versa.

Table 5. Oral versus written contracts, general results

	Type of contract		
	WRITTEN	ORAL	DON'T KNOW
How do you pay your rent?			
Transfer to landowners bank account	8.33%	0.00%	0.00%
Deposit in landowners bank account	33.33%	6.25%	0.00%
Cash	58.34%	93.75%	100.00%
Who pays basic services?			
Landlord	16.67%	12.50%	0.00%
Tenant	83.33%	87.50%	100.00%
Do you have any relationship with landowner?			
Yes	8.33%	18.75%	50.00%
No	91.67%	81.25%	50.00%
Are you aware of the required time you need to tell landlord if want to leave the property?			
Household is aware	58.33%	25.00%	0.00%
Household is aware but no time is required	8.33%	6.25%	0.00%
Household is not aware	33.33%	68.75%	100.00%
Are you aware of the required time if your landlord wants you to leave the property?			
Household is aware	58.33%	18.75%	0.00%
Household is aware but no time is required	0.00%	6.25%	0.00%
Household is not aware	41.67%	75.00%	100.00%
N	12	16	2

5. Conclusions

In this article I evaluate the willingness to pay for written rental contracts of poor households in informal settlements in the city of Medellin. I use a hedonic prices approach based on an extensive database comprehending 10,332 households among which 3,372 are renters. The database used contains information on housing characteristics, socio-economic characteristics and rental values. I assume initially that the written contract dummy present in the hedonic price equation captures only the 'premium risk' associated to having less secure rental contracts, and that although both types of contracts have no legal value – since they are both in the informal housing sector – written contracts provide a more secure social contract than oral ones. This 'premium risk' is equal to the risks faced by the squatter owner or faced by the squatter tenant, when making an oral contract agreement. Households having oral rental arrangements are expected to have lower tenure security since they can be more easily evicted than households having written rental contracts, and should therefore pay less for identical housing units. The hedonic prices analysis is complemented by a qualitative survey carried out by the author, in which, households were asked to express their perceived risk of eviction and to discuss the contract agreements or clauses they had made with landlords.

Compared to similar studies present in literature (Jimenez, 1984; Friedman *et al.* 1988; Kapoor and Le Blanc, 2008; and Lanjouw and Levy, 2002) I control for a large set of neighborhood

characteristics. The purpose of the latter is to avoid possible bias due to neighborhood omitted variables: *if oral contract households are on average located in less valuable neighborhoods than written contract households the dummy variable for oral contract will capture these differences.* Results from the hedonic price regression with and without neighborhood control dummies indicate that the rental value of a house when passing from oral to written contract increases by 18,23% in the first case and by 26.56% in the second case. These findings confirm the importance of including neighborhood variables to avoid overestimating the value of written contracts.

Results from the qualitative survey on risk perception support hedonic prices analysis interpretation. Oral contract households report having a higher perceived risk of being evicted by landlord without a valid reason; a higher risk of being forced to move out due to an arbitrary increase of rent beyond agreed clauses, and a higher risk of being expulsed before the agreed duration of stay. However, the qualitative survey also evidenced the possible existence of a 'relative premium effect' for households with rental contracts since a higher proportion of households having oral contracts are found to be related to the landlord when compared to households having written contract arrangements. If related landlords (or related tenants) consider oral contract agreements less risky that the general population since a 'social' contract between the two parties already exists, the written contract dummy in the hedonic price equation is not only capturing the 'risk premium effect' but also capturing a 'relative premium effect'.

The main contribution of this paper is to evidence the existing differences in tenure security in informal settlements between two different types of rental agreements. The analysis presented in this article suggests that the owners/renters division of informal settlements might be insufficient to understand completely the heterogeneous population living in this type of habitat and that although none of the contracts studied have a legal value, they do have a social contractual value. This evidence suggests the existence of a parallel system of law that has a social value for economic agents, similar to the one found in experimental economic studies such as the ones carried out by Charnes and Dufwenberg (2006), Vanberg (2008) and Jacquemet 2009. The policy implications of our results suggest that slum policies such as titling might have different impacts on tenants depending on their type of rental arrangement. For instance titling policies which lead to an increase in the rental value of properties might affect in a higher proportion households having oral rental agreements than those having written rental agreements. Furthermore, the distribution effects of slum policies (between the poor and the poorer) will depend on the fragmentations of the informal city and the delimitation of policy's beneficiaries

However, these results need to be taken with care since I was not able to control for the possible endogeneity product of households choosing simultaneously the type of contract and

the monthly rental value. Future extensions of this study might comprehend more advanced econometric techniques that allow to control for endogeneity and the implementation of a two-stage hedonic price model using non-parametric approaches to evaluate if preferences for written contracts changes according to households characteristics.

Annex I

Figure 7 presents the normalized square residuals from the neighborhood hedonic regressions. No outliers and leverage observations of any concern are found.

Figure 7. Leverage versus normalized residuals for the neighborhood variables regression.
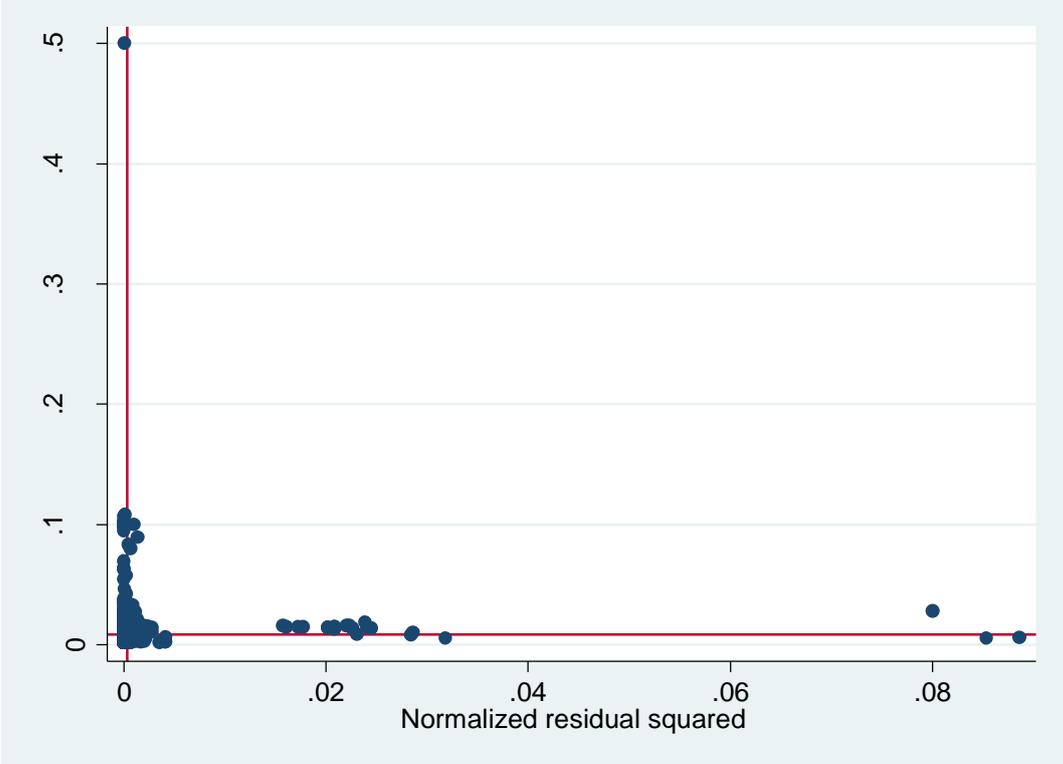
Annex II

Telephonic household survey (traduced from Spanish)

Hello, I am a student from the School of Mines and we are doing a survey to evaluate the different rental contracts in the city of Medellin. I wanted to ask you if you could lend me some of your time to answer to some questions that will help us very much. I won't be asking you any personal question or any information of your family and this information will only be used for academic purposes.

1. In the house in which you live are you owner or renter?
   > Renter (go to 2.) _____
   > Owner (end) _____
2. For how long have you live in this house? _____ months, _____ years
3. What type of rental contract do you have?
   > Written _____ (0)
   > Oral _____ (1)
   > Don't Know _____ (2)
4. The type of contract agreement you have (oral or written) was…
   > Imposed by the owner _____ (1)
   > Imposed by you _____ (2)
   > Agreed between the two parts _____ (3)
   > Other _____ (4)
5. How did you found the dwelling in which you are actually living?
   > Through friends _____ (1)
   > Newspaper/magazine adds _____ (2)
   > Through relatives _____ (3)
   > Other, which? _____ (4)
6. Can you please give me the following information about your contract agreement,
   6.1. How much do you pay per month? _____ pesos
   6.2. How do you pay your rent?
       (1) Check _____
       (2) Money transfer from your bank account _____
       (3) Cash deposit in owners bank account _____
       (4) Cash _____
   6.3. Who pays for basic services?
       (1) Tenant (interviewed) _____
       (0) Owner _____
   6.4. When you did your rental agreement… did you have to be supported by a cosigner?
       (0) NO _____
       (1) YES _____
       (2) Don't know _____
   6.5. When you did your rental agreement… did you have to give an initial sum of money as guarantee for payment?
       (0) NO _____
       (1) YES _____
       (2) Don't Know _____
   6.6. Did the contract (or agreement) have any clause which indicated how much could rent increase from one year to another?
       (0) NO _____
       (1) YES _____
       (2) Don't Know _____

6.7. For how many months or years was the rental contract initially agreed?
- (1) Months_____
- (2) Years _____
- (3) Indefinite _____
- (4) No agreement on occupancy period _____
- (5) Don't know_____

6.8. How much time, in advance, do you have to inform your owner if you want to leave the house in which you are living?
- (1) Months_____
- (99) No time agreed _____
- (98) Don't Know _____

6.9. How much time, in advance, does the owner has to inform you if he wants you to leave the house in which you are living?
- (1) Months_____
- (99) No time agreed _____
- (98) Don't Know _____

7. Have you ever been late in payments?
- (0) NO_____ (go to 9.)
- (1) YES _____

8. What happened when you didn't pay in time? _____
_____

9. Have you ever had any damage in the house in which you are living? For example inundations, problems in water provision, etc.
- (0)   NO_____ (go to 11.)
- (1)   YES _____

10. Who solved the problem and paid for the damages?
- (0) Owner _____
- (1) Tenant (interviewed) _____

11. Do you have any close relationship with the owner?
- (0) NO_____
- (1) YES _____, which? _____

12. Can you answer the following questions…
   12.1. How likely do you find it possible that the owner increases rapidly the rent to a value that you are not able to pay? Very likely _____ (1) Not likely _____ (0)
   12.2. How likely do you find it possible that the owner decides to terminate the contract before the end of the agreement? Very likely _____ (1) Not likely _____ (0)
   12.3. How likely do you find it possible that the owner decides to evict you from the property without a valid reason? Very likely _____ (1) Not likely _____ (0)

Part II

The impact of slum interventions on households' welfare

Chapter 5
Measuring the effects of slum policies

1. Introduction

A slum household as defined by the United Nations is a household that lacks one or more of the following characteristics: access to improved water, access to improved sanitation, security of tenure, durable housing and sufficient living area (UN Habitat, 2003). Therefore, slum policies can cover very different interventions from simple improvements in access to basic services to more complete actions that lead to a total reconstruction of slums. In the previous chapters we have discussed the importance of making correct impact evaluations of slum policies (1) to identify if a given policy is achieving its objectives (i.e. number of beneficiaries, total cost), (2) to compare the policy's return to other policies and (3) to evaluate whether the policy is contributing to or opposing poverty–alleviation efforts. In addition, evaluating the outcomes of slum improvements can lead to a better understanding of slum formation mechanisms, which are essential to tackle the slum 'problem'.

The evaluation of the impacts of slum policies encounters the same difficulties as that of the analysis of traditional public policies but has some additional complexities specific to the slum issue. First, slum policies are on many occasions composed of packages of policies; a given slum policy can improve both basic service provision and tenure security, thus making it difficult to separate the effects of each intervention on a given welfare indicator and develop theoretical analysis that consider both. Second, as explained by Field and Kremer (2006), most poor neighborhoods and particularly informal settlements are underrepresented in census data. The lack of information on slums and the sometimes low quality of the information available makes it more difficult for researchers to establish pre–existing conditions and evaluate the effects of policies. This means that in many cases researchers need to collect the information themselves, which can be time–consuming and costly. Furthermore, when little information on the distribution and the dispersion of the slum population is known, the creation of representative samples of treated and control groups can be difficult.

In addition, the evaluation of the impact of slum policies intends to respond–as every other analysis of public policies–an essential counterfactual question: what would have happened to those who benefitted from the policy if they had not benefitted and how would those who did not benefit react in the presence of the policy? Since it is impossible to measure the two outcomes for the same individual, researchers have to find ways to identify non–beneficiary or control groups that can be used as the benchmark for treated or beneficiary groups. The latter is referred to in literature as **the evaluation problem.** Finding comparable treated and control groups is in most cases problematic since those who did benefit from the policy are generally different from those who were left outside. For instance, in Mumbai, only households that are live prior to January 1, 1995 in the city can be eligible for the Slum Rehabilitation Scheme (SRS); non–eligible slums are more recent, less consolidated and tend to house poorer households. Therefore, a direct comparison of rehabilitated households to slum households introduces a **selection bias** as the initial differences between the two groups are captured in the measurement of the effect of the policy. In the following section we will evaluate different methodologies to face **the evaluation problem** and control or reduce **selection bias.** Throughout this chapter the terms intervention, project or public policy and treated or beneficiaries are used without distinction.

This chapter is organized as follows. Section 2 discusses the evaluation problem and some of the possible selection bias present in slum–policy evaluation. Section 3 describes methodological approaches to overcome the evaluation problem and selection bias. Section 4 presents some of the most relevant empirical studies related to slum upgrading. Finally, in Section 5 I present the methodologies used to evaluate the welfare effects of slum upgrading, in Mumbai and Medellin, which are used in the development of impact evaluations presented in the following chapters.

2. Methodological concerns for public policies evaluation[1]

The evaluation problem

The evaluation of public interventions aims to assess the effect of a treatment T on a variable of interest y. In empirical economic analysis, modifications of y due to public interventions can be measured by looking at the variable of interest for the same individual with (y_1) and without the treatment (y_0). The difference between the outcome of interest ($\Delta = y_1 - y_0$) will correspond to the treatment effect. Usually public interventions are studied to determine how treated individuals responded to the policy and/or to anticipate how those who did not benefit

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[1] This section draws heavily from Chapter 10 "*Evaluation des politiques publiques. Econométrie des effets de traitement*" of Crépon and Jacquemet (2010)

would have responded if treated. Crépon and Jacquemet (2010) explain the differences between these two measurements in the following way:

[1] Average Treatment effect on Treated $\Delta^{ATT} = E(y_1 - y_0 | T = 1)$ [1]

[2] Average Treatment Effect $\Delta^{ATE} = E(y_1 - y_0)$ [2]

[1] measures the average treatment effect on those who benefitted from the policy while [2] estimates the effect of treatment if the policy were extended to the general population. These two effects are different when the gain that individuals derive from treatment conditions their decisions to participate. Ideally, to estimate these effects it would be necessary to identify $E(y_1|T)$ and $E(y_0|T)$, but in reality, the same individual is never observed simultaneously in these two situations. A set of methodologies, explored in the next section, allows, under a number of hypotheses, to estimate the value of Δ^{ATT} and Δ^{ATE}.

Selection bias

One way to estimate $\Delta^{ATT}/\Delta^{ATE}$ is to compare the average situation of those who benefitted from the policy to the average situation of those who did not benefit. Crépon and Jacquemet (2010) refer to this as *the naïve estimator of the treatment effect*.

The naïve estimator of the treatment effect is: $\hat{\Delta}^0 = \bar{y}^{T=1} - \bar{y}^{T=0}$

By definition this estimator identifies: $E(\hat{\Delta}^0) = \Delta^0 = E(y_1|T = 1) - E(y_0|T = 0)$ that could be rewritten as:

$$\Delta^0 = E(y_1|T = 1) - E(y_0|T = 1) + E(y_0|T = 1) - E(y_0|T = 0) = \Delta^{ATT} + B^{ATT}$$ [3]

In [3], B^{ATT} corresponds to the initial differences between treated and control groups. Therefore, if B^{ATT} is not different from zero, t*he naïve estimator of the treatment effect* leads to a bias estimation of the treatment effect; this bias is generally referred to as the ***selection bias.*** B^{ATT} is not different from zero when participation or treatment is endogenous. For example, if we suppose that a given NGO starts a project to give free malaria nets to households in a village, it only has a certain budget and can only finance 100 malaria nets, while the village's population is the double. Therefore, it gives the nets to the first 100 households who come to the NGO's headquarters and then measures malaria incidence comparing beneficiaries to non–beneficiaries. While in this case all households from the village are potential beneficiaries (since there is no criteria for selection), only the first 100 households benefit from the project, and it is possible that those who arrived first are the ones who expected to have the higher benefits from having malaria nets. In the same way, it is possible that those who benefitted from the policy were the ones who could read the information posted outside the NGO's headquarters or who had free

time on the day on which malaria nets were distributed. The differences between those who actually got malaria nets and those who didn't (B^{ATT}) will lead the NGO to underestimate or overestimate the policy's effect.

The estimation of the Δ^{ATE} can be biased in the same manner. Crépon and Jacquemet (2010) develop this idea as follows:

$E(y_1) = P(T = 1)E(y_1|T = 1) + (1 - P(T = 1))E(y_1|T = 0)$, which can be rearranged as $E(y_1|T = 1)= E(y_1) - (1 - P(T = 1))[E(y_1|T = 1) - E(y_1|T = 0)]$ [4]

Using a similar transformation for $E(y_0)$, Δ^0 can be rewritten in the following way: $\Delta^0 = \Delta^{ATE} + B^{ATE}$.

Were $B^{ATE} = (1 - P(T = 1))[E(y_1|T = 1) - E(y_1|T = 0)] + P(T = 1)[E(y_0|T = 1) - E(y_0|T = 0)]$ or $B^{ATE} = B^{ATT} + (1 - P(T = 1)[E(y_1 - y_0|T = 1) - E(y_1 - y_0|T = 0)]$

This transformation evidences a second source of bias related to the heterogeneity of treatment that appears when the probability to participate differs according to the possible outcomes of the individual participating or not participating.

The previous analysis allows for the identification of two conditions that will lead *the naïve estimator of the treatment effect* to converge to $\Delta^{ATT}/\Delta^{ATE}$:

First condition, Δ^0 converges to Δ^{ATT} if the probability of being treated is independent of y_0

Second condition, Δ^0 converges to Δ^{ATE} if the probability of being treated is independent of y_0 and y_1

The critical element to avoid **selection bias** is–therefore–the identification of a credible control group of non–beneficiaries who, in the absence of treatment, would have outcomes similar to those who were actually treated. The problem is that usually people who participated in a program are different from those who did not. Beneficiaries can be screened to enter the policy, located in a given geographic area or be those who have the expected higher returns to what the policy is offering. Therefore, in most cases, individuals who did not benefit from the policy cannot be used as a control group. However, there are a number of methods to address endogeneity of treatment. The most common ones will be discussed in the next section.

3. Experimental and quasi–experimental approaches

Angrist and Krueger (1999) argue that the most challenging empirical question in economics involve the "what if" statement. What if those who weren't treated got treatment, or what if those who got treatment, had not? As will be presented in this section, there is a very direct form of responding to these questions by using randomized experiments in which treatment is

assigned to households randomly. However, rarely do researchers have the chance to observe policies that assign treatment randomly and, in most cases, the establishment of credible comparison groups–who in the absence of the policy would have had similar outcomes to those who were treated–is essential (Field and Kremer, 2006). In this section experimental and quasi–experimental approaches that lead to a reduction of the **selection bias** will be discussed.

Randomized methodologies (Experimental approaches)

Most public policies are designed to target a certain group of individuals gathering a number of characteristics that make them eligible. In some cases, like our example of malaria–net distributions, all households are potential beneficiaries but the project is designed in a way that those who finally benefit are probably the ones who expect to have the higher returns for using malaria nets. In both cases it is not possible to assure the **First** and **Second** conditions to avoid **selection bias**, since treated and non–treated groups have visible differences before the policy is implemented and do not have the same probability of treatment.

Unlike quasi–experimental methodologies, randomized methodologies propose the elimination of **selection bias** through the implementation of policies that assign treatment randomly to the potential population of beneficiaries. Duflo and Kremer (2003) explain how *"In this case, on average, we can be assured that those who are exposed to the program are no different from those who are not, and thus a statistically significant difference between the groups in the outcomes the program was planning to affect can be confidently attributed to the program"[2]*.

Randomly assigning individuals to treatment and following both treated and control groups allows–on the one hand–the elimination of the initial differences between the two groups and–on the other hand–breaking the relationship between the expected treatment effect and the probability of being treated. If the NGO mentioned in the previous section had assigned malaria nets randomly to households in the village, the probability of being treated would be independent from the households' expected utility of having malaria nets, their malaria incidence prior to the project (**Second** condition) and their initial characteristics such as their ability to read or their time constraints (**First** condition).

Nevertheless, randomized methodologies require large coordination and monetary efforts to implement and track beneficiaries and non–beneficiaries a sufficient time for the policy to have produced results. Furthermore, most randomized evaluation encounters strong opposition related to ethical issues. If two very poor households are in great need of malaria nets, it is ethically difficult to accept that one got one and the other one did not, due to the implementation

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[2] pp. 95

of randomized evaluations. The latter makes it very difficult for policy makers to justify the implementation of policies which assign treatment randomly. For all of these reasons, the use of randomized evaluations for public policy analysis has remained low.

In the past decade research institutions like the *Poverty Action Laboratory* and *Innovation for Poverty Action* have lead a campaign for the implementation of randomized evaluation that has resulted in a higher recognition of the benefits of this type of evaluations and the multiplication of the number of randomized experiments worldwide. Nevertheless, most randomized experiments carried out for the moment have been in rural areas and involve the analysis of health or education policies or projects. The extension of randomized experiments for the analysis of more complex public policies, like slum policies, is not always easy and has not been developed considerably. To my knowledge only one randomized evaluation carried out so far can be considered as being part of slum policies and it involved the evaluation of the effects of accessing private piped water connections in Tangier (Morocco). This example will be discussed in the following section.

In Conclusion, *How does it control for initial differences between control and treated groups and solve endogeneity of treatment?* By designing a policy that assigns the treatment randomly, breaking the endogeneity of treatment and leading to 'perfect' treated and control groups (as both had the same probability of being treated).

Downsides: Ethical dilemma. They are labor intensive and costly. From the technical point of view, it means that the researcher is at the core of the program or policy implementation, which is not always the case. Furthermore, randomized evaluation estimates partial equilibrium programs which–if implemented on a large scale–could have different results. Randomized evaluations are not exempt from other problems also present in quasi–experimental studies that lead to bias in the estimation of the treatment effect, such as attrition (i.e. individuals with specific characteristics dropping out of the database), a non–random sample and spillovers (i.e. effects of treatment on treated which affect the control group indirectly).

Non–experimental approaches

In most impact evaluation studies of public interventions, control groups are identified *ex–post* based on the policy's design and data availability. In some cases multiple observations of treated and/or non–treated individuals are available (panel or multiple cross–sections), in others, it is only possible for the researcher to observe individuals after the policy was implemented (cross–section). The availability of data determines–to some extent–the possible methodologies used to control for **selection bias.** In this sub–section, we will first discuss how treatment effects

are estimated according to the type of data available and then describe some empirical techniques available for the identification of control groups in the case of non–experimental studies.

Before–After, Difference and Difference–in–Difference estimations

Before–After (BA), Difference (D) and Difference–in–Difference (DID) estimations are some of the most used methodologies to evaluate public policies. They are based on the comparison of individuals before and/or after the policy, in which the individuals observed before and after are not necessarily the same. In each of these estimations, additional hypotheses–that are sometimes not very convincing–need to be made to control for ***Selection bias.*** We will first discuss what the hypotheses are that are made in each of these cases–that allow a consistent estimation of the treatment effect–and then describe some of the available methodologies or techniques used in literature to support these hypotheses.

Before–After (BA) estimation is based on panel–data or repeated cross–section observations of treated individuals. In BA evaluations the control group is a group of to–be–treated individuals before they receive treatment. This estimator is biased if an exogenous variation affects the variable of interest in the period of analysis. Therefore, BA evaluation supposes that all observables changes between the two periods of analysis were caused by the policy or program, a very restrictive and unrealistic hypothesis.

Difference (D) estimations use cross–sectional observations of treated and non–treated (control) individuals *ex–post*. This estimator is–therefore–the same as the *naïve estimator* discussed in the previous section and is biased if unobservable differences between the two groups are correlated with the probability of receiving treatment.

Difference–in–Difference (DID) estimations combine the two previous methodologies by using panel or repeated cross–sections of treated and non–treated individuals. The hypothesis made in this estimation is less restrictive than in the case of BA and D, since it supposes that initial differences between treated and control groups would have been maintained in absence of treatment(Crépon and Jacquemet, 2010) . Field and Kremer (2006) argue that it is important not to take this assumption for granted. On a number of occasions treatment is assigned following negative shock in output (Ashenfelter, 1978). Some techniques might allow evaluating graphically if data support the hypothesis of constant average differences between the two groups prior to treatment. For instance, when long–time series data are available, it is possible to compare trends between control and treated groups over a long period before the intervention took place. However, even in these cases a recent study made by Bertrand *et al.* (2004) suggest that DID estimators (as commonly performed) can lead to biased estimators of the treatment effect due to

possible misspecifications of the parametric form that do not account for possible autocorrelation of time–series data.

The most common methods for BA, D and DID estimations of the treatment effects are regression models or average differences in the outcome of interest between control and treated groups. When treatment is estimated using regression models, a number of variables related to the outcome of interest can be used to capture differences between and/or within treated and not treated (or not–yet treated) individuals.

Figure 1 presents a simplified graphical example of the three estimators and the possible bias of measurement of the Treatment Effect (TE) for the case of D and BA estimators. In the case presented, in which there are initial differences in the outcome of interest between control and treated groups and there is an external force affecting the outcome of interest (trend), both the Difference and the Before–After estimators overestimate the treatment effect. While BA, D and DID estimators can all be used to estimate treatment effects in randomized experiments, it is generally the DID estimator that is used. Since randomized experiments are planned before policies take place and are generally meant to produce accurate policy analysis, they usually count with panel data of treated and control groups.

Figure 1. Comparison between Before–After (BA), Difference (D) and Difference–in–Difference (DID) estimators
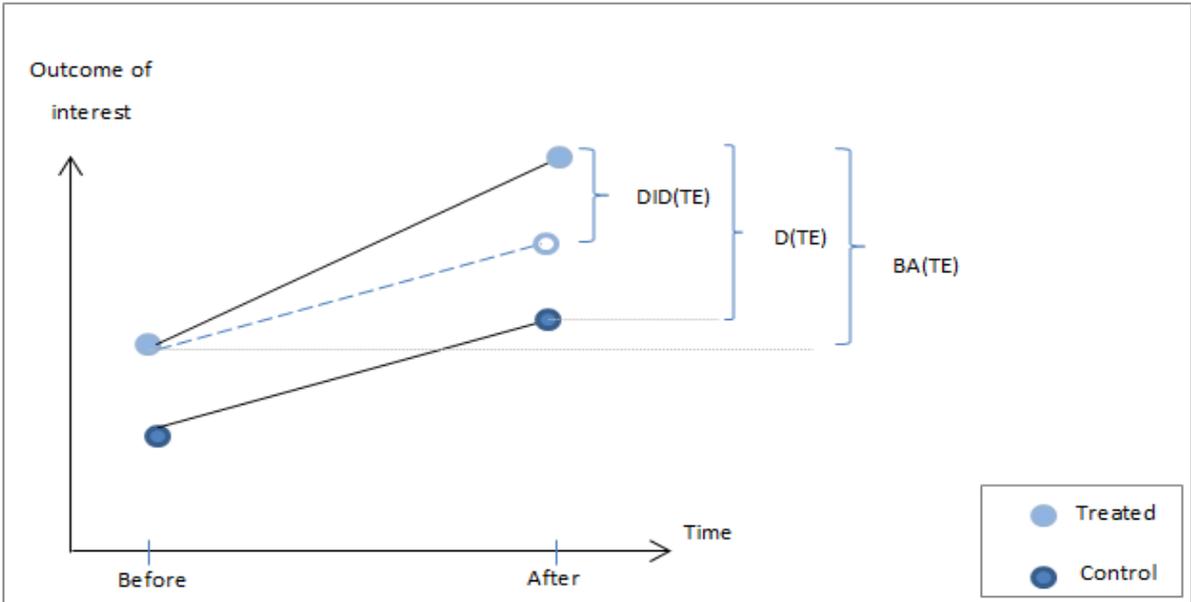
Techniques for controlling selection bias

So far we have seen how–in most cases– public policies target specific groups and are usually evaluated ex–post. Therefore, in most empirical studies, the estimation of the treatment effect depends on the data available or the possibilities for researchers to produce such data. Under

these circumstances most empirical studies carried out for policy analysis require the identification of convincing control groups to assure that the **First** and **Second** conditions are met. In this sub–section we present two of the most common techniques[3] used in empirical literature to identify control groups and reduce ***selection bias***. In some empirical studies a combination of both techniques is used.

Regression discontinuities

Regression–discontinuities techniques are applicable when either cross–sectional or panel data of treated and non–treated groups are available, and the policy design allows for it. On some occasions the criteria or the rules used to select policy beneficiaries generate *discontinuities* that can be used to compare those who meet the criteria (treated) to those who almost met the criteria but were left out (control). Scenarios in which policies allow for this type of techniques to be used are usually referred to as natural experiments. *Discontinuities* can take a number of different forms, such as geographical disruptions or "timing" discontinuities. Cattaneo *et al.* (2009) take advantage of a geographic disruption in the implementation of a policy that replaced dirty floors for cement floors in Mexico. In their study they compare treated and non–treated individuals who lived on the boundaries of two states, when only one of them had been treated. Field (2003, 2005 and 2007) and Field and Torero (2006) use timing discontinuities in a massive titling program in Peru, comparing households in areas that had already been reached by the program to households that had not been reached by the program at the moment of analysis.

In Conclusion, *How does it control for initial differences between control and treated groups and solve endogeneity of treatment?* By comparing treated and non–treated individuals who are very close to one another (boundaries).

Downsides: The use of regression *discontinuities* can be problematic in a number of cases. On the one hand, it is one technique that is especially vulnerable to spillover effects since treated and non–treated individuals sometimes share the same environment. On the other hand, it is sometimes difficult to identify accurately treated and control groups based on criteria as in many developing countries rules or criteria for participation in interventions are not always respected.

Propensity Score Matching

Propensity Score Matching (PSM) techniques are applicable when either cross–sectional or panel data of treated and non–treated groups are available, and the quality of the data allows for it. Controls and treated groups are identified using different matching techniques based on a

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[3] Other techniques such as hedonic prices, contingent evaluation methods or location choice models are used commonly to evaluate the monetary value of public interventions or model the possible welfare effects of different interventions. Examples of these techniques in the case of slum upgrading interventions are presented in Section 4 of this Chapter.

series of observable covariates according to the probability of being treated (Propensity Score). The Propensity Score is calculated using regression techniques based on covariates and serves to estimate the probability of treatment conditional on the covariates for each observation. The treatment effect is estimated comparing the average outcome of interest for individuals who had the same (or a very similar) probability of being treated (control) than treated individuals. One of the advantages of PSM, as explained by Jalan and Ravallion (2003), is that it allows estimating the heterogeneity of public policies, which serves to measure distributional impacts.

In Conclusion, *How does it control for initial differences between control and treated groups and solve endogeneity of treatment?* By comparing treated and non–treated individuals who had the same probability of treatment.

Downsides: To be able to find sufficiently close individuals from the non–treated group to those who were treated, this methodology sometimes requires the existence of very large databases. Furthermore, as matching is done based on observed covariates, bias may result if non–observables from the treated and control groups are very different and are related to the outcome of measurements or when the rules for allocating treatment are unknown to the observer.

4. Examples of empirical studies of slum upgrading interventions

Table 1 presents relevant examples of empirical studies evaluating slum upgrading interventions. As in the case of most public policies evaluations, most of these evaluations are done *ex–post* and many of them use cross–sectional data of treated and non–treated individuals. In many cases *regression discontinuities* are used to identify control groups or *exogenous treatment allocation* is assumed, as in the case of Galiani and Schargrodky (2010). Some studies use *ex–ante* data of treated and non–treated individuals, usually coming from official sources such as census data, which serve to test the hypothesis made for each estimation (BA, D, DID) based on a series of covariates.

In this chapter only empirical evaluations of real policies have been discussed; however, there are a number of studies in literature that respond to the "what if" question using techniques such as hedonic prices. In these cases, the empirical analysis serves to evaluate multiple policy scenarios and determine their welfare benefits. Most of these techniques are used to determine monetary values of public interventions, usually relying on the housing market, to evaluate how households value different policies and – if possible–estimate possible financing mechanisms. One example of this type of evaluations is presented in Table 1 (Takeuchi et al. 2008). The hedonic regression analysis of the informal rental housing market in the city of Medellin, presented in Chapter 4 can be considered as being part of this type of evaluations.

Table 1. Literature review and analysis of relevant empirical studies related to slum or housing upgrading interventions.

Author(s)	Purpose of the study	Approach	Type of data	Type of estimation	Criteria Identifying Control/Treated	Method for estimation
Field (2003, 2005, 2007), Field and Torero (2006)	Estimate the effects of a massive titling policy on: fertility, access to credit, housing investments and working hours (among others)	Non–experimental	Cross–section	D/DID	Regression discontinuities: comparison of treated households to to–be–treated (control) individuals	Regression models
Cattaneo et al. (2009)	Estimate the effect of a Mexican government policy to replace dirt floors with cement floors on child health and adult happiness.	Non–experimental	Cross–section + *ex–ante* census data	D	Regression discontinuities: comparison of treated and non–treated households living on the boundaries of a treated and a non–yet–treated state. Treated and control groups, identified by using Propensity Score Matching methods based on *ex–ante* census data were sampled to create the cross–sectional data based used for impact evaluation.	Regression models
Galiani and Schargrodky (2010)	Estimate the effect of a titling law in squatter settlements in Buenos Aires (Argentina) on housing investments, household size, children's education and access to credit.	Non–experimental	Cross–section	D	Exogeneity of treatment: compare treated and non–treated households. Treated households are those that received titles after the titling law passed and control households remained untitled at the time of the survey since the original owners of the parcels disputed the government's compensation in court.	Regression models
Aiga and Umenai (2002)	Estimate the impact of improvement of water supply in a squatter settlement in Manila(Philippines) on poverty and time allocation (among others)	Non–experimental	Cross–section + *ex–ante* socio–economic data	D	Control settlement was selected among 88 squatter communities since it was the most similar settlement, in terms of socio–economic characteristics, to the treated group.	Differences in outcomes of interest
Sharma et al. (2008)	Estimate the impact of relocating slum households due to an infrastructure project in Mumbai (India) on a number of welfare indicators	Non–experimental	Cross–section + Baseline Survey	BA	The treated group–prior to relocation–served as control for the treated group after relocation.	Differences in outcomes of interest
Takeuchi et al. (2008)	Estimate the welfare effects of relocating and rehabilitating slum dwellers in Mumbai (India).	Non–experimental	Cross–section	–	Each individual serves as a control for its own treatment.	Regression models (compensating variation)
Devoto *et al.*(2011)	Estimate the effects of private connections to the city's water grid in Tangier (Morocco) on waterborne illness, time allocation and social integration (among others)	Experimental (randomized)	Panel	DID	Treatment is assigned randomly to potential beneficiaries; a baseline survey is carried out before implementation and both treated and non–treated (control) households are resurveyed after treatment.	Regression models

5. The impacts of slum policies on households welfare: the case of Medellin (Colombia) and Mumbai (India)

The following chapters present results of two empirical studies of slum upgrading interventions in the city of Medellin (Colombia) and Mumbai (India). Each chapter puts forward distinct research questions and can be read on its own. The methodologies used, as well as the research subjects treated in each of the following chapters, are presented in Table 2

Table 2. Methodologies used for the empirical analysis of the Slum Rehabilitation Scheme in Mumbai and Urban Renewal Intervention in Medellin

Chapter	Purpose of the study	Type of data	Type of estimation	Criteria Identifying Control/Treated	Method for estimation
6	Evaluate the effects of Urban–Renewal Projects on the level of housing consolidation	Panel	DID	Regression discontinuities: comparison of treated and non–treated households from the same *comuna*. Treated households are those living in Urban Renewal Intervention areas of direct influence.	Regression models
8	Evaluate the effects of the Slum Rehabilitation Scheme on residential mobility	Cross–section	BA-D	Regression discontinuities: comparison of treated households to to–be–treated (control) individuals	Differences in outcomes of interest
9	Evaluate the effects of the Slum Rehabilitation Scheme on household access to credit, housing investments and access to basic services (among others)	Cross–section	BA-D	Regression discontinuities: comparison of treated households to to–be–treated (control) individuals	Differences in outcomes of interest

For the empirical analysis of *the Slum Rehabilitation Scheme* in Mumbai, it was necessary to carry out and extensive household survey, given the lack of data available at the household level. In this case, two criteria were used to identify convincing control groups: (1) time *discontinuities* in the policy's implementation and (2) *ex–ante* characteristics of treated and control households. First, a number of slum sites that had launched the slum rehabilitation process but had not yet been rehabilitated were identified. Second, a series of pre–survey questionnaires and meeting with leaders were carried out covering all of the potential control slum sites and a number of rehabilitated sites (treated). Finally, five slum sites and four rehabilitated sites that had very similar *ex–ante* characteristics were selected.

For the empirical analysis of *Urban Renewal Interventions* (*URP*) in Medellin, household–level data provided by the Mayor's office of the city of Medellin was used. The quality and extension of the database, which contained household–level information before and after the policy, allowed for a panel evaluation of *URP* but restrained the analysis of impacts to the information collected by the Municipal Government. In this case two criteria were used to identify control

and treated groups. First, the universe of analysis was restrained to the two *comunas (*districts) in which the first *URP* was implemented. Second, based on the geographical position of each observation and the areas of direct intervention of the policy, a distance to treatment was estimated. Based on distance to treatment and a number of additional information (of the policy's implementation and households behavior), treated and control groups were identified. The estimation of the treatment effect was made using DID based on regression models.

Chapter 6

The effects of Urban Renewal Projects on the level of housing consolidation: the case of Medellin (Colombia)[1]

Abstract

Recent literature suggests that changes in the perception of risk of eviction in informal settlements–even when titles are not granted–could lead to changes in the level of investments in housing. This paper examines the effects of *Urban Renewal Projects* (*URPs*), which consider the *Metrocable* intervention and the *Urban Integral Project (UIP)*, implemented in two marginalized settlements in the city of Medellin (Colombia), on the level of housing consolidation. The setting of the *URP* allows the testing of the previous hypothesis since it does not induce direct changes in housing but is based on the improvement of public amenities that lead to a higher presence of local authorities in these settlements. I use a quasi-experimental approach using geographical position of households in relation to the direct area of *URP* intervention to compare outcomes for treated and control groups. Results suggest that the *Metrocable* intervention had a negative and significant effect on the probability of living in a consolidated house and the *Urban Integral Project* had no significant effect. A more specific analysis based on tenure security and forms of occupation of the territory (squatters, pirate urbanization and public housing) indicates that *Metrocable*'s effect is only significant for squatter households. This unexpected result evidences how Urban Renewal Projects, even when aiming to improve a household's living conditions, could disrupt their perception of security and lead to a diminution of housing investments.

Résumé

La littérature récente suggère que des changements dans la perception du risque d'éviction dans des bidonvilles, même quand des titres ne sont pas accordés, pourrait conduire à des changements dans le niveau des investissements dans le logement. Cet article évalue les effets des *Projets de Renouvellement Urbain (PRU – Urban Renewal Projects URP* en anglais), qui comprennent le *Metrocable* et le *Projet Urbain Intégral (PUI – Urban Integral Project UIP* en anglais), sur le niveau de consolidation des logements. Etant donné que les PRU ne concernent pas des modifications des logements mais des améliorations des équipements publics qui conduisent à une plus grande présence des autorités, on peut tester l'hypothèse précédente. Pour cela j'utilise une approche quasi-expérimentale utilisant la localisation géographique des ménages par rapport à la zone d'intervention directe du PRU. Les résultats suggèrent que le *Metrocable* a eu un effet négatif et significatif sur la probabilité de vivre dans une maison consolidée et que le PUI n'a eu aucun effet significatif. Une analyse approfondie basé sur une comparaison des formes d'occupation du territoire (squatters, urbanisation pirate ou logement public) indique que l'effet du *Metrocable* n'est significatif que pour les squatters. Ce résultat montre comment des projets de renouvellement urbain ayant le but d'améliorer les conditions de vie de ménages, peuvent perturber la perception de sécurité des ménages et les conduire à diminuer leurs investissements dans le logement.

1. Introduction

The United Nations uses five criteria to define a slum household: a group of individuals living under the same roof and lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, structural quality and durability of housing and security of tenure (UN-Habitat, 2009b). Following these axes, most 'inclusive' slum policies implemented in developing countries consider the improvement of one or more of these criteria. Some policies bring piped–water connections to slum households while others consider a complete reconstruction and reabsorption of slums. In this paper I study an innovative slum policy currently being applied in Medellin (Colombia), which–contrary to traditional slum policies–concentrates on everything that is outside the house. Urban Renewal Projects (*URP*s), which are the scope of this article, involve, among others, the improvement of public spaces, mobility, public amenities and environmental conditions in marginalized settlements. The purpose of this article is to evaluate what the long–lasting private effects of the implementation of public policies are, using the level of housing consolidation as an indicator.

The causal relationship between the implementation of *URP*s and changes in the level of housing consolidation can be understood through the relationship between changes in perceived security of tenure generated by changes in the presence of the local government (or the law) in marginalized settlements. The link between tenure security and the level of housing investments has been studied broadly in literature and is one of the most common subjects in slum studies. Literature on the relationship between housing investments and tenure security is generally

divided into two schools of thought[2]. The first one argues that only through the provision of a legal title is there a change in housing investments (De Soto, 1990). De Soto (1990, 2000) claims that housing investments in informal settlements are low, given households' insecure tenure and the possible and palpable risk of eviction without any form of compensation. According to De Soto, once households have legal tenure their investment behavior is expected to change given the reduction of risk of eviction and a higher access to credit, both of which lead to an improvement of housing structures.

The second school of thought argues that giving legal titles is not the only way to improve a household's conditions and that intermediate or semi–legal forms of tenure can also be beneficial (Razzaz 1993, Gilbert 2002 and Payne 2001). According to Payne (2001), alternative tenure forms–such as registered leasehold or public rental in which households are not the legal owners but do not face a constant threat of eviction–might also lead to an increase of investments in housing. Furthermore, recent empirical studies have revealed how a household's decision to invest in their houses when having informal tenure is correlated not only to the perceived risk of eviction (rational) but to their expressed fear of eviction (sentimental) (Van Gelder 2007, Reerink and Van Gelder 2010). The research question treated in this article is aligned with the hypotheses set by the second school of thought, by analyzing the effect on the level of housing consolidation generated by external shocks in the presence of the local government in a marginalized area. Throughout this article I use the term **marginalized settlements** instead of slum or informal settlements since in the two districts studied in the city of Medellin not all of the households have informal tenure over their houses.

Previous to this study, anecdotal evidence suggested that households had been improving their houses following *URP*s. However, since this evidence was based only on observations made after *URP*s were made, it was impossible to differentiate the policy's effect from the general city trend. But how could Urban Interventions lead to changes in the level of investment in housing? One possible link between "public space" interventions and "private space" improvement is the changing perception of tenure security. On one hand, investments made for *URP*s could be interpreted by the local community as an 'acceptance' or 'semi–formalization' of the settlement, which generates a higher perception of security. On the other hand, the higher presence of local authorities (the law) along with the expropriation of some properties during infrastructure construction might generate higher levels of uncertainty for the local community and reduce their

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[2] Other authors (Fass 1990, Hoffman 1990, Razzaz 1991) suggest that the level of consolidation is more a response to the levels of tenure security, meaning that households consolidate their dwellings to achieve higher levels of security (which lowers the possibility of eviction when a house is well consolidated).

perception of security. An empirical study, similar to the one presented in this article, showed how public upgrading schemes in Mexico City carried out in a number of informal settlements led, in some cases, to an increase perception of security of tenure and housing improvements (Varley, 1987).

The methodology I use is able to separate the city's trend from the policy's effect. I use a quasi–experimental approach using geographical position of households in relation to the direct area of intervention of *URP*s to compare outcomes in the level of housing consolidation of treated and control groups. Using the *SISBEN* database I was able to follow 10,457 households before and after each of the urban interventions and measure the effect of the *URP* policy using a panel *difference–in–difference*. This methodology is similar to the one employed by Cattaneo et al. (2009) who used geographical discontinuities to evaluate the welfare effects of replacing dirty floors with cement floors in Mexico. Two different urban–renewal interventions are evaluated in this article. The first, called the *Metrocable* intervention, involved the construction of an aerial cable car that connected two previously isolated settlements to the rest of the city. The second, known as *Urban Integral Projects* or *UIP*s, involved, among others, the improvement of public spaces and amenities. Both of them were implemented in the *Santa Cruz* and *Popular comunas*[3] of the city of Medellin. Results from our analysis suggest that the *Metrocable* intervention had a negative and significant effect on the probability of living in a consolidated house, and that this effect was concentrated on households with informal tenure or land being occupied by squatters. On the contrary, *UIP*s–which were implemented later–appear to have no effect on the level of housing consolidation.

This article is organized in the following manner: The second section briefly describes *URP* implemented in one of the most marginalized areas in the city of Medellin: the *Santa Cruz* and *Popular comunas*. The third section describes the dataset as well as the methodology implemented for the analysis of housing consolidation. In the fourth section results are exposed and commented and in the fifth section conclusions are outlined.

2. Urban Renewal in Medellin

Slum growth in the city of Medellin

The city of Medellin located in the *Aburrá* Valley in the middle of the Andes Mountains is the second–largest city in Colombia with a population of around 2.4 million. The Metropolitan Area, which envelops the 10 municipalities in the *Aburrá* Valley, has around 3.5 million inhabitants

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[3] Medellin urban area is divided in 16 districts (*comunas*) which–in turn–are divided in neighborhoods (*barrios*). The city has 16 *comunas* and 249 official *barrios*.

(Alcaldía de Medellin, 2006a). Medellin is the capital of the Department of Antioquia, which produces approximately 15% of Colombia's GDP (Torres Tovar, 2009). Although the city has been known nationally for its industrial development and is home to many of the country's most important industries, it has also been recognized as one of the most–violent cities in the world. In many ways, today's urban interventions have been fueled by the idea of changing both the insider's and the outsider's image of the city.

Informal settlements began appearing in Medellin in the middle of the XX century, as in many Latin American cities, in the form of p*irate urbanizations*. However, contrary to experiences in other countries, classic urbanization led by economic growth was also accompanied by violence, which led rural–to–urban migration caused first by *"La Violencia",* a period of civil conflict between the liberal and conservative parties (1948-1958*), and later, by the confrontation between insurgent groups and the government. Two predominant types of informal settlements are visible in the city: *Pirate urbanizations* and *squatters*. *Pirate urbanizations* are the product of illegal land divisions made by land speculators who divide plots and sell them to poor migrants. When formed, *pirate urbanizations* generally lack basic infrastructure but space for the construction of future roads is sometimes considered; the construction of housing structures is usually left to new occupants'. *Pirate urbanizations* were the predominant form of informal land occupation in the city before the 1968 Enforcement Act, which declared illegal urbanization as a crime punishable by imprisonment (DPU, 2006). *Squatter* settlements, commonly known as *invasiones,* flourished in the early 70s and are even today the principal form of informal urbanization in the city. *Squatters* or *invasiones* are the product of illegal occupation of lands, are generally less structured and consolidated when compared to *pirate urbanizations* and households living in this type of settlements usually do not have legal proof of ownership of their land or of their housing structures.

A series of informal–settlement censuses have been carried out in the city. In 1992, 70 informal settlements, composed of 37,000 housing units housing around 185,000 persons, were identified. In 1994, the Planning Departments registered 87 informal settlements with approximately 202,500 inhabitants. By the end of 2002 the total number of informal settlements had risen to 104 with around 350,000 inhabitants, the equivalent of 18% of the total city population (Torres Tovar, 2010). Informal settlements in Medellin, unlike other developing cities like Mumbai (India), are spatially concentrated and most of them are located at the periphery of the city. Almost all of the informal settlements have access to basic services and have achieved a certain degree of consolidation. However, given that a considerable proportion of the population

living in these settlements was forced to migrate to the city due to violence[4], the levels of unemployment and poverty are very high. I concentrate my analysis in the *Santa Cruz* and *Popular comunas,* located in the northeastern part of the city of Medellin.

The *Santa Cruz* and *Popular comunas*

The first neighborhoods located in the area that today constitutes the *Santa Cruz* and *Popular comunas* were constructed between 1940 and 1960. During these decades most of the occupation was done following common informal urbanization techniques of the time: *Pirate Urbanizations*. In the sixties new neighborhoods appeared filling the spaces left by previous urbanization. However, some of them like *Villa Niza* and *Villa Socorro,* did not follow previous land–occupation forms and were the product of public–housing projects. During the seventies, a pattern, that is still visible, was established (EDU-DAP, 2005). The lower parts of the sector (mostly located in the *Santa Cruz comuna*) were occupied with public–housing schemes or *pirate urbanization* settlements, while the upper parts of the sector were occupied by squatters. During the eighties, there was a further densification of the sector; new arrivals filled the spaces that had not yet been occupied by the previous urbanization and in the last few decades the densification process continued. Today, the sector's population continues to grow, at a lower rate, and new squatter settlements have appeared in the upper part of the *Popular comuna*. Figure 1 shows the different forms of occupation of the *Santa Cruz* and *Popular comunas* as well as their location in the city of Medellin.

Figure 1. Forms of land occupation in the *Santa Cruz* and *Popular comunas*
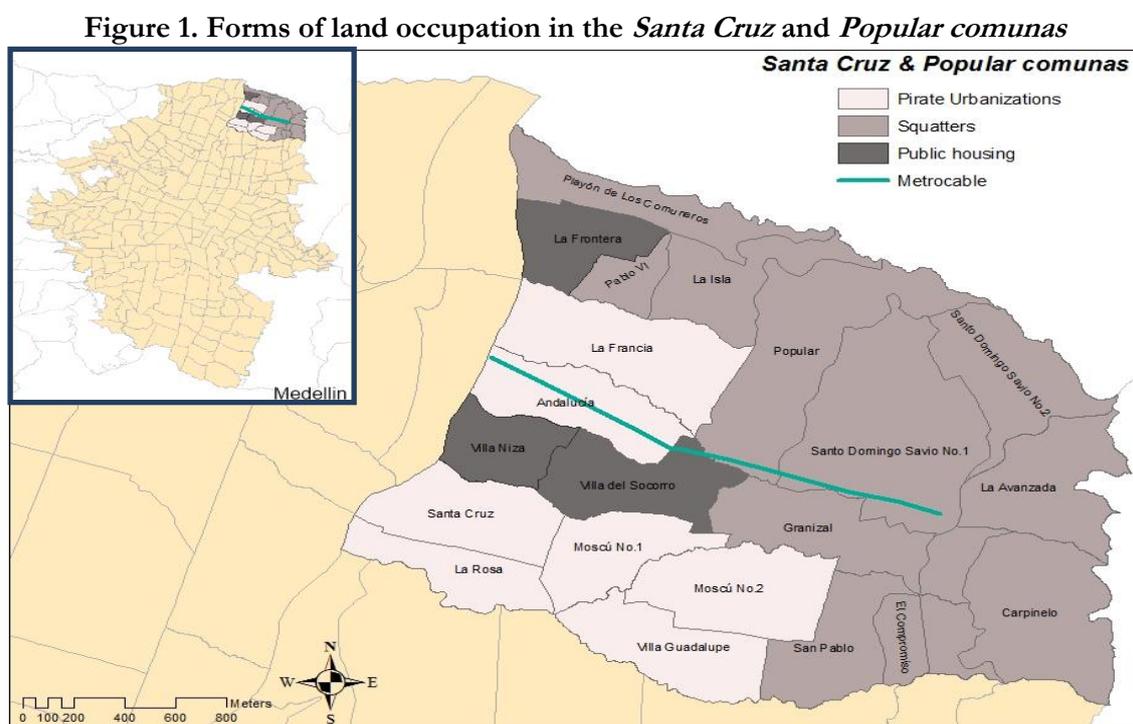
Source: adapted by author from (EDU-DAP, 2005)

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[4] In Colombia this phenomenon is called "forced displacement" (*desplazamiento forzado*)

Urban Renewal Projects: *Metrocable + Urban Integral Project*

In the next two sections I evaluate the effects of two *Urban Renewal Projects (URPs)* implemented in the city of Medellin by two different local administrations: the Northeastern *Metrocable* line and the Northeastern *Urban Integral Project*, the first implemented during the Luis Pérez administration and the second, during the Sergio Fajardo administration.

The 2001–2003 Luis Pérez Development Plan of the city of Medellin considered the implementation of a new model of mobility supported by the existing Metro system but having medium capacity and looking to improve the conditions of low–income households. Concentrating a considerable percentage of the city's poor and having the highest population densities, the *Santa Cruz* and *Popular comunas* were chosen for the development of the new model of mobility. However, given the zone's topography and unorganized urbanization, the establishment of traditional public–transport systems was very difficult and the Mayor's office opted for an alternative approach: using aerial cable cars. In July 2004 the first *Metrocable* system with three stations, connected to the Metro A line, started operating in the *Santa Cruz* and *Popular comunas. Calle 107* (Street 107), which divides the two *comunas* in half, was chosen as the axis for the *Metrocable* trace following technical recommendations and to assure an efficient delivery of the public–transportation service.

With the arrival of Sergio Fajardo to the city's administration in 2004, a new wave of thoughts was introduced to the city management that became the basis for the creation of *Urban Integral Projects*. Line 3 of Fajardo's Development Plan had as its objective *"to bring equal opportunities to all of the territory, make urban integral interventions in the city to pay for the accumulated social debt and stimulate positive socio–cultural changes in the population"*. A number of scholars and architects were designated to lead these actions to conceive a model for urban intervention in poor settlements. Since the previous administration had constructed the new *Metrocable* system in the *Santa Cruz* and *Popular comunas*, they decided to implement the first *Urban Integral Project*[5] in this area. The main objective of the *UIP* according to the EDU[6] was to "*Improve households' living conditions through the implementation of comprehensive development initiatives that bring together the local administration and communities*" (Echeverri Restrepo and Orsini, 2010). The project, lead by the EDU, involved more than 16 entities at the local level, among which are the following secretaries: Treasury, Public Works, Education; Solidarity and Civic Culture and Environment. The criteria

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[5] Today, three more *Urban Integral Projects* (*Comuna* 13, *Centro–Oriental* and *Noroccidental*) are being implemented in the city. *Urban Integral Projects* in the city of Medellin have been recognized by a number of international organizations and awarded half a dozen urban planning and architectural prizes (Holcim Awards Gold 2008, 2009 City of Barcelona FAD Award, Curry Stone Design 2009…).

[6] The Medellín Urban Development Enterprise–*Empresa de Desarrollo Urbano de* Medellín

used to delimitate the direct *UIP* area of intervention was the following: the existence of the three *Metrocable* stations, the presence of bodies of water, the configuration of streets and the geomorphology of the area (EDU–DAP, 2005)

But what exactly is an *Urban Integral Project*? EDU defines a *UIP* as a planning instrument for physical interventions in highly marginalized, segregated, violent and poor settlements. *Urban Integral Projects* generate a considerable transformation of the urban tissue by improving public spaces and amenities, and integrating these settlements into the city. Some of the interventions made for the Northeastern *Urban Integral Project* involve the construction of a public library, the improvement and creation of sidewalks and public parks and the renovation of sport units. Figure 2 and Figure 3 present photographic evidence of some of the physical changes in public spaces incurred in these two districts due to the implementation of the *UIP*.

Figure 2. Comparison before and after the implementation of *UIP* (A)

Source: Alcaldía de Medellin (2006c)

Figure 3. Comparison before and after the implementation of *UIP* (B)

Source: Alcaldía de Medellin (2006c)

3. Methodology

Dataset

The empirical analysis of the effect of *Urban Renewal Projects* on housing consolidation relies on the *SISBEN*[7]database. *SISBEN* is an identification system, implemented by the Colombian government and authorities at different governance levels, that serves to identify potential beneficiaries of social programs. It is based on the collection and updating of household data at a national level. The results of each household survey are used to create an aggregate indicator and determine if a given household belongs to the *SISBEN* category; if they do, to determine to which *SISBEN* strata they belong. Based on *SISBEN* strata, households can be beneficiaries of a number of health, education and housing subsidies. In the city of Medellin a general *SISBEN* survey covering all poor neighborhoods and some of the middle–class neighborhoods has been conducted on three occasions: 1994–1995, 2005 and 2009–2010. Between these dates, households that had any changes in their living conditions (i.e. changed house, new household members, just arrived to the city, marriage) could ask the Mayor's Office to update the information by collecting a new survey. Five different *SISBEN* consolidated databases are used for the empirical analysis: 2002, 2003, 2004, 2006 and 2010. Most of the surveys in each database correspond to the year of the consolidated database, (i.e. most of the household's in the 2002 database were surveyed during this year), but the set of databases contains information from household surveys carried out as far back as 1994 and as recently as February 2010.

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[7] SISBEN (*Sistema de Identificación de Potenciales Beneficiarios de Programas Sociales*)

Given that the *Santa Cruz* and *Popular comunas* have the lowest Quality–of–Life Index[8] in the city of Medellin and concentrate a large proportion of the city's poor, it is one of the areas of the city in which the *SISBEN* survey is done with more consideration. The 2010 *SISBEN* survey covered 44,016 households in these two settlements, while the population projection for the same year was around 52,435 households (Census, 2005). Since *Metrocable* started operating in July 2004 and most of the *UIP* projects were constructed and completed between 2007 and 2008, the *SISBEN* data allows constructing a panel data of households living in the settlement before all urban interventions took place, after the *Metrocable* started operating and after both *Metrocable* and *UIP* had taken place.

It is important to notice that given that the *SISBEN* household survey is used to identify social programs, beneficiary households have been known to misinform interviewers about their income and household size. However, for the analysis that follows this section, I expect all households–both in *treated* and *control* groups–to have the same incentives to lie about their income and household size, which are some of the controls used in the regression equation. Therefore, controlling for these two variables is not expected to bias results. Furthermore, given that data on the materials of the house, which is used to construct the dependent variable, is registered following the interviewer's direct observation, measurement error in these variables is expected to be low.

Sample

To evaluate if *URP*s have any effect on housing consolidation using a *Difference–in –Difference* approach, I restrict the analysis to households that lived in the settlements before the policy took place and did not move in the period of analysis. To do so, databases were matched to identify households present in the first and last survey using the head of household's national identification number[9]. While this restriction could lead to eventual selection bias–since the reasons for leaving the *SISBEN* database are unknown–I have analyzed if there were significant differences between those who left the database and those who stayed. Summary results for matched and unmatched households presented in column (1) and (2) of Table 6 in Annex I suggest that both of groups are very similar. The significant differences between matched and unmatched groups are the following: the proportion of married heads of household, the age distribution of household members and household income. Households from the unmatched group are less likely to be married and the average head of household of the matched group is

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[8] The Quality of Life Index or *Índice de Calidad de Vida* is an aggregate indicator calculated for each comuna in the city of Medellin.
[9] *Cédula de ciudadanía*

about 3–4 years older than the unmatched head of household. Since unmarried households and younger households are more mobile, this might be one of the causes for not finding a match between databases.

In addition, since the main objective of the study is to measure changes in the level of consolidation of houses, it was necessary to restrain the analysis to households that had not moved during the period of analysis. I make use of two different controls. The first control I use is the land telephone number. While there is the possibility of households moving to another house and keeping the same land telephone number, the local telephone company (*UNE*) assured us that this involved a very complicated procedure and that it was only possible when households were moving very close to their original dwelling. Therefore the bias induced by using this information is expected to be low. The second control I use, for households that do not report having a land telephone number, is household's address; this was done manually. As mentioned before, during the time of study a housing upgrading program[10] was carried out in one small area of the *Santa Cruz comuna*. To avoid bias, all households living in this area were eliminated from the database. Matching the head–of–household national identification number, I found that 20,836 of the households present in the 2010 database were also present in the 2002–2003 databases[11]. Controlling for land telephone number and address, I further restrict the analysis to 10,457 households, for which I can have a high degree of certainty that they were living in the settlement before *URP* started and have not changed of house since.

Treatment

The following procedure was used to identify a household's location in relation to the *URP* area of intervention and define treatment variables:

(1) Geographical coordinates were obtained for each of the households, using the reported address and the Medellin MapGIS free–use application <http://www.medellin.gov.co/MapGIS/web/swf/MAPGIS_FLEX.jsp>

(2) Administrative maps were obtained from the Mayor's Office; maps containing the exact location of the *Metrocable* line and stations and the direct area of intervention of the *UIP*s were obtained from the *Empresa de Desarrollo Urbano*.

(3) Distance to the closest *Metrocable* station (*dist*) was calculated for each of the households.

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[10] *Proyecto Habitacional Juan Bobo*

[11] The restriction of the analysis to almost half of the initial matched database might seem a little radical. However, the difficulty of matching telephones and addresses in a marginal and semi–informal settlement needs to be taken into consideration. For instance on many occasions no exact address is reported and one finds information such as "In front of House #5 on Street 110" or "neighbor's telephone: 311XXXX" which makes it almost impossible to assure that households have not moved by matching addresses and/or telephones from different databases.

For the case of *UIP* I used the area of intervention defined by local authorities to divide our sample into control and treated groups. A dummy variable, called $treated_{uip}$ takes the value of 1 if the household is inside the direct area of intervention of the *UIP* and zero, otherwise. However, for the case of *Metrocable*, it is difficult to define what the direct area of intervention of the project is or the distance at which the urban intervention ceases to have any effect. Therefore, two different model specifications (*a* and *b*) were defined to evaluate *Metrocable*'s effect on the level of housing consolidation. In the first case *(a),* the distance to *Metrocable*'s stations ($dist$) was used as a continuous variable that signals treatment. This means that there is no division of the sample between treated and control groups, but that the effect of treatment is expected to vary according to the distance to treatment (to *Metrocable*'s stations).

In the second case *(b),* I define a distance dt which corresponds to the distance after which the *Metrocable* policy is expected to have no effect. A dummy variable called $treated_{met}$, takes the value of 1 if the household is within a given distance (dt) of the *Metrocable* stations and zero, otherwise. But how can I define a distance dt that accurately represents reality? While the use of geographic disruptions has been used in a number of empirical studies to analyze the effects of a given policy (Cattaneo et al*., 2009*) or how household's value public goods (Gibbons et al*., 2009*), the exact replication of this methodology for the analysis of the effects of *Metrocable* in the *Santa Cruz* and *Popular comunas* is not possible. First of all, there is no disruptive administrative boundary that distinguishes *Metrocable*'s beneficiaries to non–beneficiaries. Second, while it is possible to determine to some extent what the direct area of impact of the new transportation system is (i.e. how many blocks people are willing to walk to take the new transportation system), it is uncertain whether this corresponds to the psychological limits affecting a household's perception of security.

For model *b* to be accurate I need to have a good idea of the distance at which the policy stops having an effect on the population *(dt)* to correctly identify *control* and *treated* groups. Since dt is unknown I have evaluated the possible consequences of underestimating or overestimating the value of dt. This evaluation, presented in Annex II, shows how if the value of dt is smaller than the maximum distance of analysis, both the underestimation and overestimation of the value of dt lead us to an underestimation of the policy's effect but should not produce changes in signs. Therefore, this model specification will probably lead to an underestimation of *Metrocable*'s effect but the sign of the measured effect is expected to be the same as the one of the real effect. I have selected an estimate of $dt,$ which I will refer as dt', based on the hypothesis that the real value of dt is close to the distance of use of the *Metrocable* system. I use information from the

Encuesta de Calidad de Vida–2006, a household survey carried every year in the city of Medellin, which contains information on the means of transportation used to go to work. According to results, from 1,811 households sampled in this survey from the *Santa Cruz* and *Popular comunas,* 80% of *Metrocable*'s demand comes from within a distance of 700m. Therefore, I have decided to use a value of dt' equal to 700m. Table 1 presents the different criteria used for the identification of the treatment variables used for each of the urban interventions.

Table 1. Criteria for the identification of *treated* and *control* groups or treatment

Intervention	Groups	Criteria	Subgroup	Criteria
Metrocable ***a***	$dist$	---	---	---
Metrocable ***b***	$treated_{met}$	$dist < dt'$	---	---
	$control_{met}$	$dist > dt'$	---	---
Urban Integral Projects	$treated_{uip}$	Inside *UIP*	$treated_{uip/met}$ $treated_{uip/no\_met}$	$dist < dt$ $dist > dt$
	$control_{pui}$	Outside *UIP*	---	----

Figure 4 presents the *UIP* area of intervention, the *Metrocable* line and a household's location. When evaluating the *Metrocable* ***b*** model specification plus the *UIP* intervention, I carry out an additional analysis to determine if the policies' effects are additive or whether the effects of the *UIP* vary depending on being a beneficiary of the *Metrocable* urban intervention. This analysis is possible since the *UIP* and *Metrocable* direct areas of interventions do not completely overlap. For this, I use two set of *treated* and *control* groups ($treated_{uip/met} - treated_{uip/no\_met}$).

Summary statistics

Columns (3) to (6) of Table 6 in Annex I present summary statistics for the different *control* and *treated* groups. Overall, apart from the significant difference between the age compositions of household members, the presented *treated* and *control* groups from the *Santa Cruz* and *Popular comunas* were very similar before the urban intervention started. The latter indicates that, before both interventions took place, households living in the total extension of the *Santa Cruz* and *Popular comunas* were very similar. It also serves to strengthen two hypotheses I made to solve the research question touched in this article. The first hypothesis is that *"If the urban intervention had not taken place, the evolution of housing consolidation in both treated and control groups would have been the same".* Since both *Metrocable* and *UIP* control and *treated* groups are very similar, I can expect them to have had the same evolution in absence of *URP*. The second hypothesis, which relates to the exogeneity of treatment, states that *"treatment inside the Santa Cruz and Popular comunas was exogenous to a household's socio-economic characteristics and depended only on its geographical location".*

The typical household before both interventions took place was composed of around 4.7 household members who gained–on average–244,300 COP–below the minimum legal salary in 2003 (332,000 COP). Around 35% of the heads of household were women and 40% of the heads of household were married.

Figure 4. *UIP* direct area of intervention, *UIP* control and treated groups

(Northeaster zone - Medellin)
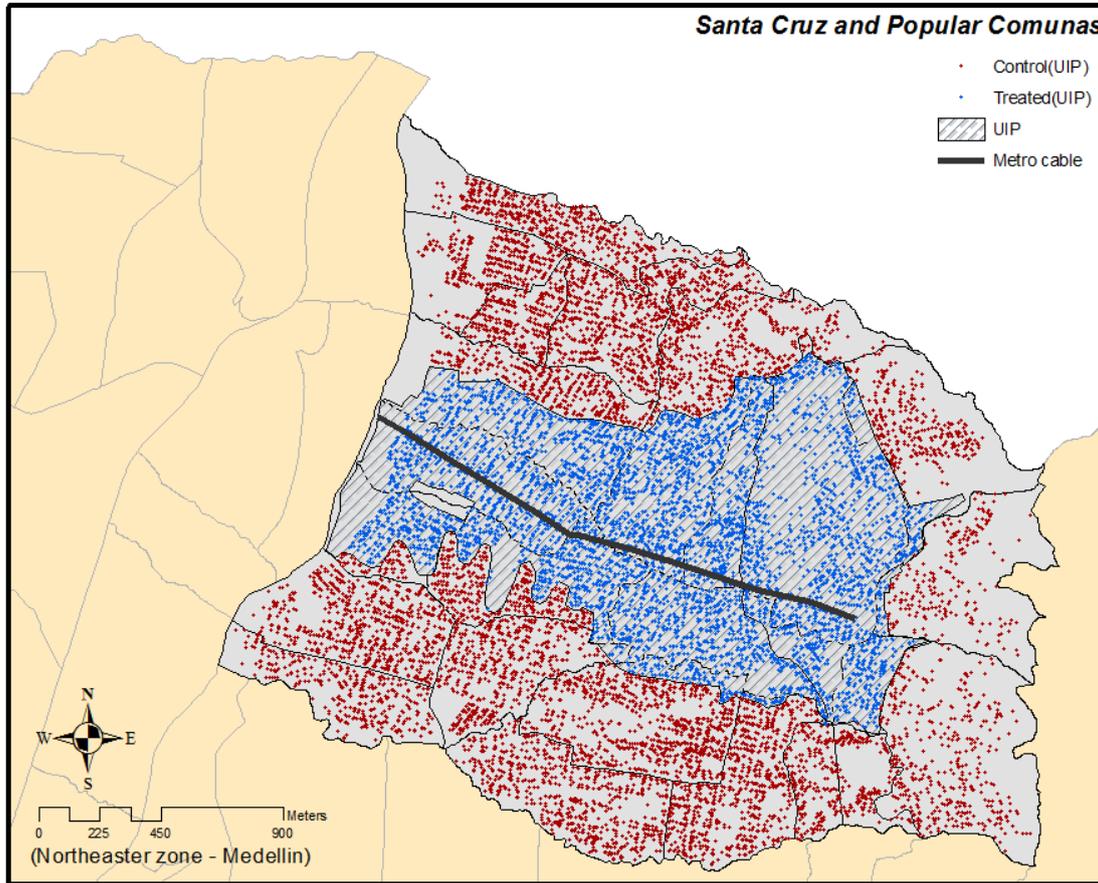
Regression model

In order to examine whether the *URP* intervention in the *Santa Cruz* and *Popular comunas* had any effect on the level of housing consolidation, I use a panel *Difference–in–Difference* model. The general form of the model is very similar to the one used by Meyer et al. (1995) in their study of the effects of changes in workers compensation on injury duration. The specifications of the two models used for the analysis of the *Metrocable* intervention (***a*** and ***b***) are the following:

$$constot_{it} = \beta_0 + \beta_1 dist + \beta_2 time_{met} + \beta_3 time_{met}.dist + \beta_7 X_{it} + \beta_8 A_i + a_i + u_{it}$$
[1***a***] if year<2007

$$constot_{it} = \beta_0 + \beta_1 treated_{met} + \beta_2 time_{met} + \beta_3 time_{met}.treated_{met} + \beta_7 X_{it} + \beta_8 A_i + a_i + u_{it}$$ [1***b***] if year<2007

The analysis of the *Metrocable* and *UIP* intervention together is done with the following model specifications:

$$constot_{it} = \beta_0 + \beta_1 dist + \beta_2 time_{met} + \beta_3 time_{met}.dist + \beta_4 treated_{uip} + \beta_5 time_{uip} + \beta_6 time_{uip}.treated_{uip} + \beta_7 X_{it} + \beta_8 A_i + a_i + u_{it} \quad [2a]$$

$$constot_{it} = \beta_0 + \beta_1 treated_{met} + \beta_2 time_{met} + \beta_3 time_{met}.treated_{met} + \beta_4 treated_{uip} + \beta_5 time_{uip} + \beta_6 time_{uip}.treated_{uip} + \beta_7 X_{it} + \beta_8 A_i + a_i + u_{it} \quad [2b]$$

The aggregate dependent variable $constot$ in all the model specifications is equal to 1 if the house is consolidated and zero, otherwise. This variable was constructed from the information provided in *SISBEN* surveys on predominant material of external walls and interior floors. Each of the floor and wall materials (i.e. carton, wood, bricks, and cement) was classified accordingly. Consolidated houses have both their external walls and floors made of long–lasting materials. I use a probit model in which the succeed event is having a consolidated house; therefore, the β_k coefficients represent the effect of each of the explanatory variables on the probability of having a consolidated house.

In equations [1-2*a*] I use the distance to *Metrocable* stations $dist$ as a proxy for treatment. On the contrary, in equations [1-2*b*] the dummy variable $treated_{met}$ serves to identify treated individuals from the *Metrocable* intervention according to the maximum distance to treatment dt' criteria. In [2*a-b*] models $treated_{uip}$ is a dummy variable that identifies treated individuals from *UIP* intervention. T*ime*$_{met}$ *and time*$_{UIP}$ are dummy variables that identify the year in which each of the interventions was completed (I use 2004 for *Metrocable* and 2008 for *UIP*) and $time_{met}.treated_{met}$, $time_{met}.dist$ and $time_{uip}.treated_{uip}$ are the variables of interest that will indicate if the policies had any effect on the probability of living in a consolidated house.

X_{it} and A_i are, respectively, vectors of time–variant and time–invariant individual and household characteristics to control for other elements that might affect the probability of living in a consolidated house. Among the time–invariant control variables, I include head of household gender and marital status and if the household states to be at risk from natural disasters. Among the time–variant control variables, I include household size, household or head–of–household income and number of members under 10 years old. Households with a higher income are expected to have a higher probability of living in a consolidated house. In the same way, I control for the existence of older household members who can be used as labor income since on many occasions houses are self–made. Field (2007) and Lanjow and Levy (2002) find that levels of tenure security are variable among urban communities; years of residence could positively affect

perceived tenure security by lowering a household's perceived eviction risk. I also include a dummy variable related to the perception of absence of natural risk from the 2010 survey, in which households were asked if their houses were at the risk of flooding, landslides or avalanches. This variable is of special interest since this type of events could eventually lead to a partial or complete destruction of dwellings and some areas in these settlements are located in zones of high and non–recoverable risk. A complete description of the variables used can be found in Table 5 in Annex I.

4. Results

The effects of *Metrocable* on the level of housing consolidation

To first evaluate the effects of the *Metrocable* intervention, I have restrained the analysis before the year 2007. In all model specifications I use a probit Random–Effects model instead of Fixed Effects for a number of reasons. First, since for many households no change in the level of housing consolidation was observed in the period of analysis, using Fixed Effects leads to dropping a large amount of observations. Second, since both of the policies I analyze did not depend on housing characteristics, the unobserved effect a_i should not be correlated with treatment dummies.

Table 2. *Metrocable*'s effect on housing consolidation

	Model [1*a*] (1)	Model [1*b*] (2)
dist	-0.051***	
	(0.017)	
$time_{met}$	-0.027	0.426***
	(0.125)	(0.086)
$time_{met}.dist$	0.050***	
	(0.019)	
$treated_{met}$		-0.036
		(0.095)
$time_{met}.treated_{met}$		-0.238**
		(0.106)
female_hoh	0.424***	0.418***
	(0.098)	(0.098)
married_hoh	0.983***	0.976***
	(0.108)	(0.106)
Handicap_hoh	-0.552	-0.556
	(0.487)	(0.489)
age_hoh	0.025***	0.024***
	(0.003)	(0.003)
inc_hoh	0.003***	0.003***
	(0.000)	(0.000)
Hhsize	-0.048***	-0.049***
	(0.015)	(0.015)
no_risk	2.693***	2.732***
	(0.119)	(0.119)
N	10457	10457

Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01

Results for both of the model specifications [1*a-b*] can be found in Table 2. Most controls variables used in both of the models have the expected signs. Income, age of head of household,

the absence of natural risk all have a positive and very significant effect on the probability of living in a consolidated house. Household size, on the contrary, has a negative and significant effect on the level of housing consolidation and having a female head of household has a positive and very significant effect on the level of housing consolidation. The latter can be due to a higher preference for female heads of household to live in a more consolidated house, with income held constant. The negative effect of household size on the level of housing consolidation could be explained by the higher living expenses required to support more household members, once income is controlled for.

Results for model [1*a*] suggest that before the *Metrocable* intervention took place, there were significant differences in the level of consolidation when comparing households that were close to future *Metrocable* stations to those that were more distant. In this model, the time trend is not significant and the treatment proxy variable ($time_{met}.dist$) suggests that the initial decreasing level of consolidation with distance was offset by the *Metrocable* intervention, meaning that *ex–post*, the higher the distance to the *Metrocable* intervention, the higher the probability of living in a consolidated house. These results suggest that the *Metrocable* intervention had a negative effect on the probability of living in a consolidated household and that this effect depended on the distance of each household to the *Metrocable* stations. Results for model [1*b*] confirm findings from model [1*a*] indicating that the *Metrocable* intervention had a negative and significant effect on the probability of living in a consolidated house when comparing treated to control households.

In order to evaluate the robustness of these results, I used alternative model specifications. For the [1*a*] regression analysis, I tried using the distance to the *Metrocable* line instead of the distance to *Metrocable* stations as a proxy for treatment. For the [1*b*] regression analysis, I tried using different values of dt' (ranging from 400 - 800m). In both cases, model variations leaded to very similar results (see Table 7 and Table 8 in Annex I).

The effects of the Northeastern *Urban Integral Project* on the level of housing consolidation

The same analysis–as in the previous sub–section–is done introducing *Urban Integral Projects* dummies and extending the period of analysis until the year 2010. Three different model specifications are used. The first corresponds to the *Metrocable* distance to the treatment proxy model [*a*] with extensions to cover the *UIP* analysis. The second corresponds to the *Metrocable* treated and control model [*b*] with extensions to cover the *UIP* analysis. The third model [*c*] is the same as the previous but with two additional sets of dummy variables. In [*c*] I divide dummies for $treated_{uip}$ into those who overlap with the $treated_{met}$ group and those who do

not overlap. This model specification allows evaluating if the effects of *UIP* vary according to the *Metrocable*'s treatment:

$$constot_{it} = \beta_0 + \beta_1 treated_{met} + \beta_2 time_{met} + \beta_3 time_{met}.treated_{met}$$
$$+ \beta_{4.1} treated_{uip(met=YES)} + \beta_{4.2} treated_{uip(met=NO)} + \beta_5 time_{uip}$$
$$+ \beta_{6.1} time_{uip}.treated_{uip(met=YES)} + \beta_{6.2} time_{uip}.treated_{uip(met=NO)}$$
$$+ \beta_7 X_{it} + \beta_8 A_i + a_i + u_{it} \text{ [2c]}$$

Results for the three model specifications are presented in Table 3. I use the same controls as in Table 2 but have not included them to avoid extensions. In all model specifications I find that the *UIP* intervention had no significant effect on the probability of living in a consolidated house. The effect of *Metrocable* intervention on the level of housing consolidation is still negative and very significant. Furthermore, the [2c] model presented in column (3) of Table 3 suggests that the *UIP* intervention had no significant effect on the level of housing consolidation, independent of being a beneficiary of the *Metrocable* intervention or not.

Table 3. *Metrocable*'s and *UIP*'s effect on housing consolidation

	Model [2a] (1)	Model [2b] (2)	Model [2c] (3)
$dist$	0.033		
	(0.023)		
$time_{met}$	0.010	0.487***	0.491***
	(0.128)	(0.085)	(0.086)
$time_{met}.dist$	0.055***		
	(0.019)		
$treated_{met}$		-0.381***	-0.466***
		(0.106)	(0.108)
$time_{met}treated_{met}$		-0.226**	-0.228**
		(0.104)	(0.104)
$treated_{uip}$	0.777***	0.789***	
	(0.125)	(0.104)	
$time_{uip}$	0.158*	0.173*	0.174*
	(0.092)	(0.091)	(0.091)
$time_{uip}.treated_{uip}$	-0.132	-0.184	
	(0.161)	(0.159)	
$treated_{uip(met=YES)}$			0.885***
			(0.107)
$treated_{uip(met=NO)}$			-0.558
			(0.368)
$time_{uip}.treated_{uip(met=YES)}$			-0.186
			(0.162)
$time_{uip}.treated_{uip(met=NO)}$			-0.172
			(0.607)
n	10457	10457	10457

Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01

The difference in results from the two *URP* interventions can be explained by the differences in the local authority's attitude in the implementation of *UIP* when compared to the *Metrocable*

intervention. As previously mentioned, two contrary mechanisms might be at the core of the evolutions in the level of housing consolidation due to *URP*. The first, which might lead to increase investments in housing, is produced when *URP* interventions are interpreted by the local community as an "acceptance" or "semi–formalization" of the settlement generating higher perceptions of security. The second, which might lead to a decrease of housing investments, is produced when the higher presence of local authorities (the law)–along with the expropriation of some properties during infrastructure construction–is seen as a "menace" by the local community which reduces perception of security. *UIP*, contrary to the *Metrocable* intervention, was done with a high degree of community participation, which generated a friendlier environment. Therefore, it is possible that the external shock in the presence of state generated by the *UIP* intervention could have generated compensation between the "acceptance effect" and the "menace effect".

Tenure security and forms of occupation

So far I have evaluated whether the *URP* implemented in the *Santa Cruz* and *Popular comunas* have had any effect on housing consolidation for all households, regardless of their tenure security or form of occupation. Results suggest the *Metrocable* intervention had a negative and significant effect on the probability of living in a consolidated house and the *UIP* intervention had non–significant effect. However, the causal mechanisms which produce this effect have not been discussed. As I mentioned in the introduction, the most probable cause for a household's investment changes due to the implementation of policy is the variation of the perception of risk of eviction for households having insecure tenure over their houses. Nevertheless, as discussed in section 2, the *Santa Cruz* and *Popular comunas* are home to a variety of communities with different forms of tenure. Therefore, I carry out the same analysis as in the previous two sub–sections differentiating, tenure security and type of occupation.

Information on tenure security (informal or formal occupation) was created by the author by observing housing and neighborhood urbanization structure (organized versus disorganized forms) viewing the layout of settlements using Geographical Information Systems (GIS). The different forms of type of occupation (public housing, *pirate urbanization* and *squatters*) correspond to the historic forms of urbanization of each neighborhood discussed in section 2. Results presented in Table 4 correspond to the 2***b*** model specification and use the same control variables as in the previous analysis; however, the latter were not presented to avoid extensions. The same analysis, using the 2***b*** model specification was also done with similar results and can be found in Table 9 in Annex I.

Table 4. The effects of *URP* by tenure security and type of occupation–model [2b]

	Tenure Security		Type of Occupation		
	Informal	Formal	Public Housing	*Pirate Urbanization*	*Squatters*
	(1)	(2)	(3)	(4)	(5)
$treated_{met}$	-0.360***	-0.002	-9.372	-0.247	-0.817***
	(0.138)	(0.259)	(219.529)	(0.215)	(0.143)
$time_{met}$	0.660***	0.148	-8.187	0.216	0.597***
	(0.104)	(0.181)	(219.529)	(0.188)	(0.100)
$time_{met} treated_{met}$	-0.368***	0.178	8.589	-0.052	-0.281**
	(0.123)	(0.245)	(219.529)	(0.223)	(0.125)
$treated_{uip}$	1.508***	-0.292	-0.131	-0.015	1.414***
	(0.141)	(0.281)	(0.440)	(0.195)	(0.150)
$time_{uip}$	0.187*	0.362	1.470	0.163	0.173
	(0.103)	(0.261)	(1.084)	(0.201)	(0.107)
$time_{uip}.treated_{uip}$	-0.198	-0.462	-1.627	-0.340	-0.106
	(0.176)	(0.460)	(1.169)	(0.309)	(0.199)
N	5667	4796	1133	3733	5597

Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01

Columns (1) and (2) in Table 4 confirm the initial hypothesis: the effect of the *Metrocable* intervention is concentrated in households having an informal tenure over their houses and no effect whatsoever is found for formal households. Individual regressions by type of occupation, presented in columns (3) to (5) also reveal interesting results. The *Metrocable* intervention had no significant effect on neighborhoods occupied by *pirate urbanizations* or *public housing,* but had a significant and negative effect for *squatter neighborhoods*, which suggest that the negative effects are only concentrated on those settlements having the lower ex–ante tenure security levels.

5. Conclusions

In this article I examine the effects of *Urban Renewal Projects*–which consider the *Metrocable* intervention and the *Urban Integral Project* intervention–carried out in the *Santa Cruz* and *Popular comunas,* one of the most marginalized and poor sectors of the city of Medellin, on the level of housing consolidation. Using a panel database of 10,457 households and a *difference–in –difference* approach, I am able to differentiate the general city trend of housing consolidation in semi–informal settlements from the effect of each of the policies. My analysis is based on the idea that changes in the presence of law, in this case local governments, in previously out–of–law and semi–informal settlements could lead to changes in the perception of risk of eviction and might lead to adjustments of housing investment behavior.

Two mechanisms might explain changes in the perception of risk of eviction. In the first case, investments made for Urban Renewal in the sector could be interpreted by the local community as an "acceptance" or "semi–formalization" of the settlement and lead to an increased perception of security. In the second case, the higher presence of local authorities (the law) along with expropriations of some properties made for infrastructure construction, might be

seen as a "menace" and generate higher levels of uncertainty for local communities and reduce their perception of security. My analysis reveals that–in the case of the *Metrocable* policy–it is the second effect that dominates.

To test the set hypothesis I used two models in the case of the *Metrocable* interventions, the first using a binary indicator of treatment based on an estimation of the maximum distance at which the policy had an effect, and the second using the distance to *Metrocable* stations as a proxy for treatment. Both model specifications indicated a negative and significant effect on the probability of living in a consolidated house of the *Metrocable* intervention and no significant effect of the *Urban Integral Projects*. The absence of effect of *Urban Integral Projects* can be due to the integration of the local community in the implementation of projects, which might have led to a balance between the "acceptance" and "menace" mechanisms previously mentioned. A more specific analysis of the effects of both the urban intervention using tenure status and forms of occupation indicated that the effect of the *Metrocable* policy was only significant for *squatter* households. No effect was found on settlements occupied by *pirate urbanizations*, confirming that their semi–formal form of occupation and perception security is not affected by *URP*.

Results confirm theory on the correlation between insecurity of tenure and housing investments and indicate that not only changes from informal to formal tenure systems produce changes in a households' housing–investment behavior. In the case analyzed, the higher presence of the local government due to the *Metrocable* intervention was sufficient to produce changes in housing investments. *Urban Renewal Projects* and especially *Urban Integral Projects* carried out in the city of Medellin are–without a doubt–one of the most innovative slum policies of the last decade. They allow local government to concentrate its efforts in a given area and transform the urban tissue. However, this article has revealed how fragile the equilibrium of tenure perception in marginalized and semi–informal areas is and how easily it can be disrupted by the action of the local government.

Annex I

Table 5. Description of variables

Name	Description	Values	Time Var.
Dependent variable			
$constot$	Total level of consolidation of the house	1 if consolidated; 0, otherwise	YES
Variables of interest			
$dist$	Proxy variable for treatment, distance of *Metrocable* stations	Numeric (measured in 100m)	NO (2002)
$dist\_l$	Proxy variable for treatment, distance of *Metrocable* line	Numeric (measured in 100m)	NO (2002)
$treated_{met}$	Dummy variable for households within a dt distance of *Metrocable* stations	1 (treated) and 0 (control)	NO (2002)
$treated_{uip}$	Dummy variable for households within the *UIP* direct area of intervention	1 inside (treated) and 0, outside (control)	NO (2002)
$time_{met}$	Time at which the *Metrocable* started operating	0 if year<2003 and 1 if year>2003	YES
$time_{uip}$	Time at which the *UIP* intervention was completed	0 if year<2007 and 1 if year>2007	YES
$treated_{met}dist$	Impact of the *Metrocable* intervention on housing consolidation		YES
$treated_{met}dist\_l$	Impact of the *Metrocable* intervention on housing consolidation		YES
$treated_{met}time_{met}$	Impact of the *Metrocable* intervention on housing consolidation		YES
$treated_{uip}time_{uip}$	Impact of the *UIP* intervention on housing consolidation		YES
Control variables			
female_hoh	Gender of head of household	1 if female; 0, otherwise	NO (2001)
married_hoh	If head of household is married	1 if married; 0, otherwise	NO (2001)
handicap_hoh	If head of household is handicap	1 if handicap; 0, otherwise	NO (2001)
age_hoh	Age of head of household	Age (Numeric)	NO (2001)
inc_hoh	Income of head of household	Numeric in thousands of pesos	YES
hhsize	Household size	Numeric	YES
risk	Housing structure considered at risk of:	Dummies: no risk(1), landslides(2), floods(3), Avalanche(4), Others(5)	NO(2010)

Table 6. Summary statistics from the 2002-2003 *SISBEN* database

| | Complete Database | | Metrocable *(b)* | | *Urban Integral Project* | |
	Unmatched	Matched	Treated	Control	Treated	Control
	(1)	(2)	(3)	(4)	(5)	(6)
female_hoh	0,355	0,356	0,355	0,362	0,351	0,360
	(0,005)	(0,004)	(0,006)	(0,008)	(0,008)	(0,006)
married_hoh	0,346	0,396***	0,393	0,403	0,398	0,396
	(0,005)	(0,005)	(0,006)	(0,008)	(0,008)	(0,006)
handicap_hoh	0,006	0,006	0,005	0,005	0,004	0,006
	(0,001)	(0,001)	(0,001)	(0,001)	(0,001)	(0,001)
age_hoh	43,878	47,245***	47,073	47,726**	46,984	47,453*
	(0,143)	(0,131)	(0,163)	(0,227)	(0,228)	(0,163)
hhsize	4,783	4,731	4,732	4,735	4,636	4,784***
	(0,025)	(0,022)	(0,027)	(0,038)	(0,037)	(0,028)
Years_16	2,869	2,996***	2,970	3,058***	2,931	3,035***
	(0,016)	(0,015)	(0,018)	(0,026)	(0,024)	(0,019)
Years_16m	1,285	1,346***	1,328	1,379**	1,328	1,354
	(0,010)	(0,009)	(0,011)	(0,017)	(0,016)	(0,012)
Years0_17	2,013	1,837***	1,864	1,778***	1,809	1,850
	(0,017)	(0,014)	(0,018)	(0,024)	(0,018)	(0,025)
Years0_10	1,253	1,093***	1,120	1,041***	1,086	1,098
	(0,013)	(0,011)	(0,014)	(0,018)	(0,019)	(0,014)
Inc_hoh	147,738	154,784***	150,08	164,50***	150,45	157,22**
	(1,412)	(1,247)	(1,479)	(2,331)	(2,058)	(1,583)
Inc_all	231,876	244,300***	234,02	266,98***	229,87	252,98***
	(2,001)	(1,851)	(2,165)	(3,535)	(2,912)	(2,401)
Risk1	0,910	0,915	0,921	0,906	0,921	0,914
	(0,003)	(0,003)	(0,003)	(0,005)	(0,004)	(0,003)
Risk2	0,079	0,074	0,071	0,079	0,072	0,074
	(0,003)	(0,002)	(0,003)	(0,004)	(0,003)	(0,002)
Risk3	0,007	0,007	0,005	0,011***	0,003	0,009***
	(0,001)	(0,001)	(0,001)	(0,002)	(0,001)	(0,001)
Constot	0,922	0,919	0,920	0,924	0,944	0,909***
	(0,003)	(0,003)	(0,003)	(0,004)	(0,004)	(0,003)
Conspared	0,932	0,930	0,931	0,933	0,955	0,919***
	(0,003)	(0,002)	(0,003)	(0,004)	(0,003)	(0,003)
Conspiso	0,952	0,954	0,953	0,958	0,967	0,948***
	(0,002)	(0,002)	(0,002)	(0,003)	(0,003)	(0,003)
N	11201	8515	7480	3721	3883	7318

Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01

Table 7. _Metrocable_ effects using distance to _Metrocable_ line - _model [1a]_

	Model [1*a*]
dist_l	-0.015
	(0.015)
$time_{met}$	0.041
	(0.104)
$time_{met}.dist\_l$	0.044**
	(0.017)
female_hoh	0.421***
	(0.098)
married_hoh	0.978***
	(0.106)
handicap_hoh	-0.563
	(0.488)
age_hoh	0.024***
	(0.003)
inc_hoh	0.003***
	(0.000)
hhsize	-0.048***
	(0.015)
no_risk	2.723***
	(0.119)
n	10457

Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01

Table 8. _Metrocable_ effects for different values of _dt' -_ model [1b]

	400m	500m	600m	700m	800m
	(1)	(2)	(3)	(4)	(5)
$treated_{met}$	0.606***	0.322***	0.295***	-0.036	-0.051
	(0.110)	(0.095)	(0.092)	(0.095)	(0.106)
$time_{met}$	0.344***	0.346***	0.400***	0.426***	0.507***
	(0.059)	(0.065)	(0.072)	(0.086)	(0.108)
$time_{met}.treated_{met}$	-0.299**	-0.206**	-0.270***	-0.238**	-0.302**
	(0.117)	(0.104)	(0.101)	(0.106)	(0.122)
n	10457	10457	10457	10457	10457

Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01

Table 9.. The effects of _URP_ by tenure security and type of occupation–model [2a]

	Tenure Security		Type of Occupation		
	Informal	Formal	Public Housing	*Pirate Urbanization*	*Squatters*
	(1)	(2)	(3)	(4)	(5)
dist	-0.019	0.055	0.210	0.074	0.099***
	(0.029)	(0.057)	(0.148)	(0.051)	(0.030)
$time_{met}$	-0.089	0.369	0.784	-0.062	0.029
	(0.150)	(0.321)	(0.515)	(0.266)	(0.161)
$time_{met}dist$	0.089***	-0.020	-0.137	0.043	0.064***
	(0.023)	(0.046)	(0.127)	(0.043)	(0.024)
$treated_{uip}$	1.331***	-0.037	-0.019	0.241	1.423***
	(0.154)	(0.341)	(0.503)	(0.264)	(0.174)
$time_{uip}$	0.173	0.357	1.484	0.137	0.164
	(0.106)	(0.261)	(1.062)	(0.204)	(0.107)
$time_{uip}.treated_{uip}$	-0.121	-0.447	-1.650	-0.261	-0.060
	(0.182)	(0.465)	(1.150)	(0.319)	(0.202)
n	5667	4796	1133	3733	5597

Annex II

The consequences of miss–specifying dt

If we suppose the policy had a positive and fixed effect (*Ef*) for all households within a distance dt of the **Metrocable** line and that households are all equal and uniformly distributed in space, three problems can arise from the miss–specification of the value of dt. The first two cases generate an underestimation of the policy's effect. The third case, which we are able to control by setting a logic value of dt, is the most problematic since it leads to the conclusion that the policy had no effect. dC refers to the comuna's boundaries and comprehends the universe of households that can be included in the **control** and **treated** groups.

First case, the estimated value of dt, which we will refer to as dt^*, is lower than the real value of dt. (see figure 1a)

$$mean.effect_{<dt*}(treated^*) = Ef * \frac{dt^*}{dt^*} = Ef$$

$$mean.effect_{>dt*}(control^*) = \frac{Ef * (dt - dt^*) + 0(dC - dt)}{(dC - dt^*)}$$

$$Measured.policy's.effect = mean.effect_{<dt*}(treated^*) - mean.effect_{>dt*}(control^*)$$

$$Measured.policy's.effect = Ef - \frac{Ef * (dt - dt^*)}{(dC - dt^*)} = Ef.\left(1 - \frac{(dt - dt^*)}{(dC - dt^*)}\right),$$

$$since \ 0 < \frac{dt - dt^*}{dC - dt^*} < 1^{12}, the \ Measured.policy's.effect < Real.Policy's.effect \text{ and the}$$
observed effect always has the same sign as the real effect

Second case, the estimated value of dt, which we will refer to as dt^*, is bigger than the real value of dt. (see figure 2a)

$$mean.effect_{<dt*}(treated^*) = \frac{Ef * dt + 0 * (dt^* - dt)}{dt^*} = Ef.\frac{dt}{dt^*}$$

$$mean.effect_{>dt*}(control^*) = 0$$

$$Measured.policy's.effect = mean.effect_{<dt*}(treated^*) - mean.effect_{>dt*}(control^*)$$

$$Measured.policy's.effect = Ef.\frac{dt}{dt^*} - 0, since \ 0 < \frac{dt}{dt^*} < 1 \ / \ dt < dt^*$$

---

[12] $by \ definition \ dt > dt^*, so \ \frac{dt}{dc-dt^*} > \frac{dt^*}{dc-dt^*} \ and \ \frac{dt}{dc-dt^*} - \frac{dt^*}{dc-dt^*} > 0$

But when it is the latter expression > 1? $\frac{dt}{dc-dt^*} - \frac{dt^*}{dc-dt^*} > 1 \ when \ (dt - dt^*) > (dc - dt^*) or \ dt > dC$ (never)

And when it is the latter expression<1? $\frac{dt}{dc-dt^*} - \frac{dt^*}{dc-dt^*} < 1 \ when \ (dt - dt^*) < (dc - dt^*) or \ dt < dC$ (always)

the $Measured. policy's. effect < Real. Policy's\ effect$ and the observed effect always has the same sign as the real effect

Third case, the real value of **dt** *is bigger than* **dC.** (see figure 3a)

$$mean. effect_{<dt*}(treated^*) = Ef$$

$$mean. effect_{>dt*}(control^*) = Ef$$

$$Measured. policy's. effect = mean. effect_{<dt*}(treated^*) -$$
$$mean. effect_{>dt*}(control^*) = 0$$

Figure 1a. First case dt*<dt
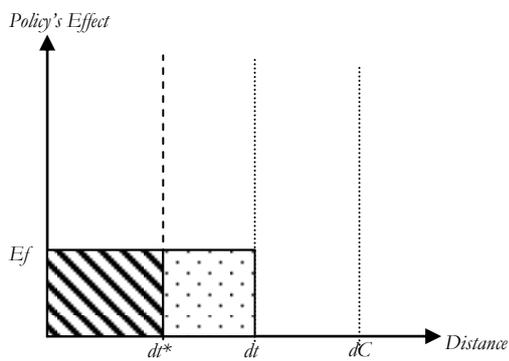
Figure 2a. Second case dt*>dt
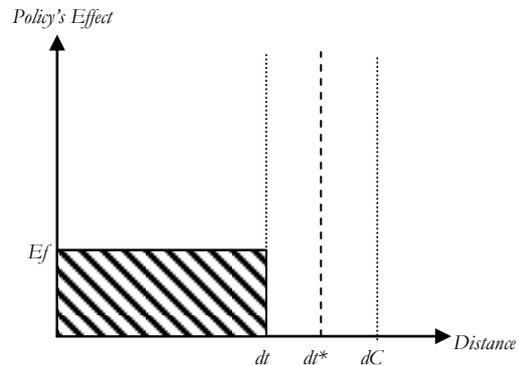
Figure 3a. Third case dt>dC
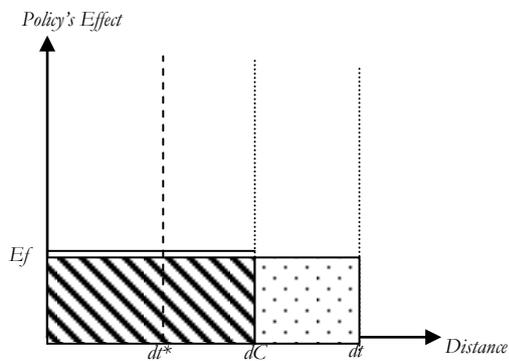
Chapter 7

The Slum Rehabilitation Scheme: What consequences at a city level?[1]

Abstract

In this article we evaluate the achievements–in terms of slum absorption–of the *Slum Rehabilitation Scheme* (*SRS*), the principal slum policy of the city of Mumbai (India) and its consequences on population density distribution at the city level. The *SRS* is a very innovative slum policy since it allows for the private sector to completely finance slum rehabilitation through the creation of an Additional Development Rights (ADR) program. Developers who rehabilitate slums are compensated with transferable or *in-situ* ADRs, which allow them to exceed planned Floor Space Index (FSI) regulations, construct additional tenements and sell them in the traditional formal–housing market. The profits made from the conferment of ADRs serve to finance the total cost of the slum rehabilitation. This policy allows the private sector to choose which slums to rehabilitate –having the slum dwellers' agreement–and does not designate specific wards as ADRs generators or receptors. Results suggest that while the *SRS* has successfully absorbed a significant part of the slum population into the formal city, it has not been able to meet the initial objectives and will be insufficient to make Mumbai a 'slum–free city'. In addition, the ADR program's analysis revealed that most of the additional population density is being absorbed by Mumbai's wealthier neighborhoods, which might be generating infrastructure bottlenecks as planned capacities might not be able to host a greater demand for services.

Résumé

Dans cet article, nous évaluons les avancées – en termes d'absorption des bidonvilles –permises par le *Schéma de Réhabilitation des Bidonvilles (SRB, Slum Rehabilitation Scheme SRS* en anglais), principale politique des bidonvilles à la ville de Mumbai et ses conséquences sur la distribution des densités à l'intérieur de la ville. Le *SRS* est une politique innovante car elle permet de financer la totalité de la reconstruction des bidonvilles par le secteur privé en mettant en place un système d'incitations par l'allocation aux promoteurs des « Droits de Développement Supplémentaires » (DDS). Les promoteurs qui réhabilitent des bidonvilles sont compensés par des DDS qui leur permettent de construire plus de surface, sur le même terrain ou ailleurs selon les conditions, de vendre la surface additionnelle sur le marché immobilier et de financer ainsi la totalité des projets de réhabilitation. Dans ce système, ce sont les promoteurs privés qui choisissent les bidonvilles à réhabiliter, après accord des habitants. On examine quel sont ses effets sur l'évolution des densités dans la ville de cette logique du secteur privé et on identifie les problèmes de congestion d'infrastructures que cela peut poser. Les résultats de cette analyse suggèrent que, malgré une absorption significative de la population des bidonvilles à Mumbai, le *SRB* n'a pas réussi à répondre aux objectifs initiaux et restera insuffisante pour faire de Mumbai une 'ville sans bidonvilles'. En outre, l'analyse du programme de DDS a révélé que la densité de population supplémentaire a été absorbée par les quartiers aisés de Mumbai, ce qui pourrait engendrer une congestion de l'infrastructure urbaine existante qui n'est pas en mesure d'accueillir une plus grande demande de services sans investissement complémentaires.

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[1] A part of this chapter has been published as: Giraud, P.N. and Restrepo, P. (2011), Mumbai, des droits de construire baladeurs au service du renouvellement urbain, *Etudes foncières*, nro 150 Mars-Avril.

1. Introduction

According to the United Nations, each year 70 million inhabitants are added to the world cities; the equivalent to creating seven new megacities from scratch. In 2015, the world will have at least 550 cities with more than one million inhabitants and by 2020, almost all of the worlds' demographic growth will occur in urban areas. However, while urbanization has usually been linked to prosperity, most of today's urbanization is occurring in developing countries and about half of it is being absorbed by the informal housing sector. Estimations suggest that between 2030 and 2040, the world will house around two billion inhabitants in slums, which will represent about one third of the worlds' urban population (UN-Habitat, 2003a).

The recognition of slums as a world urban problem, along with their high correlation with poverty, has made slum improvement a priority for local governments and international organizations. Goal 7 of the *Millennium Development Goals*, which seeks to ensure environmental sustainability, envisions the improvement of the lives of at least 100 million slum dwellers world-wide by the year 2020 (UN, 2010). In Peru for the past two decades, the national Government has lead a massive titling campaign at a national level that resulted in the formalization of around 1.9 million urban properties between 1991 and 2010 (Camaiora, 2011). In Medellin (Colombia), the local Government introduced a policy to connect and integrate marginalized settlements to the rest of the city, leading to the transformation of previously outside–of–law neighborhoods into international city references[2]. The actual policy applied in the city of Mumbai (India), which is the object of analysis of this article, is also a relevant example of new tendencies in slum policies.

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[2] *Urban Integral Projects* of the city of Medellin have been recognized by a number of international organizations and awarded half a dozen urban planning and architectural prizes (Holcim Awards Gold 2008, 2009 City of Barcelona FAD Award, Curry Stone Design 2009…).

Despite being the commercial and industrial capital of India, the city of Mumbai (Bombay), is–unfortunately–one of the most famous references of informal urbanization. With a population of around 13 million inhabitants, considerable development restrictions, due to topographic constraints and a history of strict land use policies, formal housing prices have remained outside most of the population's payment capacities for decades. Around half of its inhabitants live in slums with precarious sanitary conditions while its leaders dream of making Mumbai a "World-Class City" (McKinsey, 2003). The actual slum policy was at first proposed by the *Shiv Sena* political party in the 1995 election and was intended to rehabilitate 800,000 slum dwellers (Burra, 1999). The policy, called the *Slum Rehabilitation Scheme (SRS)*, introduced a set of financial mechanisms based on Additional Development Rights that allowed the public sector to switch the burden of financing slum rehabilitation to the private sector.

In this article we approach two different research questions related to the *SRS* policy. The first question evaluates the effectiveness of the *SRS* policy in terms of slum absorption, comparing the initial political objectives to the actual policy results. Since the policy has been running for 16 years, it is possible for us examine the achievements of the policy, based on data provided by the *Slum Rehabilitation Authority* (SRA). The second question evaluates the consequences of the *SRS* on population density distribution at the city level by using data provided by the Municipal Corporation of Greater Mumbai (MCGM) on the Additional Development Rights (ADRs) program. This question is of special relevance given the policy design and the city context. As the *SRS* is based on density incentives in the form of Additional Development Rights and does not designate specific areas in which ADRs can be generated or to which they can be transferred, the outcome of the policy–in terms of density changes–is left to the economic rationale of project developers. With density changes being fueled by the private sector, the policy could eventually lead to infrastructure bottlenecks in areas in which additional density–that goes beyond the planned capacities–cannot host a greater demand for services.

While a number of articles have studied the *SRS*'s effects on the city of Mumbai, most of the existing literature evaluates (or simulates) the policy's effect at the household's level and not at the city level (Bhide *et al.* 2003; Sharma *et al.* 2008; Takeuchi *et al.* 2008; Restrepo 2010; Vaquier 2010). To the present time only Navtej (2008) has done work similar to the one covered by this article. However, her research is focused on the possible consequences of the relocation of Project Affected Households (PAHs) from the Mumbai Urban Transport Project (MUTP) and the Mumbai Urban Infrastructure Project (MUIP), as well as the ADRs generated in this process. Both of these projects correspond to once–in–a–life–time interventions and the location choices for the rehabilitation of PAHs were defined by public authorities. Compared to Navtej's work,

we extend our analysis to evaluate the effectiveness of the policy in achieving its objective and evaluate the possible density consequences generated by the *SRS*'s ADR program, which is leaded by the private sector.

This article is organized in the following manner. In Section 2 we outline the history of slum policies in the city of Mumbai. In Section 3 we describe the principal characteristics of the *Slum Rehabilitation Scheme* and develop the analysis of the effectiveness of the *Slum Rehabilitation Scheme* in terms of slum absorption rates. In Section 4 we evaluate density changes produced by the *SRS* using the *Slum Rehabilitation Authority* (SRA) project's database and the MCGM Transfer Development Rights (TDRs) database. Finally, in Section 5 we conclude.

2. Mumbai, the Indian megapolis

The city of Mumbai, which belonged to the Portuguese since 1534, was given as dowry to the King of England in 1661 and remained under Britain's control until India's independence in 1947. Mumbai's urbanization started in the south of the peninsula–*Island City*–and spread to the north, first filling the eastern and western suburbs and then expanding beyond the city's boundaries to satellite cities like Navi Mumbai, Bhiwandi and Kalyan. From the 19th century, the population of Mumbai grew considerably, passing from 813,000 inhabitants in 1901 to 5,971,000 in 1971 and 13,831,000 in 2010 (MCGM, 2005). Today, Mumbai is the largest city in India and more than two thirds of the city's population lives in the suburbs, outside *Island City*, which is composed of wards A to G; the suburbs are composed of wards H to T, and together they constitute "Greater Mumbai", a city under a unique authority (See Figure 1).

Slums have been a part of the city of Mumbai for a long time. They emerged in the mid-nineteenth century and by the time of India's independence around five percent (5%) of the city's populations was already living in this type of habitat. Since then, slums have grown considerably, both in absolute and in relative terms. The total slum population passed from 2.8 million in 1976 to 4.3 million in 1983 and exploded to 6.2 million by the year 2000 (MCGM, 2005). The latest report estimated that 55% of the city population lived in informal settlements while occupying only 16% of the city land, clear evidence of the overcrowdings and spatial inequalities of this megapolis (Hagn, 2006). Slums in Mumbai are spatially dispersed and are present in most of the areas of the city, as can be seen in Figure 1.

Living conditions in Mumbai slums are variable but most of the slum settlement are relatively old and have achieved a certain degree of consolidation. In terms of surface, slum dwellings are quite small, with 42% having 10 sq.mt, 38% between 15–20 sq.mt and only 9% above 20 sq.mt

(Montgomery Watson and Consultants, 2001). Most houses are constructed with *pucca*[3] materials, but the provision of basic services varies considerably in each zone. While 74% of the slums in Zone 3 (the southern part of the Western Suburbs) have piped water connections, only 19% of the slums in Zone 4 (the northern part of the Western Suburbs) do (Baker et al., 2005). In terms of land ownership, a high proportion of slums (58%) are squatting on private land and about a quarter of Mumbai slums occupy municipal or state–government land (Montgomery Watson and Consultants, 2001)

Figure 1. Greater Mumbai and its slum distribution
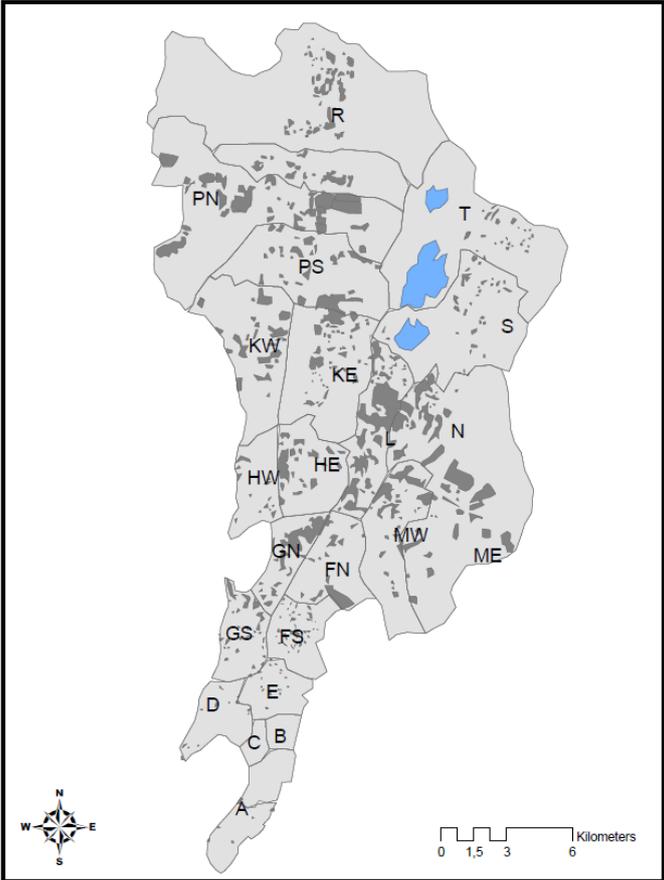
Source: adapted by author from MCGM (2005)

From demolition to slum rehabilitation

The actual slum policy of the city of Mumbai is the product of years of learning by doing and a result of the evolution its slum policies. Looking back, slum policies started in the early 50s with the installation of the Bombay Housing Board, which was meant to provide subsidized housing for industrial workers. In 1976, the first census of slums was done, and in 1983 a task force was created to discuss housing and urban development issues. However, despite the recognition of

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[3] A *pucca* structure is one having walls and roofs made of *pucca* materials. Cement, burnt bricks, hollow cement/ash, bricks, stone, etc. constitute the list of *pucca* materials. NSS Report 486 _Condition of Urban Slums

slums, the predominant policy in the 70s was the use of force to demolish and clear slum settlements, a policy that has not been completely eradicated from the city (Times of India, 2011).

The foundations of the actual slum policy were created in 1985 with the introduction of the *Slum Upgrading Program - SUP*. In the *SUP*, implemented with assistance from the World Bank, land was leased for 30 years to slum cooperatives and the government provided upgraded civic amenities. The *SUP* could only be implemented on State Governance, Municipal Corporation and Housing Board lands which were not reserved for other uses according to development plans (SRA, 2007). By 1994, when the project ended, only 22,204 households of the initial 100,000 households proposed had applied to have legal tenure (Mukhija, 2001). In 1985, and parallel to the *SUP*, the *Prime Minister's Grant Project (PMGP)* was launched. The *PMGP*, financed by the central Government, was based on an *in–situ* reconstruction of slums. Under the *PMGP*, slum dwellers had to pay the construction costs of new dwellings and only those who were on the 1985 electoral rolls or prior were eligible. In 1991, only six years after the policy started, it was evident that most of the slums dwellers were not able to pay construction costs and many were not eligible–given the policy's datelines. Even though the *PMGP* had not achieved substantial improvement of Mumbai's slums, it left the local government with an important lesson: given that neither the local government nor slum dwellers were capable of financing slum renovation and reconstruction, the next policy needed to include the private sector more actively. By the end of 1991 the *PMGP* was substituted by the *Slum Redevelopment Scheme (SRD),* which allowed private developers to sell a part of the tenements in the free market while charging slum dwellers about one third of the cost of construction. Under the *SRD* private developers were compensated with Additional Development Rights (ADR) that could only be consumed in the same site that generated them. With long procedures for approval, in 1995, only 86 out of the 185 proposed projects through the *SRD* had been approved (Mukhija, 2001).

3. Making Mumbai a slum-free city?

The *Slum Rehabilitation Scheme*

The 1995 Maharashtra state elections came with declarations of change. The *Shiv-Sena* party[4] promised, if elected, to provide 800,000 free houses for four million slum dwellers in the city (Hagn, 2006). After their victory, a new policy, called the *Slum Rehabilitation Scheme* (SRS), was introduced to substitute the *SRD*. The *SRS* created better cross-subsidizing mechanisms for the financing of slum projects by using two types of incentives: *in–situ* Additional Development

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[4] The *Shiv-Sena* party is a center-right nationalist party that initially advocated a pro-Marathi ideology and then a Hindu Nationalist ideology (in coalition with the National Democratic Alliance)

Rights (ADRi) and Transferable Development Rights (TDR). The *SRS* works in the following way: First, a constructor or developer associates himself with a slum community and collects signatures of agreement from at least 70% of the eligible slum dwellers. Second, the project follows a set of administrative procedures at the *Slum Rehabilitation Authority* (SRA)–the agency in charge of the policy–in which slum dwellers' eligibility and the project's proposal are approved. Then, slum dwellers are relocated in transit camps, housing structures are demolished and new buildings are constructed following a standard procedure. As construction finishes housing cooperatives are formed and tenements are allotted. Slum dwellers get free housing, with basic amenities and legal titles. General information on the *SRS* policy is presented in Table 1.

Table 1. General Information on the *Slum Rehabilitation Scheme*

Minimum rehabilitation tenement density	500 tenements per hectare
Additional Development Rights	(Rehabilitation Component : Sale Component) ratios: Suburbs (1:1), City (1:0.75), Difficult area (1:1.33)
Transfer Development Rights	Spillover above 2.5 FSI or due to physical constraint below 2.5 FSI
Area of dwelling	21 sq.mt carpet area free of cost
Restrictions	Dwellings cannot be sold or rented for a period of 10 years

Source: SRA (2007)

The constructor or developer is compensated by the local government in two ways (see Figure 2). If there is enough space to build additional housing units, the constructor is granted *in–situ* ADR. This allows the constructor to exceed standard Floor Space Index[5] (FSI) regulations and construct additional housing units in the same site, which can then be sold in the free market. For example, if the project is located in the suburbs, for every built-up area used for rehabilitation the same built-up area is granted in the form of an ADR is granted. However, there is a maximum level of FSI equal to 2.5 that cannot be exceeded, which leads to the second form of compensation. If there is not enough space to use all the ADRi, the constructor is granted a TDR, which can be sold in the city's TDR market and another constructor (or he himself) can use it to build additional space–beyond the planned FSI regulations–in another real–estate project in the city. Following Mumbai's historic urban policy to decongest downtown, TDRs can only be used in the suburbs and should be consumed either in the same ward of the generating site or to the north of the site. Compared to other ADR programs implemented world-wide (see Box 1), the Mumbai's ADR program is unique in the sense that it does not impose generating and receiving areas.

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[5] Floor Space Index (FSI) is the relationship between the area constructed and the area of the terrain. For example, a single–story house that occupies all the land or a four–story building that occupies one–fourth of the land may be built on an FSI of one (1).

Figure 2. *Slum Rehabilitation Scheme*
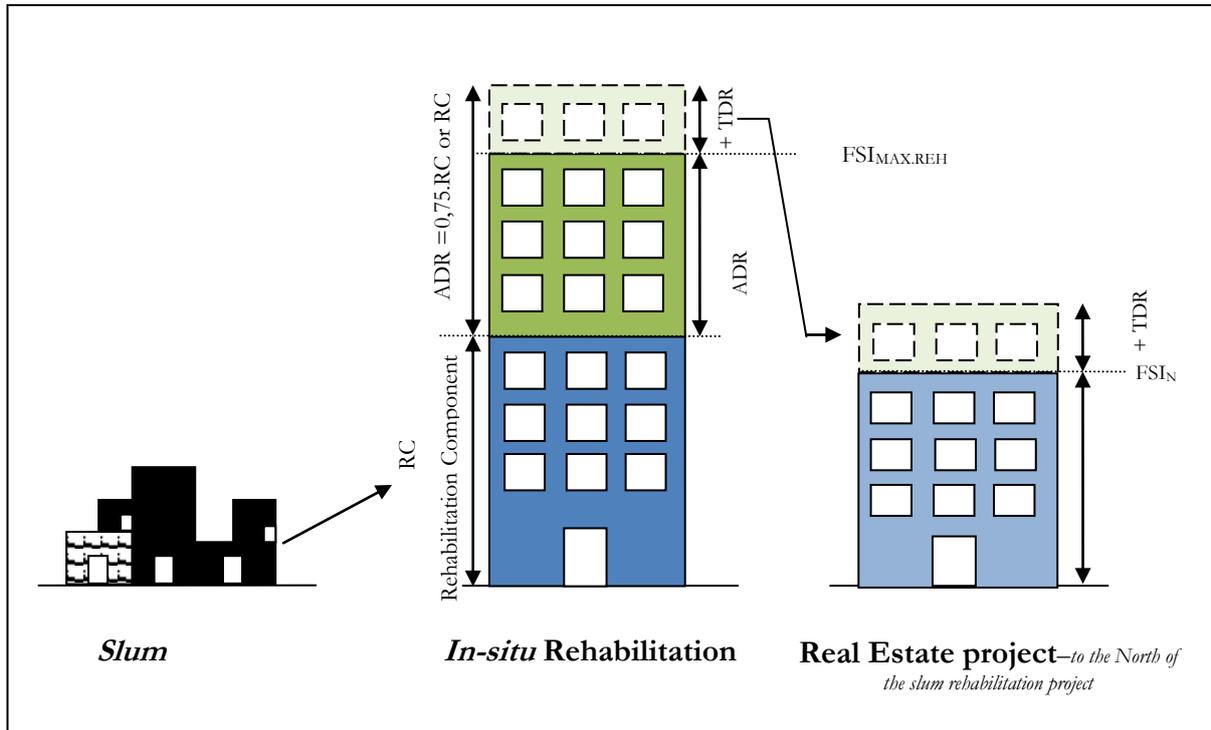
Slum absorption, slum formation

According to the SRA, after the introduction of the *SRS* policy in 1995 and until the 30 June 2009, 150,129 slum households had been rehabilitated. With an average household size of 4.5, the total number of slum dwellers rehabilitated through the *SRS* policy is around 473,081. However, on the same date, 1,252 *SRS* projects had been proposed to the SRA concerning 450,905 households. When compared to the estimated slum population of 6.5 million in 2010 (MCGM, 2005) or to the initial policy's objective (800,000 slum households), this figure is very limited. If the *SRS* policy continues at this pace–assuming that no new slums will be formed–the city will need 184 more years to achieve a slum-free objective. Under this perspective the city of Mumbai will continue to house a large proportion of its inhabitants in slums for a long period of time.

Parallel to the *SRS*, the Mumbai Metropolitan Regional Development Authority (MMRDA), the entity in charge of urban planning in the Mumbai Metropolitan Region (MMR), started three large infrastructure projects (MUIP, MUTP and MARP) that directly affected a considerable number of slum households. The Mumbai Urban Transport Project (MUTP)[6], the Mumbai Infrastructure Transportation Project (MUIP) and the Mumbai Airport Renovation Project (MARP) together required the relocation and rehabilitation (R&R) of around 125,500

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[6] A Second phase of the MUTP has already been approved by the MMRDA and the World Bank.

136

households[7]. In order to compensate the Project Affected Households (PAHs), the MMRDA decided to implement a very similar scheme to the one implemented by the SRA. The main difference between PAPs rehabilitated slum dwellers and those of *SRS* was that the former had to be relocated–in many occasions to distant sites–and the date of eligibility was switched from 1995 to 2000.

Box 1. Additional Development Programs in the World

Local authorities can intervene in the land market using three different instruments. The first and most common one is through the creation of land regulations, such as zoning or Floor Space Index (FSI) regulations. The second is through the so–called "land supply" policies in which local authorities could either directly intervene in the local market or create financial incentives for the private sector. The third is using market mechanisms applied to urban development, often called Additional Development Rights programs or Transfer development Rights Programs (Renard, 2002). Mumbai's ADRs program belongs to the third category of instruments.

A number of cities and regions in the world have implemented ADR programs. There are two types of ADR programs: the first allows builders to exceed FSI regulations in the same construction site (ADRi). The second, usually called Transfer Development Rights (TDRs) allows FSI regulations to be exceeded in a site different from the one that generated them. Both allow developers to build additional surface in exchange for the provision of a public benefit. The objective of some of the most common ADR programs is the construction of public amenities, the protection of the environment or the protection of buildings of public–interest heritage.

The first ADR program was introduced in 1961 in New York City, which allowed constructors to exceed FSI norms in compensation for the construction of public infrastructure in the same site. Some of the public amenities considered in the New York City ADR program consisted of the construction of public spaces at the street level and new theatres (CHF International, 2007).

TDR programs, widely used in the United States, usually identify a set of generating and receiving zones. This identification has a reason. Pinho (2010) explains that "TDRs … steer development away from those areas a community wants to preserve toward those areas it wants to develop". In theory ADR programs should promote the development of areas having the infrastructure capacities to absorb higher population densities. However, as explained by CHF International (2007), the identification of specific reception areas sometimes allows local communities to organize and obstruct ADR programs. Lane (1998) explains how "the first half of the TDR equation (agreement on the resource to be protected) is generally not difficult. However, the second half (agreement on where the transferred development is to go and how it should be configured) has been extremely problematic". The following table contains examples of ADRs programs in different cities or regions in the world.

City or Region	Purpose	Sending sites	Receiving sites
City of Tacoma, Washington State–USA	Protect the environment	YES	YES
Issaqua, Washington State–USA	Protect the environment and others	YES	YES
Maryland State–USA	Encourage compact development, protect the environment, Reduce traffic congestion, and minimize the need for public spending on infrastructure expansion;	YES	YES
Sao Paolo–Brazil	Infrastructure (road widening–1969)	YES	YES

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[7] Between 18,000 and 23,000 PAH needed to be relocated and rehabilitated in the case of the MUTP, around 35,000 in the case of the MUIP and between 60,000 and 80,000 in the case of the MARP (MMRDA, 2005).

Figure 3 shows the total number of *SRS* rehabilitated households, rehabilitated and to be rehabilitated PAHs compared to the total number of slum households in Mumbai. **A** corresponds to the total number of rehabilitated households through the *SRS* policy from 1995 until July 2009; **B**, to the total number of households of projects that have been proposed to the SRA. **C** corresponds to an estimation of the total number of PAHs of MUTP, MUIP and MARP; and **E**, to an estimate of the total number of PAHs that have already been relocated and rehabilitated[8]. From Figure 3 we can observe how–although the *SRS* has resulted in the rehabilitation of a considerable amount of slum dwellers–it still has a long way to go. Curiously, the number of *SRS* projects that have been proposed is three times higher than those that have been constructed and occupied (OCC). The approval of *SRS* proposals is done following three steps: (1) Letter of Intent–LOI, (2) Intimation of Approval–IOA and (3) Commencement Certificate–CC. Of the total number of *SRS* proposed projects on June 30, 2009, only 55% had a LOI, 25% had an IOA and only 20% had a CC. SRA records indicate that many of the projects in the LOI stage are not viable due to a number of reasons. In some cases less than 70% of the slum dwellers have given their signature, while in other cases the plot on which the proposed project is to be developed has not been declared a slum. Therefore, many of the proposed projects in the LOI stage will probably not be developed.

Figure 3. *Slum Rehabilitation Scheme* and Relocation and Rehabilitation of Project Affected Households
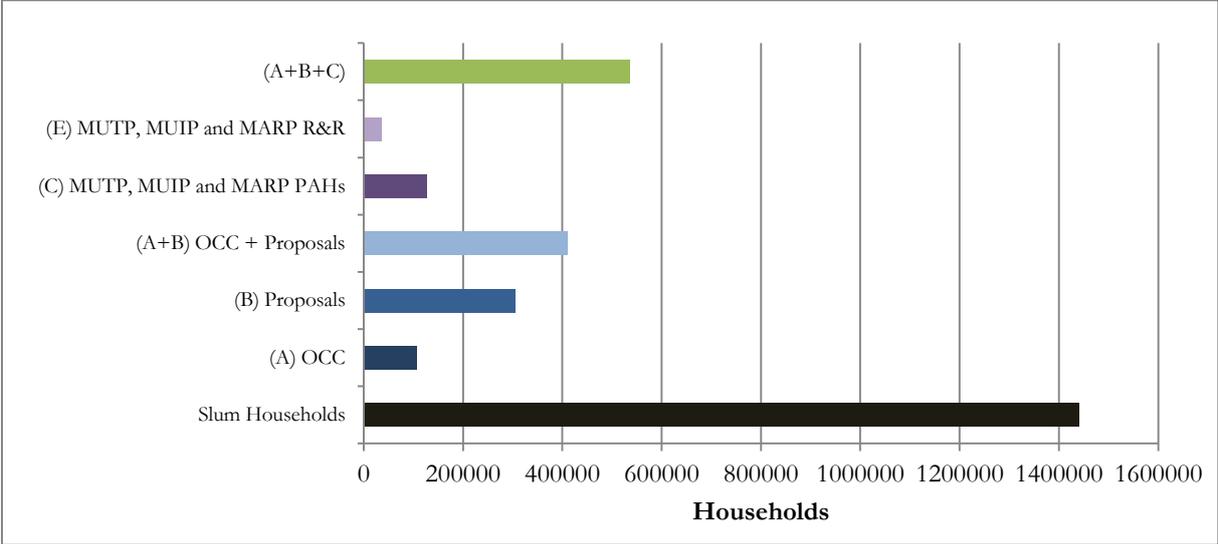
Source: *Slum Rehabilitation Authority* records (2009), OCC refers to Occupation Certificates

A comparison between the *SRS*'s achievements and slum R&R due to large infrastructure projects indicates that the total amount of PAHs that will be rehoused in the next few years–if

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[8] According to the MMRDA (2005), in 2005 6,000 PAPs had been relocated and rehabilitated from the MUIP and around 14,000 in the case of MUTP. More recent estimates (from non–official sources) suggest that the total number today of R&R PAHs is 17,280 MUTP, 9,000 MUIP and around 11,000 MARP.

the MUTP, MUIP and MARP deadlines are respected–is slightly larger than the total amount of rehabilitated households through the *SRS* scheme since the policy's beginnings.

So far, we have analyzed if the *SRS* is efficient in terms of slum absorption under the assumption of no slum formation. However, to correctly evaluate whether the *SRS* policy is leading Mumbai to become a slum-free city, it is necessary to take into account the other side of the slum equation: slum formation. The MMRDA (1995) explains the problematic housing situation in the city in the following way:

"The private housing market essentially leaves out the poor. The public sector supply is very limited. As a result, the shelter needs of 53% of the poorer or 45,000 households are satisfied in the informal sector market every year. The supply is in the form of further densification of existing slums and growth of new slums."

In addition, a simple analysis of the economic incentives proposed by the *SRS* policy reveals that the *SRS* policy, by itself, will never be sufficient to solve the housing problem in Mumbai since it ignores the dynamics of slum formation. As it is based on incentives related to the residential housing market of the city of Mumbai, the *SRS* is incapable of solving the housing problems of low –income families and achieve the rehabilitation of slum dwellers at the same time. On the one hand, for the *SRS* to be rentable it needs high housing prices, but high housing prices would probably lead some of the new population to find housing accommodations in the informal sector. On the other hand, when housing prices are low, private developers will move away from slum rehabilitation but the new population would be more capable of paying for formal accommodations in the city.

In conclusion, the *SRS* policy is–without a doubt–one of the most interesting urban innovations for the financing of slum rehabilitation and it has allowed the public sector to shift the costs of providing adequate housing solutions for poor households to the private sector. However, it is necessary that local authorities acknowledge the limits of the *SRS* policy and start looking for the implementation of alternative housing policies that serve to increase the housing supply to low–income groups and avoid new slum formation.

4. Density changes triggered by the SRS

The ADR program–at the base of the *SRS* policy–produces a densification of the city of Mumbai beyond the planned FSI that is difficult to predict, given the economic rationale of the parties involved in slum rehabilitation. The way the policy was designed means that the profitability of an *SRS* project depends not only on the location of the slum pocket and the surrounding residential housing prices, but also on its density and location in relation to richer

neighborhoods in the city. If the ADR program proposed by the *SRS* allowed only for the conferment of *in–situ* Additional Development Rights, like the SRD policy did, developers would have a preference for low–density slums located in richer neighborhoods. An analysis made by the MMRDA (1995) on the profitability of *SRD* projects is presented in Figure 4. According to their calculations, with densities between 700–900 households per hectare[9], only slums located in the Bandra–Andheri areas or in *Island City* would be profitable for redevelopment under the *SRD*, which might explain why the *SRD* policy was not very successful. However, since the *SRS* policy allows developers to benefit from TDRs when the maximum FSI permitted (2.5) is exceeded, and defines a set of rules for TDR utilization (to the north of the generating project and outside *Island City)*, it is difficult to predict beforehand which areas will be rehabilitated in a greater proportion and how ADRs will be distributed. ADRi and TDR generation depending on slum density in the *SRS* policy is discussed in Box 2.

Figure 4. *Slum Rehabilitation Scheme* and Relocation and Rehabilitation of Project Affected Households
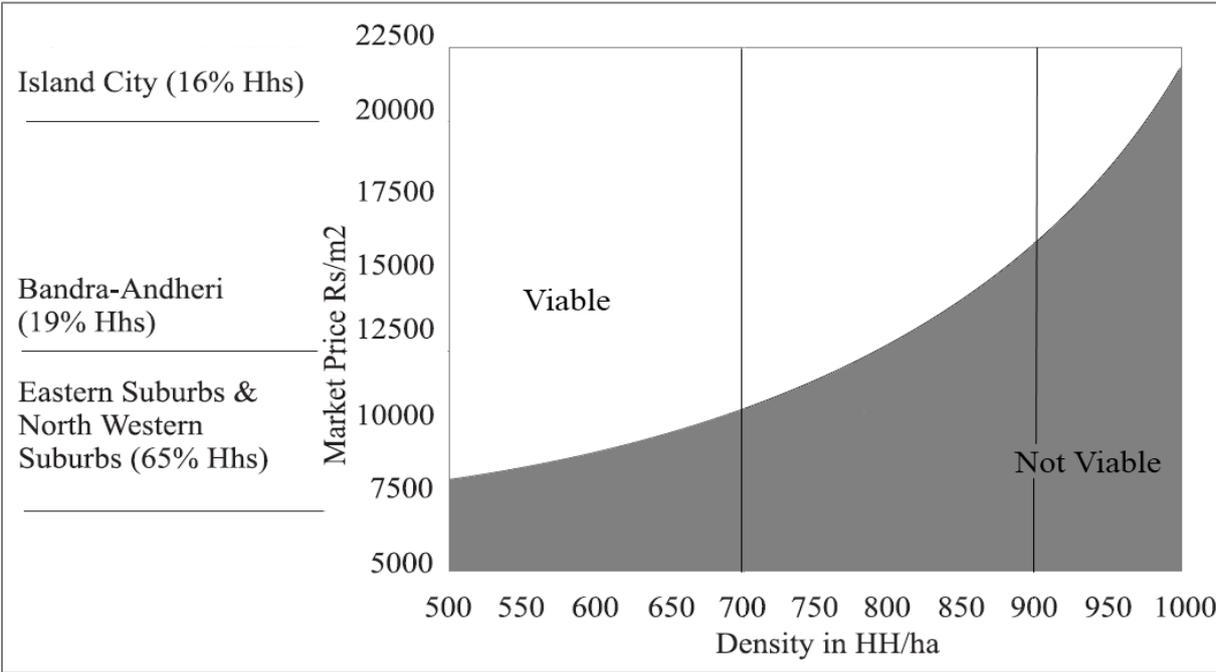
Source: MMRDA (1995)

In order to measure the consequences of the *SRS* on the population–density distribution on a city level, we use two types of data. The first, obtained from the SRA in 2009, corresponds to the number of *SRS* projects constructed and planned per ward. Figure 5 presents wards organized from South to North, planned and constructed *SRS* projects in each ward and the average

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[9] According to the MMRDA, most of Mumbai slums have a density within this range.

residential price of formal housing in Rupees (Rs.) per square meter[10]. From this figure the correlation between the number of projects and the average price in each ward is apparent, with a higher number of projects being developed in richer neighborhoods. However with this information only, it is not possible to estimate the effects of the policy on density distribution since the proportion of TDR/ADRi granted in each of the projects depends on slum density, information that is not available.

Figure 5. Number of Projects Rehabilitated by Ward and Residential Prices (Rs/ sq.mt.)
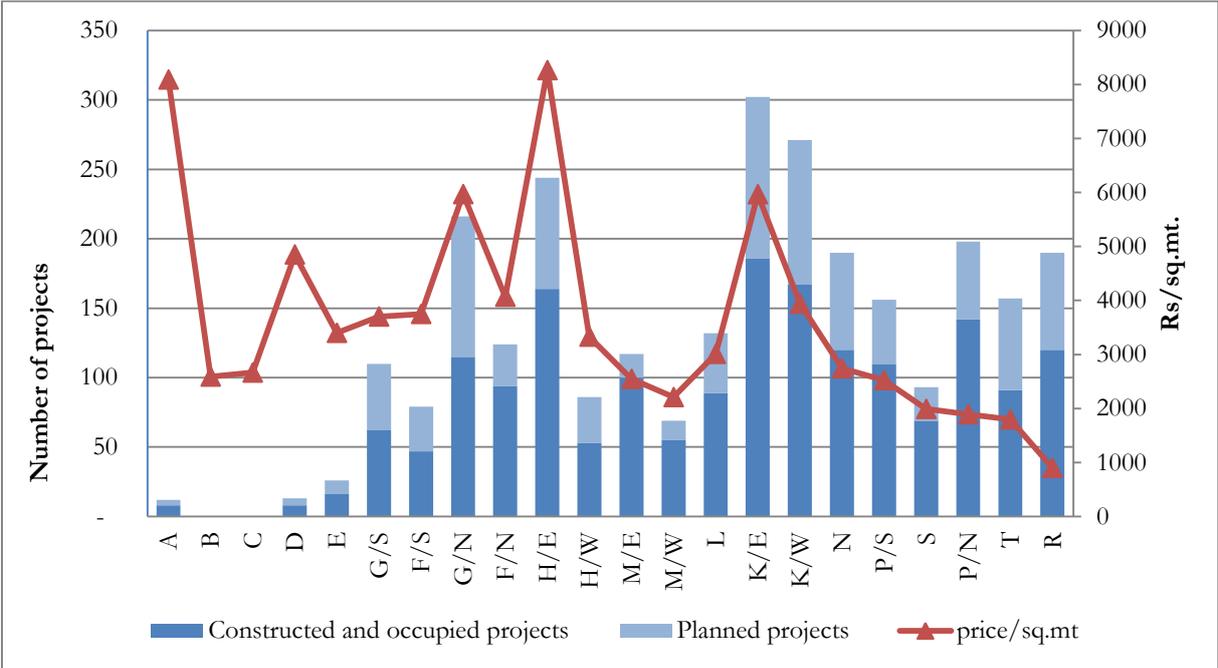
The second type of data used refers to the total number of TDRs generated and consumed per ward. This TDR database was obtained in July 2008 from the Mumbai Municipal Corporation of Greater Mumbai (MCGM). Figure 6 reveals how the large bulk of TDRs are generated in cheap neighborhoods, while most of them are consumed in the wealthiest sectors of the city. In rich wards–outside *Island City*–(H/E, H/W, KE/KW), many rehabilitation projects have been built but the TDR generation remains low when compared to poor wards. The latter suggests that developers have a preference for the rehabilitation of low–density slums in rich neighborhoods since they can profit from the conferment of additional built–up areas *in–situ* and get high returns with the sale of the sale component. In contrast, poor neighborhoods (M/E, M/W, L, P/S, S) generate a lot of TDRs compared to the number of rehabilitation projects they house. This suggests that developers have a preference for the development of high–density

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[10] Residential prices were calculated by the author using the World Bank Transport Household Survey database conducted in 2008 which is representative of the city of Mumbai.

slums in poor neighborhoods that are large generators of TDRs. Together, these two dynamics have a clear effect on Mumbai's population density distribution by leading to a higher densification of wealthier neighborhoods located outside *Island City*.

Box 2. ADRi and TDR generation depending on slum density in the *SRS* policy

The *SRS* policy states that developers who rehabilitate all eligible slum dwellers in a given slum can benefit from Additional Development Rights either in the form of ADRi or TDRs. The proportion of ADRi and TDRs conferred to developers depends on slum density. In a project located in the suburbs for every built–up area of the Rehabilitation Component, the developer is granted the same value in ADRi. In the following analysis we estimate the different slum–density values needed for *SRS* projects to be only ADRi generators, to be both ADRi and TDR generators, and to be only TDR generators.

For a project located in the suburbs, the total expected consumption of FSI–referred to as δ–can be calculated in the following way:

$$\delta = FSI(RC) + FSI(SC) = \left(\frac{Total.slum.hhs * 21sq.mt}{Area\ of\ the\ project}\right) * 2 = Density * 21sq.mt * 2$$

RC is the Rehabilitation Component and SC is the Sale Component. Since every slum household received a dwelling of 21 sq.mt., we can calculate the FSI(RC) as the number of slum households in the project multiplied by 21 sq.mt. and divided by the total area of the project. In the case of the suburbs for every FSI(RC), the developer is granted the same in FSI(SC), so it is possible to estimate the value of δ.

A project will generate only ADRi if δ≤2.5 and the project will generate both ADRi and TDRs if 2.5<δ>5. Projects will generate only TDRs for values of δ higher than 5. The density needed for each of these cases can be calculated from the equation above and is presented in the following table.

Case	Value of δ	Density of slum
Only ADRi generated	δ ≤2.5	Density < 595 hhs/ha
Both ADRi and TDRs generated	2.5<δ<5	595hhs/ha<Density<1190hhs/ha
Only TDRs generated	δ >5	Density>1190 hhs/ha

Figure 6. TDR Generation and Consumption by Ward
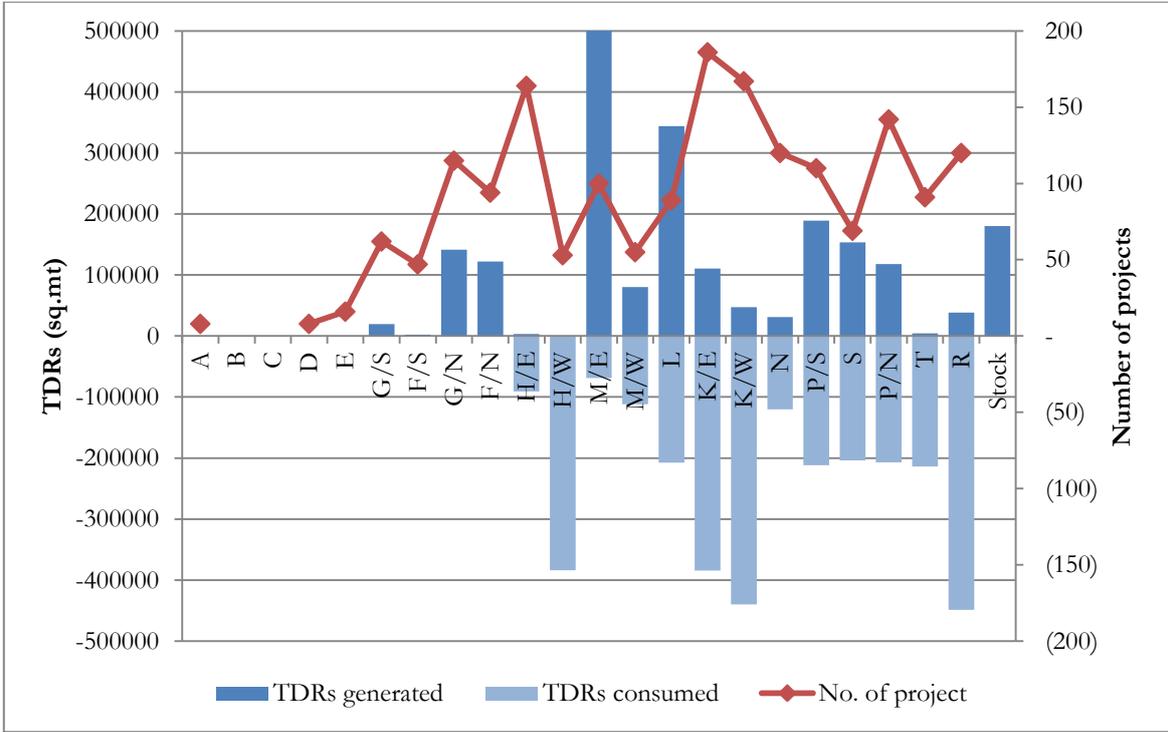
Source: *Slum Rehabilitation Authority* (2008) and Municipal Corporation of Greater Mumbai (2008)

5. Conclusions

In this paper we evaluate the impact of the *Slum Rehabilitation Scheme* (*SRS*), the principal slum policy in the city of Mumbai, at a city level. We address two issues: First, we evaluate the effectiveness of the policy in achieving the initial objectives and in achieving a slum–free scenario. Second, since the *SRS* policy is based on Additional Development Rights incentives that lead to an increase of population density beyond the planned Floor Space Index, we evaluate the *SRS* consequences on the population density distribution at a city level.

In terms of the *SRS* policy's achievements, we found that–although the policy has been relatively successful compared to previous slum policies–it has not been able to meet the initial slum absorption objective and will not be sufficient, by itself, to reach a slum–free scenario. From the introduction of the policy in 1995 until June 2009, a total of 150,129 slum households had been rehabilitated, equivalent to around 10% of the slum population. Furthermore, since the *SRS* is based on incentives linked to the state of the housing market in the city, it is not able to achieve substantial slum rehabilitation and resolve the housing problems of low–income families simultaneously. On the one hand, if the housing market prices in the city are high, slum rehabilitation is very profitable but the new population would probably find it difficult to find affordable formal housing accommodation. On the other hand, when housing market prices are low, private developers will be less interested in slum rehabilitation but the new population will be more able to integrate the formal–housing sector.

A brief analysis of other ADR programs in the world showed that in all of the case studies, specific ADR reception and generation areas were designated based on urban sustainable–development criteria. This designation allows local and regional authorities to increase density in neighborhoods having enough infrastructures to absorb a larger population. The ADR program of the *SRS* policy in Mumbai does not specify in which wards ADR can be generated and in which areas they can be consumed, but only states the rule that the consumption site of Transfer Development Rights (TDRs) has to be outside *Island City* and to the north of the generating project. The failure to designate neighborhoods receptors of ADR in the city of Mumbai leaves development in the hands of the private sector, whose sole objective is to maximize its profits in the selection of areas for densification, regardless of the capacities of the existing urban infrastructure.

A close examination of the number of projects developed in each ward and the number of TDRs generated and consumed in each ward evidenced a pattern in slum rehabilitation leading to a concentration of the density increase in the wealthiest neighborhoods outside *Island City*.

Results suggest that private developers have a preference for low–density slums in rich areas, which allow them to consume ADR *in–situ*, and high–density slums in poor areas, which allow them to generate large amount of TDRs to be consumed in rich areas.

In conclusion, the *SRS* is–without a doubt–a very innovative policy since it allows local authorities to shift the burden of rehousing slum dwellers in adequate housing to the private sector. It is a very attractive alternative for local authorities who lack the capacities to finance ambitious slum absorption policies at a city level by themselves. However, although the *SRS* has improved the quality of life of a significant proportion of the slum population, it will not, by itself, be able to make Mumbai a slum–free city. Furthermore, the economic rationale of private developers is leading to the densification of the richest neighborhoods, thus requiring additional public investment to adapt exiting infrastructure to new demands.

Chapter 8

Moving in, Selling Out: The Outcomes of Slum Rehabilitation in Mumbai[1]

Abstract

One of the possible side–effects of slum policies is policy–induced residential mobility associated with gentrification and poverty recycling. Poverty recycling is related to the incapacity of slum households to support the cost of living in formal housing, who might be forced to move back to slum settlements. This paper identifies the magnitude and causes of residential mobility using the *Slum Rehabilitation Scheme (SRS)* of the city of Mumbai as an example. It is based on the results of an exhaustive household survey, comprising 510 households. Results show that the magnitude of poverty recycling and gentrification is small, and that in most cases post–rehabilitation residential mobility is associated with incompatible housing attributes. Higher levels of residential mobility actually serve as a platform to attain better living conditions, both for those who left as well as for new comers.

Résumé

Une des possibles effets secondaires des politiques de résorption des bidonvilles est la mobilité résidentielle associée à des phénomènes de gentrification et de 'recyclage de la pauvreté'. Le recyclage de la pauvreté est lié à l'incapacité des ménages à faire face aux couts associés à la vie dans un logement légaux, et leur possible retour aux bidonvilles. Cet article évalue l'ampleur et les causes de la mobilité résidentielle dans le cas du *Schéma de Réhabilitation des Bidonvilles (SRB)* de la ville de Mumbai. Il est basé sur les résultats d'une enquête auprès de 510 ménages. Les résultats montrent que l'ampleur du recyclage de la pauvreté et de la géntrification est faible, et que la mobilité dans la plupart des cas est associée à des attributs des logements après réhabilitation qui sont incompatibles avec les besoins des ménages. Dans la plupart des cas, la mobilité résidentielle se traduit par de meilleures conditions de vie, tant pour ceux qui sont partis que pour les nouveaux venus.

1. Introduction

Seventy million inhabitants, or the equivalent of creating 7 new mega-cities from scratch, are added each year to cities worldwide. While most of this urban growth is occurring in developing countries, about half of the new population is being absorbed by the informal–housing sector. By 2040, estimates suggest that there will be two billion slum dwellers, and slums will be housing about one third of the total urban population (UN, 2007). The recognition of slums as a menace to the "planned city," along with their high correlation with poverty, have made slum improvement a priority for many local governments and international organizations. Slum and housing policies have multiplied, bringing new waves of thinking and original solutions that extend beyond the goal of just providing a house. Furthermore, recent studies have revealed that slum policies, by changing the living environment, might trigger other important positive changes as well as some unwanted side-effects. Among the stated benefits of slum policies are poverty reduction, higher gender equality, better access to credit and higher income generation (Aiga and Umenai, 2002; Cattaneo et al., 2009; Field, 2007).

This paper focuses on one of the possible side effects of slum rehabilitation policies: policy-induced residential mobility. Our interest in this subject came from a recurrent statement made by policy makers, non-governmental organizations and some researchers about how a significant proportion of slum dwellers moved out of their new homes after slum policies took place. Generally, two causes are mentioned at the core of this phenomenon. The first suggest that as many slums are located in prime areas, their inclusion in the formal real–estate market might increases the value of property and generate a gentrification process in which the poor end up being pushed out. According to Payne (2001), the provision of land titles may increase property values and displace most vulnerable groups in favor of groups with higher incomes. Gravois (2005) states how "*for a poor squatter in the middle of the capital city, the promise of a title would seem to be a road to riches…but in practice, it is more like a sign taped to his back that says, kick me*".

The second which I refer in the rest of the article as 'poverty recycling', suggests that the entry to the formal style of living might impose unaffordable costs (taxes, maintenance, and legal electricity) to some households who might be forced to sell/rent and move back to the slum. In general terms, if 'poverty recycling' occurs gentrification normally follows but the reverse is not always true. The idea of 'poverty recycling' following slum policies was first introduced by a study made by Sharma et al. (2008) which evaluated the relocation of slum dwellers under the Mumbai Urban Transport Project MUTP in Mumbai. This study, which is used as an example in the following sections, concluded that *"(vulnerable families) were not in position to pay user charges for basic services and, for such vulnerable families their resettlement was more a 'recycle of poverty'.*

Three empirical studies done in the city of Delhi, Cairo and Cape Town have provided some evidence of policy-induced residential mobility (Payne 1977, Daef 1993 and Jacobsen, 2003). Payne (1977), who evaluated the relocation of 50,000 slum families in Delhi estimated that approximately 25% of the family had sold their plots and returned to their original locations due to their inability to remain in the relocation sites. In a similar way Jacobsen (2003) pointed out how according to the Cape Town municipality around 25-30% of the houses that had been relocated from the Marconi Beam slum had sold their properties. According to Jacobsen (2003), most of the new inhabitants who bought 'relocated houses' were businessman, foreigners or people from other areas of Cape Town which might suggest a gentrification process. Daef (1993), on the other side, traced more than 21% of squatter tenants who were displaced following a titling scheme and while an additional proportion was known to be displaced they could not be traced. While these studies suggest that the magnitude of residential mobility after slum policies might be considerable, there is little evidence to support or reject either of the hypotheses since the type of destination of those who left remains unknown as well as the socio–economic characteristics of those who replaced them. Furthermore, in all of these studies the methodologies used to determine the magnitude of residential mobility following slum policies is not very accurate. For instance, both Payne (1977) and Jacobsen (2003) based their estimates on approximations made by leaders or stakeholders and no real measurement of residential mobility was done.

The purpose of this article is, on the one side, to evaluate the magnitude of residential mobility following slum rehabilitation in Mumbai and, on the other side, to test whether the poverty recycling hypothesis present in literature can be confirmed based on an analysis of the causes of post-rehabilitation residential mobility and the destination (origin) of those who left (came). Compared to the three existent empirical studies presented before, this paper proposes two innovations. On the one side, the policy evaluated is, contrary to the ones evaluated by

Payne(1977) and Jacobsen (2003) based on in-situ rehabilitation and not on slum relocation. Slum relocation has proven to have negative consequences on household's welfare, such as increase transportation costs, that could also affect residential mobility (Vaquier, 2010, Takeuchi et al 2008). On the other side, I use a robust methodological approach to identify the magnitude and causes of residential mobility post-rehabilitation. The analysis of residential mobility will be based on a household survey carried out by the author, comprising 510 household in 5 slum pockets, in the process of being rehabilitated, and 4 rehabilitated sites. The survey and sampling was constructed to obtain relevant information from rehabilitated slum dwellers – *treated* - and equivalent to-be-rehabilitated slum dwellers – *control*.

Measuring and understanding residential mobility following slum policies is important in a number of ways. First, because without it the results of policy–impact measurements are generally biased. If some people have moved out and others have replaced them, the measurement of policy effects will be biased as the study group will be composed of real beneficiaries and *newcomers*. Second, because by studying residential mobility it is possible to have insight into what is working and what is not. If slum dwellers are still unable to afford and sustain themselves in the new living conditions, informality might be linked to both to an access problem (entering formality) and a sustainability issue (staying in formality). Finally, residential–mobility analysis is essential to measure accurately the policy effect in terms of net slum–absorption and policy completion. If mobility is associated with high rates of poverty recycling and gentrification, the policy is actually just shifting the slum.

The rest of the paper is organized in the following way. Section Two presents a brief description of slum policies in Mumbai as well as the main settings of the actual policy. Section Three outlines the methodology used by the author's household survey. Section Four presents some evidences of post–rehabilitation residential mobility in the city of Mumbai. Section Five describes the model used to evaluate the moving–out decision adapted to the case of Mumbai. In Section Six, I test the poverty–recycling hypotheses and, finally, in Section Seven conclusions are outlined.

2. Slum Rehabilitation in Mumbai

Slums have been a part of the city of Mumbai for a long time. They emerged in the mid-nineteenth century and by the time of India's independence, the city had already housed 5% of the population in this type of habitat. Since then, slums have grown considerably, both in absolute and in relative terms. The total slum population passed from 2.8 million in 1976 to 6.2 million by the year 2000 (MCGM, 2005). The latest report estimated that 55% of the city

population lived in informal settlements while occupying only 16% of the city land (Hagn, 2006), a clear evidence of overcrowding and spatial inequalities of this mega polis. Living conditions in Mumbai slums are variable, but most of the settlements are relatively old and have achieved a certain degree of consolidation. In terms of surface, slum dwellings are quite small, with 42% having 10 sq.mts, 38% between 15–20 sq.mts and only 9% above 20 sq.mts (Montgomery Watson and Consultants, 2001). Most houses are constructed with *pucca*[2] materials but the provision of basic services varies considerably between zones.

The current *Slum Rehabilitation Scheme* is the product of years of "learning by doing" and a result of the evolution of slum policies in the city of Mumbai. In 1976, the first census of slums was done and in 1983 a task force was created to discuss housing and urban development issues. Despite the apparent recognition of slums, the predominant policy in the 70s was forced demolition and clearing of slum settlements, a policy that has–unfortunately–not been completely eradicated from the city. From 1985 to 1995 three different slum policies were implemented: the *Slum Upgrading Program* (1985–1991), the *Prime Minister's Grant Project* (1985–1991) and the *Slum Redevelopment Scheme* (1991–1995). However, none of them achieved significant results in terms of slum absorption (Mukhija, 2001).

As a result a new policy was introduced in 1995 called the *Slum Rehabilitation Scheme* (SRS) to substitute the Slum Redevelopment Scheme. The SRS created better mechanisms for cross-subsidizing slum projects using two types of incentives: Additional Development Rights (ADR) and Transfer Development Rights (TDR). It works in the following way. First, a builder or developer associates with a slum community and collects signatures of agreement of at least 70% of the eligible slum dwellers. Second, the project needs to follow a set of administrative procedures at the *Slum Rehabilitation Authority* (SRA), which is a centralized agency created to manage the SRS. Once the project is approved, slum dwellers are relocated in transit camps, the slum is demolished and new buildings are constructed following a standard procedure. As construction finishes, slum cooperatives are formed and tenements are allotted. Slum dwellers get free housing with basic amenities and legal titles. The builder is compensated in two ways. If there is enough space to build additional housing units within the former slum area, the constructor is granted ADR. These allow the constructor to exceed standard Floor–Space–Index (FSI) regulations, constructing additional housing units in the same site which he can sell on the free market gaining profits. For example, if the project is located in the suburbs, for every FSI used for rehabilitation one FSI in the form of ADR is granted. There is, however, a maximum

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[2] A *pucca* structure is one having walls and roofs made of *pucca* materials: cement, burned bricks, hollow cement/ash, bricks, stone, etc., which constitute the list of *pucca* materials. NSS Report 486 _Condition of Urban Slums

level of FSI that cannot be exceeded, which brings us to the second form of compensation. If there is not enough space to use all ADR in the slum area, the constructor is granted TDR, which he can sell on the market and another constructor can use to build additional space in another part of the city[3].

3. Materials and methods

The analysis of the *magnitude* of policy–induced residential mobility–in Section Four–will be based on three household surveys; the first two were carried out by the Tata Institute of Social Sciences (TISS) and the third, by the author in cooperation with the Slum Rehabilitation Society (srsindia.org). However, the analysis of the *causes* and *effects* of post–rehabilitation residential mobility–in Sections Five and Six–will be based only on the survey carried out by the author since the other two surveys did not have all of the information required.

The first of the surveys corresponds to a household survey done in 2003 by Bhide et al. of the TISS for the *Slum Rehabilitation Authority*. It covered 151 rehabilitation sites spread over 19 wards and a total of 2,138 households. A random sampling of 10% of the households in each of the sites was done. The second survey, carried out by Sharma et al. was also prepared by the TISS in 2008 but for the Mumbai Metropolitan Region Development Authority (MMRDA). It intended to analyze the impact of relocating slum dwellers under the Mumbai Urban Transportation Project–MUTP. It involved a sample of 1,505 of Project–Affected Households, which corresponds to approximately 20% of the total relocated population. The third survey, done by the author, comprised a sample of 510 households spread over nine sites and was carried out to fill–in the blanks of two previous surveys carried out by the TISS. Since in the first two studies only households who had benefited from slum rehabilitation or resettlement were sampled, it was not possible, from their results, to correctly evaluate changes produced by treatment. Therefore, in the author's study a *control* group was introduced, composed of future policy beneficiaries and additional questions on mobility determinants (*why did households leave?*) and on abandonment destination (*where did households move?*) were made.

Apart from residential mobility the author's survey took into account issues like time allocation, education, access to credit and basic services provision. Two types of settlements were sampled: the first–referred to as the *treated* group–corresponds to four slum pockets that have already benefited from the SRS policy; the second–referred to as the *control* group–corresponds to five slum pockets that are in the process of being rehabilitated. To avoid 'selection bias' I use two

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[3] TDR's can only be sold or transferred to projects located to the north of the generating project and cannot be used in Island City. For more information on SRS incentive mechanisms, please refer to Chandy, 2007

criteria to identify convincing control groups, as suggested by Field and Kremer (2006): (1) time *discontinuities* in the policy's implementation and (2) controlling for *ex–ante* characteristics of treated and control households. First, a number of slum sites that had launched the slum rehabilitation process but had not yet been rehabilitated were identified[4]. Second, a series of pre–survey questionnaires and meeting with leaders were carried out covering all of the potential control slum sites and a number of rehabilitated sites (treated). Finally, five slum sites and four rehabilitated sites that had very similar *ex–ante* characteristics were selected. This methodology is similar to the one used by Field (2007) who also used *time discontinuities* in a massive titling campaign in Peru to evaluate the policy's effect on labor supply. However, this is the first study to apply this type of methodology for the analysis of residential mobility following slum rehabilitation.

The final group of settlements selected was very similar: around 60% gained area after rehabilitation; most of the slum houses structures were made of durable materials; and a very small proportion had separate bathrooms, an indoor piped–water connection or toilets. Random sampling of around 35% of the households was done in each of the sites. In order to do so, a number of field visits were made previous to the survey to identify slum limits, and maps of both buildings and slum pockets were collected. Since the SRS policy dictates that only slum households who can prove that they live in Mumbai prior to 1st January 1995, meaning that the sites in the survey conducted by the author had to meet this criteria, the sites sampled can be found to be more consolidated that more recent slums in Mumbai. Therefore our analysis might only be representative of more or less consolidated slum settlements and the SRS policy's effect might be different if less consolidated and poorer slum settlements were to benefit.

For the purpose of this article, households that did not belong to the original group of beneficiaries will be referred to as *newcomers*. Households that benefited from the initial policy will be referred to as *original occupants*. In order to identify *newcomers* I used a different methodology than the one used by Bhide et al. (2003) and Sharma et al. (2008), who compared the list of beneficiaries of each of the sites, provided by authorities, with households found during the field work. In our case, since data at the household level of all the policy beneficiaries was not available for all of the sites, *newcomers* were differentiated from *original occupants* using a test questionnaire where households were asked a series of questions on their previous and current living conditions. When the test questionnaire result was positive, meaning that the household belonged to the *newcomers* group, the interviewer moved on to the *newcomers'* module to ask the

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[4] At the time of the survey (August, 2009), most of control group settlements had already collected 70% or more of the required signatures and passed administrative procedures at the SRA to prove the eligibility of slum dwellers.

occupants additional questions about their tenure status, their previous living conditions and their relationship to the *original occupants*. When the test questionnaire results were negative, interviewers moved to the following modules, where more questions about the initial slum settlement were asked (basic services, type of housing, etc.). At this point it was easy to identify if the test questionnaire had given a false negative, since most of the *newcomers* were unable to respond to simple questions about their previous living status in the slum, and move to the *newcomer's* module.

4. Evidences of residential mobility

Understanding and measuring residential mobility following slum policies is important since it allows answering innumerable questions. Is the policy matching household needs? Who are the real beneficiaries of the policy? And most importantly, are policy objectives being accomplished? To evaluate the *magnitude* of post–rehabilitation residential mobility, I will take into account the three surveys presented in the previous section. However, given the differences in methodology and settings of each of the surveys, I do not seek–nor is it possible–to make a direct comparison between results but an evidence of the phenomena that is taking place. Table 1 presents results for residential mobility of each of the studies analyzed as well as their sample size and the number of projects surveyed in each household survey. According to the results, around 10–15% of households who have gone through the rehabilitation process moved out.

Table 1. Residential mobility post–rehabilitation

Survey	Sample size (hhs)	Projects surveyed	% of hhs that moved out
Bhide et al. (2003)	2138	151	13.5%
Sharma et al. (2008)	1505	3	15.2%
Author (2009)	510	4 (*treated*) and 5 (*control*)	9.2%

The difference in the three surveys in the percentages of household who moved out might be explained by differences in the projects characteristics. In the MUTP project, slum dwellers were relocated at distant sites, while the two other surveys (Bhide et al., 2003 and Author, 2009) involved *in–situ* rehabilitation projects. Two studies carried out in Mumbai show that relocating slum dwellers in distant areas might have serious consequences on their incomes and increase considerably transportation costs, both of which might have effects on mobility (Vaquier, 2010; Takeuchi et al., 2008). Furthermore, general observations suggest that the samples selected for each of the studies are quite different. The sample selected by the author was taken from slums that had achieved a high degree of consolidation–most of which had *pucca* structures–while only 20% of the Bhide et al. (2003) survey had *pucca* houses. Changes in the living environment, such

as evolution in the housing market, can also be a source of divergence but it is not possible to account for this effect.

Compared to the three other studies available in literature (Payne 1977, Daef 1993 and Jacobsen, 2003) which suggest rates of moving out between 10–30%, the SRS seems to generate lower levels of post–rehabilitation residential mobility. However, as mention before, the methodology used to measure residential mobility in prior empirical studies was not very robust as it was based on approximations made by stakeholders (i.e. mayor's office), or community leaders. Furthermore, to have a clear idea of the effects on residential mobility of the SRS policy, it is necessary to take a look at residential mobility before slum rehabilitation took place. The Bhide et al. (2003) survey included a question that asked policy beneficiaries how many times they had moved before rehabilitation. Results shown in Figure 1 indicate that for 78% of the policy beneficiaries, slum rehabilitation represented their first shift in dwelling. On average, households sampled by the Bhide et al. (2003) survey had lived in Mumbai for 25 years before rehabilitation took place and for 3.3 years in new rehabilitated apartments. A rough estimate, based on these values, gives a 0.88% rate of households moving out of their houses every year before rehabilitation takes place, which is equivalent to a moving–out rate of 2.9% in 3.3 years. The latter suggests that residential mobility before rehabilitation was very low and that the SRS policy might be generating higher levels of residential mobility.

The very low levels of residential mobility found in Mumbai slums confirms a similar pattern found in other Indian cities and developing countries' cities. A study of residential mobility in Bhopal slums made by Lall et al. (2006) suggested that slums are by no means temporal homes as the average length of stay in the sample studied was around 21 years and some household had been living in the same slum dwelling for more than two generations. Another study made by Gilbert (1999), evidence the extremely limited residential mobility of owners in consolidated low-income settlement in the city of Bogota(Colombia). In the following sections I analyze what the causes of post–rehabilitation residential mobility and the consequences on slum–reduction objectives are.

Figure 1. Residential mobility before rehabilitation
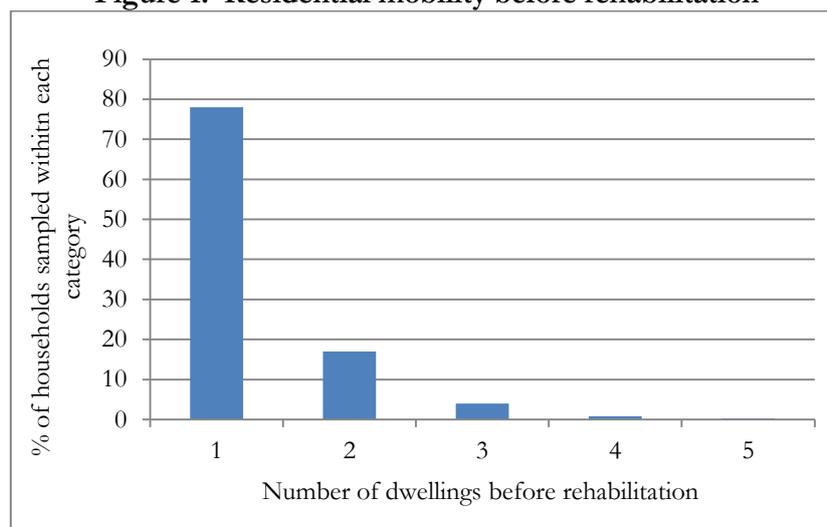
Source: Bhide et al. (2003)

5. Modeling and assessing the causes of moving out

Today, the analysis of residential mobility is mostly done based on Rossi (1955) theoretical developments of why families move. Rossi suggested that a household decision to move to another dwelling was based on housing dissatisfaction, housing characteristics, and/or exogenous circumstances. Speare et al (1975) elaborated a more profound theoretical development by describing the moving decision as a process in which (1) households start to consider moving then (2) they look and select possible alternative locations and finally (3) decide whether to move or stay. In this manner, residential mobility cannot be described by a general trend of low–income migrants who are identical in preferences and constraints but as an individual response of households to changes in their preferences (utility) and/or income (or budget constraint). A household's mobility might be associated with changes in family size or structure, the evolution of neighborhood's characteristics or new financial circumstances. Mobility might be avoided–in some cases–by adapting housing attributes to preferences, as done in many Latin America cities in which low–income households build additional floors. However, attribute adaptation is–in most cases–restrained by space, housing structure or local municipalities. For instance, improving household connection to water services needs higher levels of community cooperation or political initiatives and is rarely the product of an individual household decision.

More recent literature explains how a household decision to move is a product of (1) changes in their individual preferences, (2) changes in the household's constraints or (3) evolutions in the living environment (Dieleman, 2001; Edwards, 1983; Michielin and Mulder, 2008). Therefore, to determine the causes of residential mobility following SRS in Mumbai, it is necessary to examine each of these elements. If the hypothesis of a constant household utility is held, or that

154

household preferences present little or no change when passing from the slum household to rehab tenements, the analysis of residential mobility can be based on changes in housing attributes and evolutions of the household's budget constraint. A broader approach, considering changes in the living environment such as evolutions in the housing and job market, is–unfortunately–beyond our capacity. It is possible to argue that changes in the living environment affect all households equally, but this affirmation is not exact since households living in the same area might be affected differently by the global crisis or the relocation of industrial companies to the periphery of the city. This lack of information will remain one of the downfalls of the analysis.

Let's suppose a very simple equation in which a household's utility is a function of a composite of a non–housing good (***Nh***) and a housing good (***H***). If market equilibrium before rehabilitation is assumed, slums dwellers had chosen their previous housing maximizing their utility under their budget constraint.

$V_t = f(Nh_t, H_t)$ [1], where ***V_t*** is a household's utility in time *t*, ***Nh_t*** corresponds to the non–housing good and ***H_t*** to a housing good at time *t*.

A housing good is composed of a series of specific attributes: (***B_t***) building structure, (***Bs_t***) provision of basic services and (***S_t***) surface. A household's budget constraint is the following, assuming a unitary price for a non–housing good:

$W_t = Nh_t + p_{Bt}B_t + p_{Bst}Bs_t + p_{St}S_t$ [2], where ***W_t*** is a household's revenue and ***p_{Bt}, p_{Bst}, p_{St}*** are attribute prices.

If one holds a non–housing good constant, the utility in [1] is considered to grow with an improvement in housing attributes (***$\partial V/\partial H > 0$***) and *in–situ* slum rehabilitation is supposed to increase a household's welfare. However, changes in consumption of housing attributes generated by the policy also affect the budget constraint equation [2]. For instance, accessing legal basic service automatically generates changes in the right side of the budget–constraint equation since unitary prices are adjusted to existing tariffs. At the same time, the slum rehabilitation might also generate changes on the left side of equation [2] by indirectly increasing or decreasing a household's revenue (***W_t***). For example, the reallocation of time previously used to collect water or to protect the house to income–generating activities has been evidenced in studies carried out by Field (2007) in Peru and Aiga and Umenai (2002) in Manila.

The analysis of the possible causes of residential mobility following the SRS policy in Mumbai changes will be carried out in three steps. First, I examine what the most significant changes in

housing attributes (**B$_t$, Bs$_t$, S$_t$)** are, as experienced by the *treated* group. Then I make a brief analysis of the evolution of a household's consumer expenditure and their relation to new housing attributes. Finally, I present results from housing valuation before and after rehabilitation.

Changes in housing attributes

The *Slum Rehabilitation Scheme* produces radical changes in some of the *housing attributes*. As Table 2 presents changes in housing attributes of the *treated* group before and after rehabilitation. As indicated, SRS beneficiaries are provided with *pucca*–structured houses (**B$_t$)**, legal titles and individual access to basic services (**Bs$_t$)**. Around 80–90% of the households covered in our sample had *pucca*–structured houses but only a small percentage had individual water connection, toilets and bathrooms. Overall changes in housing surface and basic services provision seem to be more relevant than changes in tenure status.

Table 2. Changes in housing attributes for *treated* group following SRS

	Attribute	Before	After
B *(Building structure)*	*Construction materials*	80–90% *pucca*	*Pucca* house
	Structure	14.9% had mezzanine or G+1	No vertical divisions provided
	Settlement structure	Village–type	3–5 multi–story buildings
S *(surface)*	*Surface*	40% with areas > 21 sq.mts	21 sq.mts
Bs *(Basic services)*	*Access to sanitation*	94.7% did not have a bathroom inside and 99.6% did not have individual toilets	Provision of separate toilet and separate bathroom
	Access to water	Only 31.6% had an individual water connection	Legal and independent connection to water
	Electricity connection	97.6% had electricity connections	Legal and individual meters for electricity connection
Tenure	*Tenure*	96.9% said to be structure owners and only 2.6% said to be on rental basis	Ownership papers, transactions are forbidden for 10 years

Source: Author's survey (2009)

Changes in constraints

A comparison between *control* and *treated budget–constraint* equation evidences considerable changes in both of the equation sides. A simple comparison between *control* and *treated* average revenue from the survey points in the direction of increased income through reallocation of time when *control* and *treated* groups are compared, suggesting that slum rehabilitation might be welfare improving (Table 5). However, no statistical analysis has been carried out so far to prove the significance of policy effect on income.

The difference in mean expenditure by item to total expenditure between *control* and *treated* group is presented in Table 3. Results suggest that expenditures in house maintenance, electricity and society charges of the *treated* group are higher than those of the control group. Society charges correspond to expenses paid to the cooperative society in charge of the rehabilitation apartments and which are normally used for maintenance of common spaces (corridors, lifts, etc). All of these items correspond to changes in attributes due to the SRS policy and are directly associated with formal housing. It is interesting to notice that expenses in water services are slightly lower in the *treated* group than in the *control* group; however, no information on quantity of water consumed was collected during the survey, so no further conclusions can be made. According to observations made during field surveys, slum pockets were already served by Municipal Corporation, which might explain the few changes in water expenditure.

Table 3. Differences in mean expenditure between *control* and *treated* households

Variable	Mean expenditure to total expenditure		Mean difference
	Control	*Treated*	
Food	0,580	0,544	0,037***
	(0.011)	(0.008)	(0.014)
Education	0,104	0,082	0,022**
	(0.008)	(0.006)	(0.010)
Transport	0,065	0,050	0,014***
	(0.004)	(0.002)	(0.005)
Health	0,075	0,036	0,039***
	(0.005)	(0.003)	(0.006)
Water	0,035	0,020	0,015***
	(0.003)	(0.002)	(0.003)
Waste Collection	0,000	0,001	0,000
	(0.000)	(0.000)	(0.001)
Electricity	0,040	0,094	-0,055***
	(0.005)	(0.003)	(0.006)
House maintenance	0,000	0,049	-0,047***
	(0.001)	(0.003)	(0.003)
Clothing	0,070	0,061	0,009
	(0.006)	(0.006)	(0.001)
Remittance	0,000	0,000	0,002
	(0.002)	(0.000)	(0.006)
Savings	0,010	0,018	-0,008**
	(0.002)	(0.003)	(0.003)
Loans	0,008	0,012	-0,004
	(0.003)	(0.004)	(0.009)
Entertainment	0,007	0,011	-0,004
	(0.002)	(0.001)	(0.005)
Society charges	0,000	0,021	-0,021***
	(0.000)	(0.003)	(0.002)

*** Significantly different at the 1% level; ** Significantly different at the 5% level; Standard errors in parenthesis

In the case of electricity, the author's estimations suggest that *control* households have a higher per–capita consumption (57.0 kWh/month/person) than *treated* households (48.1 kWh/month/person) and pay less per kWh. The difference in the mean expenditure in electricity between the two groups was significant at the 0.01 level, which suggests that this is a consequence of the formalization of the electricity supply. Overall, results suggest that sharp increases in electricity, household maintenance and society charges are being partly compensated

by lower percentage expenditure in health, education, food and transport. While transport and education expenditures may reveal specific characteristics of a household's employment and a slum pocket's location, the health expenditure might actually reveal a positive, indirect outcome of rehabilitation. A comparison between *control* and *treated* households from our survey shows that–on average–*treated* households' income earners and students lose less days of work or school due to illness.

Households were also asked if they had problems facing end of months and shortfall frequency. According to results, around 26% of *treated* households and 39% of *control* household face shortfalls regularly. The capacity of households to save money was measured in the same manner. A higher proportion of households' saving was found in the *treated* group and the frequency of saving was also found to be higher. In general terms, the slum dwellers' rehabilitation generates both changes in a household's expenditure due to associated costs such as having legal electricity, but it also seems to have indirect effects on the households' income. It is the magnitude of each of the effects that will define if households can maintain previous expenditures in new living conditions or if they are forced due to unsustainable and unaffordable new expenditures.

Opportunity cost

Literature refers to slum policies' generated mobility, mostly as a consequence of the opportunity cost. When a slum dweller receives a formal ownership right, property value, as well as the cost of the opportunity, increases. In each of the sites, households were asked to estimate the rental and total value of their houses. *Control* groups that still live in slums were asked about actual (slum) and future (rehabilitation) values, while *treated* groups were asked about their previous (slum) and actual (rehabilitation) values. Since property value is not only a function of housing attributes but also of location, the groups were not merged and results are shown by site. As shown in Table 4, in all of the sites households estimate that the value of their houses doubles following rehabilitation. In absolute values, households that are still living in the slums tend to overestimate the value of rehabilitation tenements, but–in general terms–the slum rehabilitation policy in Mumbai signifies a considerable transfer of physical capital to slum dwellers. Given the way in which the SRS policy has been designed, slum dwellers are gaining all of the added value at no cost.

But how is residential mobility related to changes in housing attributes, changes in the budget constraint and in the opportunity cost? So far, our analysis suggests that the SRS policy implies a significant improvement in most of the housing attributes, which reflects on the housing price

but also generates higher costs of living associated to formal housing. The magnitude of each of these effects will be crucial to explain residential mobility and its causes. This will be discussed in the next section.

Table 4. Housing valuation

Group	Slum/rehab site name	Sell (Rs.)		Rent (Rs./Month)	
		Slum	Rehabilitation	Slum	Rehabilitation
Treated	*Sai Wadi*	625,000	1'532,268	2,185	7,769
Treated	*Sundar Nagar*	635,000	930,000	1,279	3,313
Treated	*Ganesh Nagar*	581,539	1'509,700	1,327	4,250
Treated	*Ashram Chawl*	570,833	1'253,036	2,325	4,622
Control	*Korba Mithagar*	903,380	1'773,295	2,219	5,964
Control	*Sundar Nagar II*	788,842	1'766,667	3,698	5,079
Control	*Betwala Chawl*	603,000	1'800,000	3,100	17,250
Control	*Godiwala Compound*	663,333	1'600,000	4,143	7,000
Control	*Waterfield Road*	1'474,429	3'000,000	6,000	7,750

Source: Author's survey (2009)

6. Understanding the reasons for moving out

Previous discussions suggest that, while changes in housing attributes are mostly for the better, these usually come at a higher cost. It seems logical that most slum dwellers chose to live in slums either because they had an access problem–formal housing was unaffordable–or because they had a durability issue–they were unable to support the cost of living in it. Under this approach, slum households that have sufficient incomes to support the new cost of living in the *treated* slum will probably be able to stay. On the contrary, slum households having both an access and a durability problem will be able to stay only if the increase in income compensates the increased costs. When this is not the case, households will quickly find themselves in a trap and will probably return to the slums.

During the author's survey *newcomers* were asked their reasons for moving out of *original occupants*. Fifty–five percent (55%) of them answered that the main reason they moved out of *original occupants* was the incompatibility of space provided, 32% associated residential mobility to a higher cost of living in the new apartments and 14% provided no answer. Our results corroborate those found in the TISS survey by Bhide et al. (2003) who asked all of the surveyed households what they thought were the main reasons for people moving out of rehabilitation apartments. Although many were not able to respond, 27.5% of the respondents thought that moving out was primarily due to the weak economic status of slum dwellers and the increased maintenance charges. Insufficient living area was also reported as a possible reason for mobility. While the first reason (unaffordable costs) reveals an alarming truth of how "normal standards"

of living are simply not affordable for the poor, the second reason (incompatible living space) evidences a failure in the policy to meet household needs.

The standardization of the SRS policy–providing equal surfaces and housing structures regardless of original conditions–might be its Achilles heel. While local authorities argue that giving areas of 21 sq.mts implies an improvement for most of the slum dwellers, four walls do not make a home. The rigidity of new houses poses a serious problem since modification of housing attributes is restrained. Differences in type of investments in housing made between *control* and *treated* groups evidence these limitations: 22,2% of the *control* groups' investments in housing are used for structural changes (adding divisions, mezzanine or doors) while only 10.9% in the case of the *treated* group. Results also suggest that a good part of a household's investments in housing after rehabilitation are directed towards the acquisition of durable goods (electrical appliances and furniture).

These results show how slum dwellings, despite their constant stigmatization, seem to provide more adaptable environments to household needs. Joshi (2006) states how *"The priorities of the slum dweller are frequently not those of the authorities or the developers. Space takes precedence over permanence, function over aesthetic. A porch may be built before a bathroom"*.

Poverty Recycling

Previous findings suggest that post–rehabilitation mobility might be associated with poverty recycling. The poorest of former slum dwellers moving to rehabilitation apartments find they are unable to support the higher cost of living and are forced to move back to the slums. But what is the magnitude of this recycling and is it seriously damaging the overall efficiency of the policy? In order to answer both of these questions, it is necessary to know both the *original occupants'* destinations and the *newcomers'* origins. Net slum absorption is given by the total number of rehabilitated households minus poverty–recycled households plus *newcomers* coming from slums, or:

$$Net\ Slum\ Absorption = Rehab.\ Households - Rehab.\ Households\ that\ went\ back\ to\ slums$$
$$+\ Newcomers\ that\ previously\ lived\ in\ slums$$

In the author's survey *newcomers* were asked about their previous place of living and about the *original occupants'* destination. Results are shown in Figure 2. While 44% of *newcomers* said they had previously lived in slums, most of the *original occupants* (82%) moved out to formal housing. Out of all the households leaving, only 18% went back to live in slums. Curiously, it seems that mobility post–rehabilitation is actually increasing the net absorption rates by allowing additional

slum dwellers to enter formality. *Newcomers* were also asked the time they spent in their previous residence and results indicate that around 72.7% had spent only five years or less in their previous houses. This means that most of the *newcomers* who were previously living in the slums are not eligible as beneficiaries of any rehabilitation policy, given policy deadline (1st January 1995).

Figure 2. ***Original occupants'*** **destinations and** ***newcomers'*** **origins**
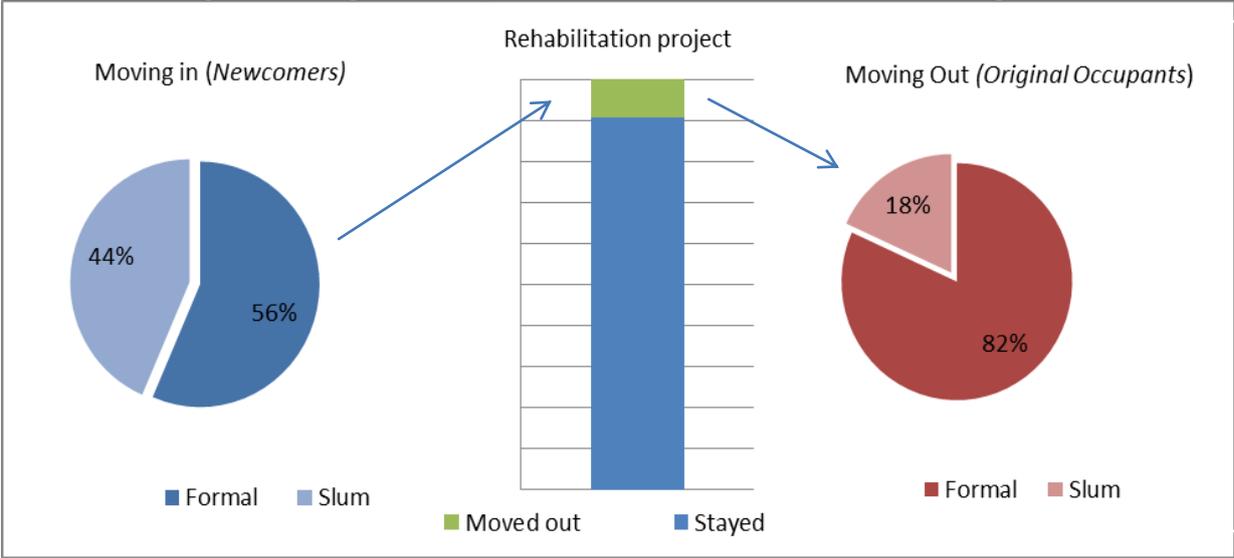
During the survey, households were asked on what basis they were staying in rehabilitation apartments. I found that the actual status of tenure differs according to *newcomers'* origins. Of the *newcomers* who were previously living in slums, 72.7% are tenants and 90.9% of those previously living in formal housing are now owners. In the case of *original occupants,* 36.4% of those renting their apartments moved back to slums and 45.5% to formal housing, while 100% of those selling their houses moved to formal housing (either in the city or outside of it). Furthermore, data on income distribution suggests that status of tenure is associated with the level of income of the household, as *newcomers* on rental status are–on average–poorer than *newcomers* who bought rehabilitation tenements. Table 5 shows a comparison of general indicators of *control*, *original occupants* (*treated*) and *newcomers* groups. Results show how *newcomers* are very similar to *original occupants,* but seem to belong to a slightly richer income group.

A comparison between *control* and *treated* groups, from Table 5, evidences a decrease in the household size and a positive displacement of the post - rehabilitation income distribution. While the proportion of children less than five years old suggests a decrease in post–rehabilitation fertility; smaller household size can also be associated with individual "invisible mobility". To cover for this, all *treated* households were asked if they had lost members after rehabilitation. Results indicate that only 3.5% of *treated* households had lost members following rehabilitation

and most of them left the household due to marriage. The latter contradicts the hypothesis of "invisible mobility" and suggests that most of the reduction in household size is explained by diminished fertility.

Table 5. *Original occupants & Newcomers*

	Control	Treated (Original occupants)	Newcomers
Mean household size	5.23	4.89	4.30
Mean of children < 19 years	1.33	1.07	1.36
Mean of children < 5 years	0.33	0.22	0.17
Mean number of income earners	1.63	1.58	1.87
Proportion permanently employed	28.7	33.1	39.4
Monthly income (Rs.) - % households in range			
0–2,500	5.4	1.7	0.0
2,501–5,000	26.0	10.9	9.1
5,001–7,500	20.7	21.8	9.1
7,501–10,000	26.0	28.2	18.2
10,001–12,500	11.6	23.6	45.5
More than 12,500	10.9	14.1	18.2

Source: Author's survey (2009)

7. Conclusions

It is a common belief that slum policies can create unsustainable living conditions due to the high cost of living in formal housing and might induce higher levels of residential mobility associated to poverty recycling and gentrification. Poverty recycling occurs when rehabilitated slum dwellers are unable to sustain the costs of new living conditions and are forced to move back to slums. Gentrification usually follows 'poverty recycling' as the poor move out and are replaced by richer households – who can afford to stay – and the average income of the community augments.

This paper has presented new evidence on how slum policies impact slum dwellers' livelihoods using residential mobility as an indicator. There are three major findings. First, the data from the household survey carried out by the author–as well as from two other surveys available–confirmed the hypothesis of policy–induced residential mobility. Around 10% of the households that benefited from the *Slum Rehabilitation Scheme* leave after policy implementation, which is considerable when compared to the insignificant rates of residential mobility beforehand.

Second, the post–rehabilitation mobility analysis revealed how the benefits of rehabilitation can be outstripped by additional costs associated to the new living status. In the case of *in–situ* rehabilitation, mobility was found to be associated to two factors: a mismatch between household needs and new housing attributes, and an incompatibility between the high cost of living and a

household's economic status. However, contrary to the hypotheses found in the literature, our results indicate that the first factor is dominant with 82% of the *original occupants* moving to formal housing and not returning to slums.

Third, post–rehabilitation residential mobility was found to lead to higher slum net–absorption rates since most of those who left moved to formal housing and 44% of those who replaced them came from the slums. While this is certainly positive, the generalization of this result is not automatic. Slum resettlement policies, in which slums are relocated to distant areas, might have higher proportions of residential mobility associated to poverty recycling due to greater impacts on the right side of the budget–constraint equation (i.e. transport) and negative impacts on the left side of the equation (i.e. loss of employment). Furthermore, slums surveyed by the authors had achieved a certain degree of consolidation, and slum rehabilitation in less–consolidated slums might lead to higher rates of poverty recycling.

Finally, throughout this, paper I have suggested how the analysis of residential mobility and abandonment destinations can be used not only as an indicator of policy impacts but also as an indicator of the mechanisms of slum formation in a given city. In the rehabilitation projects studied, slum choice was found to be linked mainly to formal entry barriers (accessing formal housing) and not to a durability problem (cost of living in formal housing).

Chapter 9

The effects of the Slum Rehabilitation Scheme in Mumbai: on household access to credit and investment in housing

Abstract

Slum policies that involve giving titles to slum dwellers have been recognized as one of the most welfare–improving policies, due to the expected indirect benefits they might induce in terms of housing improvements and access to credit. Economic theory suggests that legal titles allow households to have a higher access to credit–since they can now use housing as collateral–and lead to an increase in housing investments–both due to a higher access to credit as well as to a diminution of the risk of eviction. In this article I examine the effect of the *Slum Rehabilitation Scheme* (SRS) in the city of Mumbai, regarding access to credit and housing investments. My analysis is based on a household survey comprising 510 households spread over four rehabilitated sites (the *treated* group) and five to–be–rehabilitated slum pockets (the *control* group). Results suggest that households that have already benefited from the SRS policy have a higher access to formal credit institutions and are less credit constrained than those who have not yet benefited from the policy. A comparison of investments made by *treated* and the *control* groups evidence considerable differences between the types of investments made. Only 11% of the *treated*–group housing investments referred to structural renovations, compared to 22% in the *control* group.

Résumé

Les politiques donnant des titres de propriété aux habitants des bidonvilles ont été signalées comme un des meilleures politiques à l'égard de l'habitat illégal grâce aux bénéfices indirectes qu'elles induisent en termes d'amélioration des logements et d'accès au crédit. La théorie économique suggère que l'application de ce type des politiques permette aux ménages d'avoir un plus grande accès au crédit en utilisant leurs titres comme collatéral, et une croissance des investissements sur les logements due à l'amélioration de l'accès au crédit et la diminution de risque d'éviction. Cet article examine les effets du *Schéma de Réhabilitation des Bidonvilles (SRB)* de la ville de Mumbai sur l'accès au crédit et les investissements sur le logement. Il est basé sur les résultats d'une enquête auprès de 510 ménages dans 9 bidonvilles cibles de la politique *SRB*, celle-ci ayant été mise en place dans quatre d'entre eux. Les résultats suggèrent que les ménages ayant déjà bénéficiée de la politique *SRB* ont un plus grand accès au crédit que celles qui n'ont pas encore bénéficiée. Une comparaison des investissements sur es logements entre le groupe *traité* et le groupe de *contrôle* révèle des différences considérables entre les types d'investissements faits. Seulement 11. Des investissements du groupe *traité* ont été utilisés pour faire des rénovations structurelles, comparé au 22% dans le groupe de *contrôle*.

1. Literature review

The theory on the relationship between insecure tenure and housing investments was first developed and disclosed by Hernando de Soto (1990, 2000). De Soto argued that giving titles to households with insecure tenure should improve their access to credit and lead to an increase in housing investments. On the one hand, the expected higher access to credit was explained by the possibility of using housing as collateral when having legal titles. Fleisig et al. (2006) state that *"In low and middle–income countries between 70 percent and 80 percent of firms applying for a loan are required to pledge some form of collateral"*. On the other hand, the expected increase of housing investments was explained as both the result of higher access to credit as well as the result of the reduction of the risk of eviction.

The accuracy of De Soto's theory has been questioned by both new theory developments and recent empirical studies. Some of the arguments against De Soto's theory linking **titling and access to credit** are the following. First, since in many developing countries financial markets are not well developed and housing cannot be used as collateral, titles do not play a major role in household access to credit (Buckley and Karackal, 2006; Payne et al., 2007). Field and Torero (2006), who studied Peru's massive titling campaign, found no evidence of titles increasing the probability of receiving credit from private–sector banks, which did not use titles to secure loans. Second, even in the case of well–developed financial markets–in which housing can be used as collateral–most formal financial institutions also request households to have a stable and sufficient income to assure credits. Galiani and Schargrodky (2010), who conducted a household survey in titled and no–titled slums in Buenos Aires, provide empirical evidence to support the latter argument. They found that since most Argentine banks tend to lend only to workers with

high wages and a stable employment situation, and most of the slum dwellers (titled or not) worked in the informal sector, having titles did not lead to lower credit constraints.

The relationship between **_titling_ and _housing investments_** developed by De Soto (1990, 2000) has, however, been less criticized by literature and verified empirically by a number of authors. Field (2005) finds that strengthening property rights in Peru had a significant effect on housing investments with the rate of housing renovations rising by more than two thirds of the baseline level. Galiani and Schargrodky (2010) also find that families substantially increased housing investment after being entitled. In fact, the main argument against De Soto's theory linking titling and housing investment is that not only can legal titles induce higher housing investments through a reduction of the risk of eviction, but that intermediate options–such as a temporary lease–could also lead households to improve their housing conditions (Payne, 2001; Gilbert, 2002; Van Gelder, 2007).

The main idea of this article is to evaluate whether the _Slum Rehabilitation Scheme_ (SRS) had any effects on household access to credit and housing investment. To answer both of these questions, I use the results of a household survey carried out by the author in cooperation with the _Slum Rehabilitation Society_ and _Mars Ltda_. The household–survey methodology, as well as the setting of the SRS policy, will not be mentioned in this section since both of them have already been discussed in previous articles of this thesis (see Section 3 of **Chapter 8** for more information). It is important to highlight that, although the two groups considered in the policy analysis (_treated_ = beneficiaries of SRS, _control_ = future beneficiaries) differ in their tenure security–as the first group has legal titles and the second does not–the policy has not only granted titles to slum dwellers, but it is composed of a "package of policies." This "package of policies" differs from the one–dimensional binary policy analysis of titling policies done by Field (2005), Field and Torero (2006) and Galiani and Schargrodky (2010), since other components included in the policy package might also have an influence on housing investments and households access to credit. For instance, it is possible that the SRS has improved the health of a household due to the improvement of their access to basic services, which could–in turn–reduce the need to request health–related loans. Furthermore, since the SRS policy implies an improvement of housing conditions, we should not expect investments in housing to be comparable to those incurred in the _control_ group.

This article is organized as follows: In Section 2 I discuss some methodological concerns related to the implementation of the _Consumption Module,_ which included questions on the access to credit and investments. In Section 3 I present the results of the household surveys on access to credit, analyzing differences to both credit constraints and access to formal–informal credits

among *treated* and *control* groups. In Section 4 I briefly discuss results on housing investments. Finally, in Section 5, conclusions are outlined.

2. Methodology

The *Slum Rehabilitation Scheme* (SRS) provides slum households 21–sq. mt. apartments with individual connection to basic services and legal titles. In this article I compare access to credit and housing investments of two groups of households under the hypothesis that their evolution would have been the same if the SRS policy had not taken place. In total 510 households were surveyed in nine sites. The first–referred to as the *treated* group–corresponds to four slum pockets that have already benefited from the SRS policy; the second–referred to as the *control* group–corresponds to five slum pockets that are in the process of being rehabilitated.

Before the final household survey was carried out, I conducted a number of test questionnaires in a slum and rehabilitated site with the *Mars Ltda.* interviewer team[1]. At this point the questionnaire was organized in a way in which we first asked households questions about their *access to credit* and afterwards we asked questions about *housing investments*. Curiously, a number of households indicated they had asked for no credit in the first part of the survey and then expressed that they had paid for housing investments with loans, once we asked them how they had financed housing investments. For the final household questionnaire, aiming at reducing misinformation, questions on credit and housing investments were inverted, with the questions on investment asked first, and then, those on credit.

3. Access to credit

Credit constraints

Results from the household survey show that a very small proportion of households had taken loans in the period of analysis: only 4.4% of the *treated* households had taken any loans since they moved to the new apartments and only 9.23% of the *control* households had taken any loans in the previous five years. However, this small proportion of households that had credit does not necessarily mean that our study groups are credit constrained since it is possible that those who did not take out loans did not need them. For this reasons, all households that reported no loans were asked to give the reason for this. Results, presented in Table 1, show how 7.20% of the *control* households had not taken out loans because they were not able to get them, compared to 3.23% in the *treated* group. Furthermore, 100% of the credit–constrained

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[1] The slum and rehabilitated site used for test questionnaires were different from the sites used for the final household survey.

households from the *treated* group and 94.14% of those from the *control* groups stated as the main reason for not getting credit that they did not have enough income. The former suggests that, although the *treated* group is less credit constrained than the *control* group, there are still a number of households that are unable to access credit since they do not have enough income, confirming the hypothesis set in the literature review section. The relevance of providing income information in the Indian lending market is described by Lall et al. (2006) in their study of housing savings and mobility in Bhopal. According to them *"One important reason for the failure of financial institutions in down marketing their services to the poor is their difficulty to obtain verifiable information on the size and stability of the borrower's income."*[2]

Table 1. Reasons for not taking loans in the period of analysis

	Treated (%)	Control (%)
Why have you not taken any loans?		
Do not need loan	96.77	92.80
Could not get loan	3.23	7.20
Could you tell me the reason why you could not get a loan?		
Did not have enough income	100.00	94.12
Did not have ownership papers		5.88

In order to have more qualitative information on household perception of their access to credit, households were asked if they thought it was easy or difficult to get a loan. Results are presented in Table 2. While 60% of *control* households found that it was difficult for them to get a loan, 50% of *treated* households said it was easier to get a loan after rehabilitation compared to when they lived in the slum. Nevertheless, 37.50% of the *treated* households find that it is more difficult to get a loan after rehabilitation, suggesting that the SRS policies to improve access to credit might differ among *treated* households. When comparing total income of *treated* households among the previous categories, I found that households who find it more difficult to take out a loan after rehabilitation are on average poorer than those who think it is either easier or just as difficult.

Table 2. Reasons for not taking loans in the period of analysis

	Treated (%)	Control (%)
Compared to before, is it easier or more difficult to get a loan?		
Easier	50.00	
The same	12.50	
More difficult	37.50	
Overall do you find it easy or difficult to get a loan?		
Very Easy		10.00
Easy		30.00
Difficult		60.00
Very difficult		--

Another way of measuring credit constraints is by evaluating the differences between the amount requested for a loan and the amount granted by lenders. Comparing the *treated* to the

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[2] pp. 1032

control group, I found that–on average–the amount granted was 86.75% of the amount requested for the *treated* group and 94.75% for the *control* group; however, this difference was not significant.

Formal and informal credit markets

If De Soto's theory of improved access to credit is correct, having proof of ownership does not only allow households to have easier access to formal credit, but it also allows them to benefit from lower interest rates. In the household survey all households that said they had taken out loans were asked the reason of their loans, the source of their loans and which documents or information were required to get the loan. Results, presented in Table 3 indicate a clear difference between loan sources for *treated* and *control* groups. The households in the *treated* group have taken out loans from official and formal financial institutions, while the households in the *control* group have taken out loans in a larger proportion from informal credit sources such as money lenders, friends and *Mahila Mandals*[3].

Table 3. Reasons for not taking loans in the period of analysis

	Treated (%)	*Control (%)*
Reason for loan		
Housing improvements	40.00	31.25
Marriage	60.00	62.50
Medical expenses		6.25
Education expenses		18.75
Other	10.00	12.50
Source of loan		
Public sector banks	40.00	
Private Banks	20.00	23.53
Cooperative Banks	40.00	
Relative/friend		35.29
Mahila Mandals[3]		5.88
Moneylenders		5.88
Other		29.41

In Table 4 I present the results for information required by the source of the loan. Results indicate the relevance of legal titles for obtaining a credit in the formal sector as 100% of those who got credit from public and private sector banks, and who were asked to provide a valid proof of ownership of their houses. Curiously, all households that had taken out loans from money lenders were asked to provide a proof of ownership, but none of them were asked to provide a proof of salary. In the case of loans made by *Mahila Mandals* and relatives or friends, most of the credit was provided without any information of salary and/or ownership. These results confirm previous analyses made in the credit–constraint section and indicate that both proof of ownership (title) and proof of salary play an important role in accessing formal credit

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[3] *Mahila Mandals* are women's groups that work for the promotion of nutrition education, family welfare, food storage, immunization of children, small saving accounts of women, etc. On some occasion, they collect savings from a group of women and lend it to families when they are in need.

institutions and improving poor households' access to credit. While households were also asked to provide information on the interest rate of each loan they had taken out, almost half of the households that had taken out loans were unable or unwilling to respond. Those who eventually responded had some difficulties identifying if the interest rate referred to a monthly or a yearly basis. Therefore, I have decided not to use this information.

Table 4. Information required, average monthly interest rate and average amount granted by source of loan

	Asked for proof of ownership	Asked for proof of salary
Public sector banks	100%	75%
Private Banks	100%	100%
Cooperative Banks	50%	100%
Relative/friend	17%	17%
Mahila Mandals	0%	0%
Moneylenders	100%	0%
Other	60%	80%

4. Housing investments

One of the main purposes of the housing investment module was to evaluate if there were any significant differences in the number and type of investments made in housing when comparing the *treated* and *control* group, and if these were being generated by a greater access to credit. However, while initially the same investment module was made for *treated* and *control* groups, in the final questionnaire, one question was eliminated by error from the *control* group survey. This question referred to the financing source (i.e. savings, income, loans) *control* households used to make their housing investments. Therefore, I only have results for this question related to the *treated* group. Results for this question, presented in Table 5, indicate that most of the housing investments made in the t*reated* group were financed through savings or income, and that only a small proportion was financed through credit.

When comparing housing investments made by *treated* and *control* groups, I find that a larger proportion of households from the *control* group have made investments in housing compared to the *treated* group. In terms of the types of housing investments made, I find that the *treated* group has a much lower percentage of investments made in structural items, such as adding divisions, improving floors and adding mezzanines. The difference in structural investments in housing might be due to a diminution of the need to make this type of investment once living in new apartments–that have better structural conditions–as well as the result of the impossibility of making structural housing changes due to the rigidity of apartments supplied. In fact during a number of household surveys, families expressed their discontent with apartments supplied and their incompatibility with previous living conditions. The main argument brought to light was that new apartments did not allow for the installment of mezzanines which provided vertical

171

divisions that were very useful to divide sleeping space. In fact, the incompatibility of solutions in housing provided by the SRS was one of the main reasons of residential mobility following slum rehabilitation, as explained by Restrepo (2010). Of all of the households who had left after rehabilitation, 55% of them left due to the incompatibility of the space provided by the SRS with households needs.

Table 5. Housing investments

	Treated	Control
Percentage of households who invested in housing	17.18	20.76
Type of investment (% for each of total investments)		
Adding divisions	1.22	2.78
Kitchen (i.e. new appliances)	24.39	8.33
Floors	7.32	15.28
Walls (i.e. painting, wall paper)	37.80	34.72
Ceiling	1.22	5.56
Adding mezzanine	1.22	6.94
Wardrobe	1.22	1.39
Doors	8.54	12.50
New furniture	8.54	4.17
Other	8.54	8.33
Total structural investments	10.98	22.22
Total Non–structural investments	89.02	69.44
Where did you get the money to invest in housing?		
Savings	69.23	
Loans	12.82	
Income	17.95	

5. Conclusions

The *Slum Rehabilitation Scheme* in the city in Mumbai provides a "package of policies" by giving households new apartments with individual connections to public services and legal titles. In this article I have evaluated whether the policy has had any effects on household access to credit and housing investments, as suggested by De Soto (1990, 2000).

I find that only 4.4% of the *treated* households had taken out loans since they moved and only 9.23% of the *control* households had taken out any loans in the past five years. However, a closer examination indicated that the reason that 7.20% of the *control* households that had not taken out a loan was because they were unable to get one, compared to 3.23% of the *treated* households. Furthermore, an analysis of loan sources indicated that *treated* household loans all came from the formal credit sector (either public or private) while the *control* households mainly obtained their credit from the informal credit market. These results suggest that the *Slum Rehabilitation Scheme* has improved household access to formal credit institutions and reduced credit constraints. The analysis of credit constraints presented in this article evidenced the relevance of a stable and sufficient income in gaining access to credit, confirming some of the hypotheses present in literature.

In terms of housing investments, results suggest a switch of investments made by the *treated* group moving away from structural renovations such as adding divisions and increasing non–structural investments. While only 11% of the housing investments of the *treated* group referred to structural renovation, this proportion in the *control* group was 22%. However, since I am not evaluating a titling policy, many of the changes in housing investment between the two groups studied can be explained by the establishment of the policy. The *Slum Rehabilitation Scheme*, by providing better and more–rigid housing structures, reduces the need to improve housing, and therefore, housing investments as the same time as it constrains investments in housing renovations.

Chapter 10

The effects of the Slum Rehabilitation Scheme in Mumbai: on household access to improved and modern basic services

Abstract

The *Slum Rehabilitation Scheme* (SRS) in Mumbai has managed to improve the living conditions in slum households by providing a package of policies that include the provision of legal basic services, titling and improvement of housing structures. This policy uses an innovative market-driven approach in which slum rehabilitation is financed by the private sector, which, in turn, is compensated with Additional Development Rights to construct over the permitted Floor Space Index (FSI). So while the burden of providing housing solutions has been passed to the private sector, local authorities need to assure the financing and production of additional infrastructure requirements to cope with increased population densities. In this article I evaluate if expected improvements in access to modern basic services by the SRS policy are being translated into action based on a household survey carried out by the author in four rehabilitated sites and five sites to be rehabilitated. Findings suggest that while the SRS has significantly improved the access to modern basic services, the quality of services provided has sometimes worsened, especially in the case of water supply. It is possible that this is due to infrastructure bottlenecks in the water–provision system of the city of Mumbai, a system that has already problems meeting demand.

Résumé

Le *Schéma de Réhabilitation des Bidonvilles (SRB)* de la ville de Mumbai améliore les conditions de vie des habitants des bidonvilles en fournissant des services de base améliorés (eau, assainissement, électricité), en allouant des titres de propriété et en améliorant des structures des logements. Le *SRB* permet de financer la totalité de la reconstruction des bidonvilles par le secteur privé en mettant en place un système d'incitations par allocation aux promoteurs de « Droits de Développement Supplémentaires ». Ainsi, alors que le coût de fourniture des solutions de logements formels a été transféré au secteur privé, le secteur public doit assurer le financement et la production d'une infrastructure urbaine additionnelle pour faire face à l'augmentation de la densité démographique. Dans cet article j'évalue si les améliorations attendues en matière d'accès aux services de base se sont effectivement produites en utilisant une enquête auprès de 510 ménages dans 9 bidonvilles cibles de la politique, celle-ci ayant été mise en place dans quatre d'entre eux. Les résultats montrent que même si le *SRB* a réussi à améliorer de façon significative l'accès aux services de base, on observe une dégradation de la qualité de service fourni dans le cas de l'approvisionnement en eau. Il est probable que cela soit dû aux problèmes de congestion de l'infrastructure d'approvisionnement en eau potable de la ville de Mumbai, qui connaissait déjà des difficultés pour faire face à la demande.

1. Introduction

The *Slum Rehabilitation Scheme* (SRS) of the city of Mumbai is intended to improve living conditions of slum dwellers by completely renovating slums. Using a market–driven approach, slums are being redeveloped *in-situ* by builders; slum households are provided new apartments free of cost, with titles and access to basic services. Builders are compensated in two forms, both of them based on the conferment of higher Floor Space Index. The first form of compensation gives the builder Additional Development Rights (ADR) that he can develop on the same site to construct additional housing units and sell them on the real estate market; the Slum Rehabilitation Authority refers to this as the free–sale component. The second form of compensation is through Transfer Development Rights (TDR) that can either be used by the same builder–on a site to the north of the slum site–or be sold to another builder who can then increase the FSI in a given construction project. Both of these compensations generate an increase of population density that goes beyond the planned density capacity in each area (FSI norms). So while the burden of providing housing solutions to slum households has been somehow passed to the private sector, local authorities need to assure the financing and production of additional infrastructure requirements due to utilization of ADRs and TDRs that go beyond planned capacities.

Throughout this article I evaluate the evolution of the provision of basic services in a set of rehabilitated slums by comparing their conditions before and after they entered the policy and with a *control* group of to–be–rehabilitated slums. My analysis will be based on two indicators: access to modern basic services and perceived quality of basic services. I expand the definition of modern basic service, commonly used in energy poverty studies, to other basic services. For instance, having an inside piped–water connection is considered a modern basic service when

compared to having water provision via a stand post. The same is considered for having individual toilets inside the house when compared to community toilets. Four basic services are included in the analysis: energy, water provision, sanitation and waste collection. Since the improvement of access to quality basic services is one of the ways in which slum rehabilitation can enhance a household's welfare, it is of vital importance to see if the SRS policy intentions are being translated into real actions. Furthermore, an analysis of this type, given the setting of the SRS in Mumbai, could serve to identify some negative spillover effects being generated by the policy–through the allocation of ADRs or TDRs–that have not been previously studied or accounted for.

Most of the analysis is based on a household survey carried out by the author, comprising of 510 household in nine slum pockets and complemented by findings of two studies carried out by the Tata Institute of Social Sciences. A complete description of the household–survey methodology, as well as the setting of the *Slum Rehabilitation Scheme* policy, is not included in this article since both of them have already been discussed in previous articles of this thesis (see Section 3 of **Chapter 8** for more information).

The rest of the paper is organized in the following manner: Section 2 presents a brief description of the *Slum Rehabilitation Scheme*. Section 3 evaluates changes in accessing modern basic services before and after the policy. Section 4 comprehends an analysis of the evolution of the quality of basic services based on household perception and Section 5 outlines the conclusions.

2. The Slum Rehabilitation Scheme

The *Slum Rehabilitation Scheme* (SRS) was introduced in 1995 substituting the previous slum policy (Slum Redevelopment Scheme). The SRS, compared to the previous policy, created better mechanisms for cross–subsidizing slum projects using two types of incentives: Additional Development Rights (ADR) and Transfer Development Rights (TDR). It works in the following way. First, a builder or developer becomes associated with a slum community and collects signatures of agreement of at least 70% of the eligible slum dwellers. Second, the project needs to follow a set of administrative procedures at the Slum Rehabilitation Authority (SRA), which is a centralized agency created to manage the SRS. Once the project is approved, slum dwellers are relocated in transit camps, the slum is demolished and new buildings are constructed following a standard procedure. As construction finishes slum cooperatives are formed and tenements are allotted. Slum dwellers get free housing, with basic amenities and legal titles. The builder is compensated in two ways. If there is enough space to build additional housing units within the

former slum area, the constructor is granted ADRs. These allow the constructor to exceed standard Floor Space Index (FSI) regulations, constructing additional housing units on the same site which he can then sell on the free market gaining profits. For example, if the project is located in the suburbs, for every FSI used for rehabilitation, one FSI in form of an ADR is granted. There is, however, a maximum level of FSI that cannot be exceeded, which brings us to the second form of compensation. If there is not enough space to use all the ADRs in the slum area, the constructor is granted TDRs, which he can sell on the market to another constructor who can use it to build additional space in another part of the city[1].

Anticipating possible infrastructure bottlenecks created by slum rehabilitation due to increased density beyond planned capacities, the *Slum Rehabilitation Scheme* includes a clause that considers infrastructure charges–to be paid by the constructor. The Slum Rehabilitation Authority, the agency in charge of the SRS policy–dictates that builders need to pay 840 Rupees (Rs.) per square meter for the built–up area over the normally permissible FSI. This amount is intended for the improvement of infrastructure in slum–rehabilitated areas (SRA, 2007). However, the amount charged has remained unchanged since the beginning of the policy (1995) and some circulars from the SRA indicate that developers (builders) have not paid infrastructure development charges as expected: *"It has come to notice that many developers are neither paying the deferred amounts* (referring to unpaid infrastructure charges and maintenance deposits) *to SRA nor interests on them"* (Circular No. 51 of 2001–SRA (2007)). The procedure for payment of infrastructure charges (outlined in Circular No. 7–SRA (2007)) is the following: a first installment of Rs. 400 per square meter (sq. mt.) shall be paid at the time of the issuance of Commencement Certificates; a second installment of Rs. 400 per sq. mt. shall be paid at the time of the issuance of Occupation Certificates of the free–sale component. In the case when TDR is claimed, the entire amount of Rs. 840 sq. mt., proportionate to the extent of such TDR claimed, shall become payable.

According to the United Nations a slum household is a household that lacks one or more of the minimum standard characteristics (UN Habitat, 2003). Minimum standard characteristics as defined by the UN are: access to improved water, access to improved sanitation, security of tenure, durable housing and sufficient living area. Therefore, when compared to traditional slum policies, which consider the improvement of only one or two of the minimum standard characteristics, the SRS policy–if carried out correctly–solves most of the housing problems present in slums (see Table 1). The only housing deficiency that is not solved by the SRS, when compared to the UN's definition, is the provision of sufficient living area. Based on an average of

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[1] TDR's can only be sold or transferred to projects located to the north of the generating project and cannot be used in Island City.

4.5 persons per slum household, providing a 21–sq. mt. apartment without divisions does not solve the problem of overpopulation.

Table 1. Slum housing deficiencies and SRS provision

Indicator	United Nations [Slum definition]	Slum Rehabilitation Scheme [Provision]
Durability of housing	Permanent and adequate structure in non-hazardous location	*Pucca*[2] houses in 3-5 multi-story buildings
Security of Tenure	Evidence of documentation to prove secure tenure status or *de facto* or perceived protection from evictions	Legal ownership papers; transactions are provided for a period of 10 years.
Sufficient living area	Not more than two people sharing the same room	21 sq. mts. without divisions
Access to improved water	Access to sufficient amount of water for family use, at an affordable price, available to household members without being subject to extreme effort to obtain it.	Legal and individual connection to piped water
Access to improved sanitation	Access to an excretal disposal system, either in the form of a private toilet or a public toilet shared with a reasonable number of people	Individual provision of separate toilets and separate bathrooms
Access to modern energy sources	Not an indicator	Legal and individual connection to electricity

Source: UN-Habitat (2003a) and SRA (2007)

3. Improving access to modern basic services: formality moving in

Literature has shown how improving access to modern basic services and improving housing structures can generate a series of positive effects on a household's welfare. Jalan and Ravallion (2003) find that diarrhea among children under five years of age in rural areas in India is significantly lower for families with a piped–water connection. Aiga and Umenai (2002) find that improvements in water supply in slum households in Manila encourages slum residents to increase their income through a reallocation of time previously used for water collection.

Usually, gaining access to modern basic services is associated with an improvement of a household's health and/or significant gains in time that could lead to a reallocation of time to income–generating activities. For instance, having access to electricity allows households to switch from less efficient energy sources for cooking which, in turn, diminishes indoor pollution and improves a household's health. The counterpart of accessing modern basic services is that their unitary prices in the formal market can be more expensive than informal or improvised basic services, which could lead to a diminution of the quantity of service consumed or to an erosion of a household's budget[3]. However, while the market cost of informal alternatives might

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[2] A *pucca* structure is one having walls and roofs made of *pucca* materials. Cement, burnt bricks, hollow cement/ash, bricks, stone; etc constitute the list of *pucca* materials. *NSS Report 486 _Condition of Urban Slums*

[3] In some cases slum dwellers actually pay a higher unitary price for water and other basic services than those provided by the formal market. This seems to be the case for many slums in Africa as explored by the UN (2003).

be low when compared to modern basic services, the indirect costs inflicted by them (i.e. bad health) can be much higher. Furthermore, indirect costs associated to the provision of informal or improvised basic services are not equally distributed between genders, since it is normally women who spend considerable time in their day assuring water provision and enduring indoor pollution. Results from the household survey carried out by the author indicated that around 92% of water collection in the slums is the responsibility of women. To evaluate if the SRS has generated changes in household access to modern basic services, I first analyze pre–existing conditions in Mumbai slums and then evaluate if there were any improvements.

Pre-existing conditions: basic service provision in Mumbai slums

Provision of basic services in Mumbai slums varies from one slum to another and generally improves with time as slums consolidate. Notification of slums, an action decided by the Municipal Corporation that includes a given slum on the city map and legitimizes public actions inside their territory, has proven to improve the access to basic services of slums. During pre–survey meetings with community leaders and women's groups, a common evolution in basic services provision was described. Leaders explained how initially slum communities did not have access to water, sanitation or electricity. Through community organization and sometimes in association with Non–Governmental Organizations (NGOs), little by little the slum communities gained access to MCGM[4] shared water taps, community toilets and electricity.

Access to water: Most of the slums in Mumbai have access to water through the MCGM and almost all of them have shared sources. YUVA (2005) explains that this is, in part, the result of an MCGM policy which dictates that slum household's can only apply for water connection in groups of five or more. Slum households that state they have an independent connection have obtained it through extensions made from shared connections. Estimates of the number of households per shared connection vary from one author to another. YUVA (2005) estimates that stand posts are shared by 11 families but Karn (2003) suggest that in some cases up to 30 families might be sharing a stand post. Given that most slums only have connection to water for a number of hours per day, sharing a stand post with 10–30 families sometimes leads to conflicts and long queues and significantly affects the probability of incursion in the labor market for women. In the *Korba Mithagar* slum, one of the slum pockets in which the author worked, stand posts are on average shared by 10 households. Water is supplied for two hours a day from six to seven in the morning and from four to five in the evening MTSU (2007).

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[4] The Municipal Corporation of Greater Mumbai (MCGM) is the civic body that governs the city of Mumbai and is in charge of the provision of civil infrastructure.

Access to sanitation: Along with water provision, providing adequate sanitation is probably one of the most urgent issue slum dwellers face in their daily life. An extensive survey carried out by Montgomery Watson and Consultants in 2001 concludes that an inadequate provision of toilets results in long waiting times, especially in the morning, and poor maintenance of toilet blocks seems to be a universal complaint. Even when community toilets are available–as in all of the slums included in the household survey–the number of persons per toilet seat and the lack of maintenance rapidly lead to the deterioration of the built infrastructure. A study carried out by the Slum Rehabilitation Society and the MTSU in the *Korba Mithagar* slum showed that around 94% of the population used community toilets with an average of 64 persons per seat MTSU (2007).

Access to electricity and other energy sources: Almost all slum dwellers have access to electricity and many have independent connections. However, not all of the connections are made directly to legal electricity suppliers. In some cases, electricity comes via a single communal meter; supply is shared by a number of families and the form of payment depends on agreements with informal and/or intermediary electricity suppliers. In some slums households pay by the number of installed switches they have inside their houses, while in others total electricity consumption is divided by the number of families depending on the existence or non - existence of electric appliances (Mcleod, 2000). Given the forms in which households are connected to the electric system, interruption and fluctuation problems are very common. In a study carried by the Slum Rehabilitation Society, 43% of slum dwellers said they have recurrent fluctuation problems and 21% said they have had electricity interruptions. On average, people with a legal connection tend to pay more for electricity than those with illegal connections SRS (2007).

Solid waste collection: MCGM has adopted new mechanisms to collect solid waste in slum areas with the introduction of the Slum Adoption Scheme. In this program slum communities are organized to collect waste inside the slum in areas where it would be difficult for trucks to enter. According to MCGM, in 2005 there were 249 registered Community–Based Organizations (CBOs) covering around 4.8 million slum inhabitants (MCGM, 2005). However, in reality most households dispose their garbage in open spaces or in adjacent drains which causes clogs and contaminates water bodies (MTSU, 2007).

Improvements in access to basic services

As previously discussed, the SRS is designed to provide and improve household living conditions through a package of measures. Table 2 presents the evolution of coverage of basic service provision for the *treated* group before and after rehabilitation took place and for the *control*

group that is still living in the slum but is in the process of entering the SRS policy. Results provide evidence of the overall improvement in the access to modern basic services following the SRS policy–compared to the situation before the policy–and to the *control* group. The most relevant changes involve the provision of toilets inside the houses and an inside piped–water connection as most *treated* (before) and *control* household slums in Mumbai had shared connections and toilets inside houses are almost inexistent. In the case of waste disposal, most of the *treated* households have shifted to modes of disposal that require some sort of payment; 20% of them pay others to collect waste compared to only 4% when living in the slum. Overall, the SRS has significantly improved the access to modern basic services. But is this access being accompanied by a better and more reliable basic service provision or is it leading to infrastructure bottlenecks? I discuss both of these elements in the following section.

Table 2. Improvement of access to basic services

	Treated (Before -%)	*Treated* (After - %)	*Control* (%)
Access to water			
Individual connection	31.58	100	26.92
Shared tap	67.54		55.38
Public tap / Stand post	0.88		10
Well			7.69
Access to electricity			
No access to electricity	2.20		
Independent connection	95.60	100	99.61
Shared connection	2.20		
Currently not working			0.39
Access to sanitation			
Toilet inside house	0.44	100	1.92
Pay and use	1.32		26.15
Community toilets	98.24		71.92
Waste disposal			
nearby building/plots	0.44	1.32	1.16
nearby trash cans	87.67	41.41	75.29
pay others to collect it	3.96	20.26	13.13
collected at house	7.93	37	4.63
Other			5.79

Source: Author's survey

4. Quality of service provision after the SRS: evidences of possible infrastructure bottlenecks

In the previous section I presented the achievements of the SRS in improving the access of modern basic services to beneficiaries. After rehabilitation, households can benefit from having inside a piped–water connection, individual access to sanitation facilities and an individual connection to electricity. In this section I evaluate if a higher access to modern basic services has

been accompanied by an improvement in the quality of service provided. I concentrate my analysis on water and electricity provision since they are the most well–documented subjects.

A higher access to basic services, but a better one?

Quality of water services: One of the possible benefits of having access to an individual water connection is the gain in time that was previously used to collect water outside the dwelling. However, if an individual connection is only working for a small period of time and the time of connection is not fixed, expected gains from connection to piped water will be lower. In order to evaluate changes in quality of water provision, two indicators are used: time of connection to piped water and perceived quality of water. As Figure 1 suggests, the actual service measured by the **time of access to a piped connection** has worsened for the *treated* group. When comparing households having access to a piped connection before rehabilitation, 71% of the *treated* group now receives less than 30 minutes of daily access to piped water, compared to 37% before rehabilitation and 21% in the *control* group. The latter confirms family complaints during surveys that indicated consistent water–provision problems in some of the rehabilitation projects. In *Ashram Chawl* families said that they were getting water for only 20 minutes per day.

Figure 1. Time receiving water connection per day
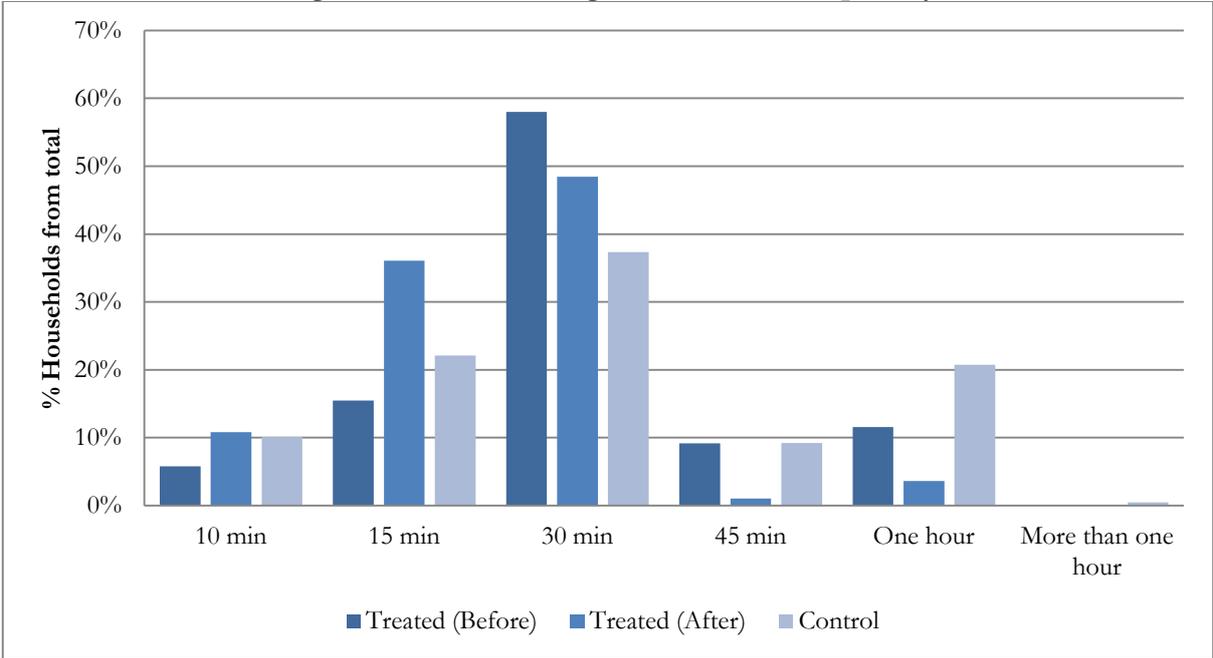
Source: Author's survey

Sharma *et al* (2008), who studied MUTP[5] resettled households, describe a similar situation as 98% of the sampled households had less than two hours of water supply daily. Their work also pointed out consistent water shortages in some of the sites. For example, in the *Lallubhai*

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[5] Mumbai Urban Transport Project (MUTP)

(*Jogeshwari*) compound, there have been occasions when there was no water supply for six days and household water supply was made by tankers, which led to high prices. Similar water–supply problems were reported in the *Anik* (*Chembur*) relocation site.

In the Sharma et al. (2008) and Bhide et al. (2003) surveys, rehabilitated households were asked if they thought water availability had increased after resettlement. In total around 50% of households comprised in both studies find that **water availability** has increased. However, perception of water consumption changes from one site to another. For instance, around 76% of the families in *Anik* thought their consumption had increased, while only 53% in *Majas* and 31% in *Lallubhai* did, all of whom belong to MUTP relocated households. In the Bhide et al. study, 40% of households think water availability has worsened.

Having an inside piped–water connection should generally mean an improvement in water quality since informal water provision through wells or open tube lines present higher risks of contamination. To measure evolutions in **quality of water** before and after rehabilitation, we asked households what they thought about water quality and if they carried out any treatment before consumption. The *treated* group's perception of the quality of water presents a slight change when compared to the quality of water when living in the slums. Overall 81% of *treated* households thought their water quality was good, compared to 84% before rehabilitation and 77% in the *control* group. Results of perception are confirmed by use of water treatment before consumption shown in Figure 2. A higher proportion of the *treated* group uses water–treatment techniques, compared to the same group before rehabilitation. Most households either filter or boil their water before consuming it.

Figure 2. Water treatment before consumption
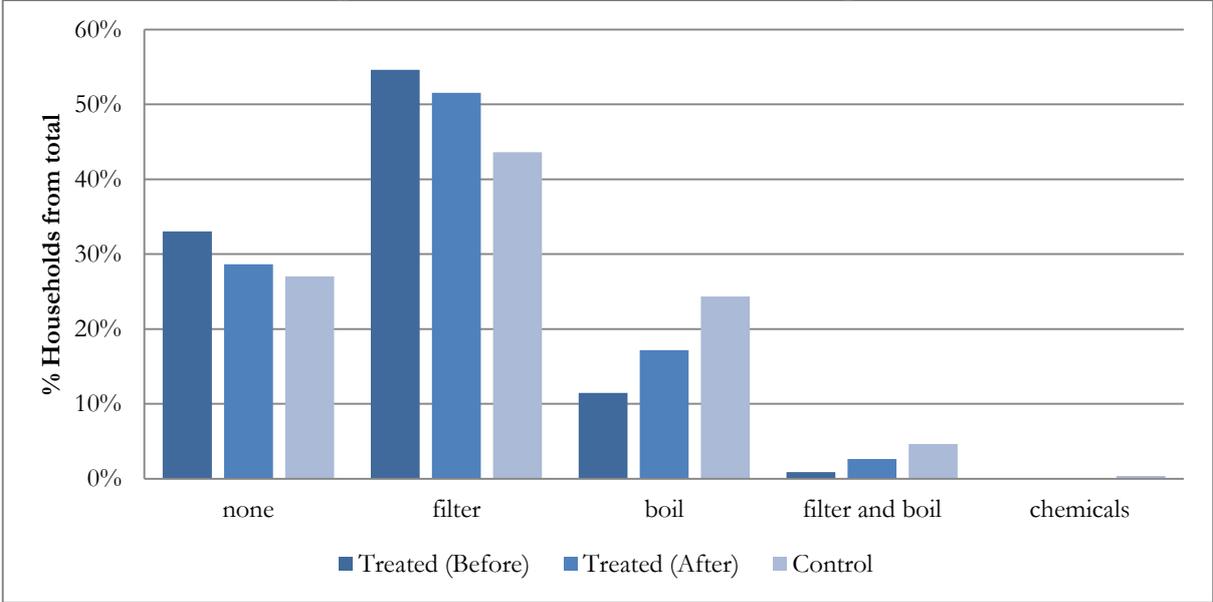
Source: Author's survey

Quality of energy services: To analyze evolutions in the quality of energy–service provision, I use two indicators: the number of hours of electricity supply per day and usage of non–modern energy sources. The first indicator serves to evaluate if there has been an improvement in connection after rehabilitation, while the use of non–modern energy sources could indicate possible malfunctioning of the electricity supply. According to results 99% of *treated* households receive electricity all day, compared to 98% before rehabilitation and 97% in the *control* group. All households in the *treated* group and most households in the *control* group said they have an independent connection and receive separate bills. When comparing energy sources used for cooking, rehabilitation seems to be accompanied by a substitution of kerosene and wood for gas (see Figure 3). Electricity is the dominant energy source for lighting both in the *control* and the *treated* group.

Figure 3. Energy sources used for cooking
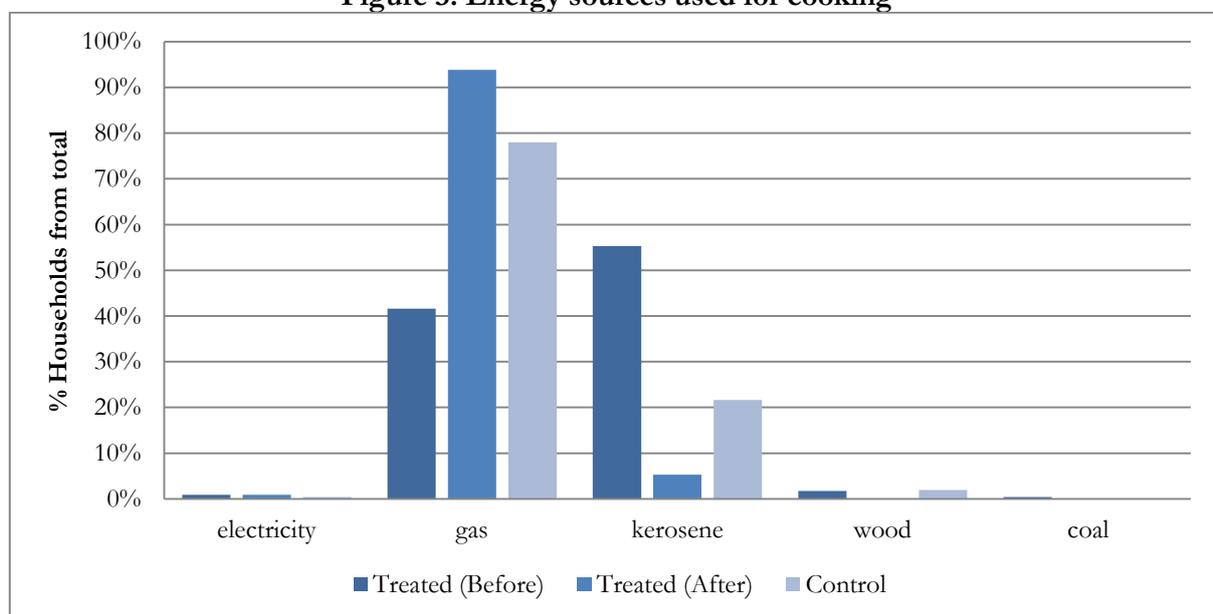
Source: Author's survey

Evidences of infrastructure bottlenecks in water provision

The previous analysis of access and quality of the provision of basic services following slum rehabilitation in Mumbai brings to light to one possible negative effect that the SRS is having in the city. While a considerable improvement of slum–household access to modern basic services was observed after rehabilitation, this is not always coupled with the provision of better services. The case of the provision of water service showed that when services were extended to the former slum community, the amount of time rehabilitated households receive water per day diminished compared to pre-existing conditions and to the *control* group. The latter evidences possible infrastructure bottlenecks being generated by the densification of slum pockets due to the SRS policy. Additional information from official and non-official sources confirms the

problematic relation between SRS densification and the adaptation of the basic–services infrastructure to meet new demand.

On a number of occasions the MCGM has denied or restrained water connection to SRS projects or to infrastructure projects, thus affecting households. In February 2010, the MCGM denied *Mankhurd*, an MUTP relocation site, access to water of 3,863 flats under the argument that they needed to consume more than 200 liters per day (Thompson, 2010). In the same month the Hydraulic Engineering Department of the MCGM suspended water supply to buildings meant for the rehabilitation of slum dwellers around the airport in the L ward (Shekhar, 2010). The insufficient pre-existing capacity, along with the additional capacity required to provide rehabilitated slum dwellers, seems to be at the core of this problem. Shekhar (2010) describes that while the total area requirement in the L ward is around 300 Million Liters per Day (MLD), the actual supply is between 150–200 MLD and additional requirements of 3,823,365 liters of water per day will be needed after residents move to the new apartments. Furthermore, some anecdotes suggest that when area's installed infrastructure was insufficient for the development of new SRS buildings, the MCGM was not able to increase installed capacities in time. In the *Chandivali* project, although 8,000 families were rehabilitated three years ago, the MCGM has not increased the water supply of the area (Shekhar, 2010).

Literature indicates that the existent water provision infrastructure does not have the capacity to absorb higher demand generated by the SRS; the policy might be leading to infrastructure bottlenecks that affect communities other than those directly covered by the policy. Mhaske (2009) explains how some slum rehabilitation or infrastructure projects affecting households will be supplied with only 45 liters of water per person per day by the MCGM once they are in new buildings. The sale component, product of the conferment of Additional Development Rights to the builder, will not get a single drop of water and will only get a connection after the Middle *Vaitarana* project is ready by the year 2011. Thompson (2010) describes how–given the water shortages–some sites have started moving back to informal sources for water provision. In *Mankhurd*, one of the sites studied by Thompson, many households have started digging illegal wells between buildings to assure water provision.

In fact, leaving aside the SRS, demand for water in Mumbai exceeds supply (MCGM, 2005). The gap between demand and supply was 1,642 million liters per day in 2001 and is expected to be 1,210 MLD in 2011. The latter, added to the increased pressure on infrastructure due to the extended access of services to slums and the increased population density, might be responsible for the diminution of the quality of water services provided to rehabilitated households. Mcleod (2000) argues that the SRS policy is placing minimal emphasis on the existing and projected need

for infrastructure services and more attention should be given based on realistic demographic projections. Furthermore, infrastructure bottlenecks due to increased population density affect not only the area in which an SRS project is developed, but also the areas receiving TDRs. According to Toutain and Gopiprasad (2006) the principle of TDRs has no bearing on the spatial plan and design of infrastructure to match increased demands of the areas receiving TDRs. Increasing infrastructure in time to be coupled with increased population densities–in the TDR receiving areas–is basically impossible since these areas are chosen by external market forces which are invisible to local authorities.

5. Conclusions

The *Slum Rehabilitation Scheme* (SRS) implemented in the city of Mumbai has allowed the public sector to shift the burden of slum improvement to the private sector, by making use of Additional Development Rights (ADRs) that allow developers to construct over the planned Floor Space Index (FSI). The SRS was designed to provide new apartments with connection to individual basic services free of cost. In this article I have evaluated whether the expected improvements in the provision of basic service by the SRS were being translated into action. Results from the household survey carried out by the author showed how the SRS has significantly improved the access of households to modern basic services. Compared to the situation before rehabilitation, where only 32% of households had an individual piped –water connection and 99% used community or pay–and–use toilets, the SRS had led to universal access to individual piped water and toilets inside the houses. Changes in terms of access to electricity provision before and after rehabilitation are less dramatic, since most households had independent connections when living in the slum.

To evaluate if the improvement of access to modern basic services was also accompanied by a better provision in terms of quality and quantity, a more specific analysis was made which led to contradictory results. In the case of electricity provision, the majority of *treated* and *control* households have 24–hour service and their only concern seems to deal with increased electricity payments when passing from illegal–and sometimes shared connection–to legal and independent electricity provision. In the case of water services, *treated* households time of connection has decreased when compared to their pre-existing conditions and those of the *control* group. The latter, added to evidence found in official and non–official sources suggest that the SRS is leading to infrastructure bottlenecks due to increased density and the extension of modern basic services to the slum communities.

These results bring to light one of the possible problems of introducing density–based incentives for slum rehabilitation. When the existent infrastructure–normally designed to support planned capacities–is not able to expand to absorb new densities, density–based incentive policies might lead to infrastructure bottlenecks. In fact, the sole existence of policies based on density incentives collides with the reason and making of urban plans and sets schizophrenic rules which might have consequences, not only on the areas in which density above permissible FSI is granted but also on areas in which TDRs are consumed. While the *Slum Rehabilitation Scheme* introduced a clause that accounts for extra infrastructure charges due to the conferment of higher FSI, the timing and extension of payments makes it very difficult for these to be translated into real infrastructure investments. The extent of the consequences generated by higher densities will depend on the existent infrastructure capacities and the ability of public authorities to adapt urban infrastructure to match new demand.

Conclusions and perspectives

This thesis addresses two aspects within the vast field of slum–policy evaluation. The first of them, covered in **Part I**, comprehends a descriptive analysis of urban policies, slum–formation mechanisms and slum absorption policies in Medellín and Mumbai and an econometric study seeking to determine how informal renters value different rental contracts in Medellín. The second, covered in **Part II**, deals with the evaluation of some of the possible welfare implication of slum – upgrading interventions using a set of welfare indicators. Built upon the idea that cities and–more precisely–slums play an important role in poverty alleviation, this dissertation intends to bring a better understanding of how slum policies can affect households' welfare by measuring some of the direct and indirect effects of their implementation. To achieve this, we have addressed very specific questions that had not been treated before in literature, tested some of the 'myths' and theories related to slum–absorption policies and incurred in new subjects that had specific relevance at the local context. Changes in households' access to credit, improvement of access to basic services, changes in housing investments and residential mobility related to slum rehabilitation were some of the 'welfare' indicators used.

The two slum–upgrading interventions considered in this dissertation are relevant since they introduce a set of innovations when compared to traditionally applied slum policies. The *Slum Rehabilitation Scheme* (SRS) in Mumbai uses market incentives based on Additional Development Rights (ADRs) that switch the burden of financing slum rehabilitation to the private sector. Through the SRS, Mumbai municipalities achieve a complete absorption of rehabilitated slum settlements by providing a 'package of policies' that include the provision of basic services, durable housing structures and titles. *Urban Integral Projects* (UIPs) implemented in the city of Medellín are, on the contrary, mainly financed by the public sector and focus on the improvement of public spaces rather than private areas. The construction of public libraries and the improvement of public parks and the surrounding environment are among some of the project interventions considered in *Urban Integral Projects*.

I next disclose the main conclusions of the research questions addressed in this dissertation, derive general conclusions of the full set of chapters and present some relevant policy implications emerging from these conclusions as well as their relevance compared to existing literature.

1. Main results and policy implications

The role of urban policies in the emergence of slums

The descriptive analysis presented in **Chapter 3** brings to light how urban policies implemented in Medellin and Mumbai have played a fundamental role in shaping the emergence and distribution of slums. In the case of Mumbai, decades of strict land regulations to 'decongest' and avoid migration summed with the city's topographical constraints for horizontal development lead to a generalization of slums and one of the highest population densities in the world. In Medellin, the constant reconfiguration of the urban perimeter, the following abandonment of the central role of the state in the provision of low–income housing, added to the implementation of a set of inclusion and exclusion policies, led to the multiplication and spatial concentration of squatter settlements at the margins of the city. The two examples studied reveal how urban policies influence the formation, type and distribution of the informal city in the urban territory and, at the same time, these three components are, among others, fundamental to design and apply inclusion policies.

The role of urban political economy in the emergence of slum policies

While slum interventions should address the double challenge of upgrading and absorbing slum settlement in the urban territory and reducing poverty, it is not always the case. In fact, the analysis made in **Chapter 3** evidenced the central role that the city's political economy takes in shaping slum inclusion or exclusion policies. Both in Medellin and Mumbai, slum policies have been fueled by a series of externalities or opportunities for action emerging from slums or marginal settlements. In the case of Medellín, the Integral Improvement Program of Subnormal *Barrios* of Medellin (*Programa de Mejoramiento Integral de Barrios Subnormales de* Medellin*, PRIMED*) which preceded the *Urban Integral Projects* had–as its main objective, to search for a less–violent and spatially unequal city. PRIMED emerged at a time where the city was considered one of the most dangerous cities in the world and arose from a Commission ordered by the national government to find ways to address the problems of violence, governance and social decomposition in poor *barrios.* Similarly, *Urban Integral Projects* were created under the argument of providing 'equal opportunities for all' to induce positive changes in the socio–cultural behavior of

the population. In Mumbai, informal settlements have been seen as vote banks by many political parties, who have made inclusion policies one more strategy to access or remain in power.

These externalities are present in the theoretical literature regarding slum formation discussed in **Chapter 2.** Henderson (2009) explains how residents can use exclusionary zoning to push low–income migrants into the informal housing sector and avoid the fiscal burdens imposed by them while Brueckner and Selod (2009) suggest the existence of a squeezing mechanism in which the informal sector, by occupying space that could be developed in the formal sector, raises formal housing prices.

Slum housing, a very heterogeneous population

An important result that emerges from this dissertation is that slum households house a very heterogeneous population and the distributional effects of slums policies might depend on the fragmentation within the informal sector. In **Chapter 3** we saw the different forms the informal city took in Medellín and Mumbai and how as the level of informality increased, meaning that tenure security decreased, shelter conditions deteriorated. These observations are consistent with empirical observations made by a number of authors in other cities (De Soto, 1990; Payne 2001).

In the same sense, **Chapter 4** confirmed that the binary division between the formal and informal sector or between renters and owners is generally insufficient to describe the reality of cities in developing countries. Evidence was found of the existence of a parallel insurance system in the informal sector that allowed economic agents to internalize the risk of making incomplete rental contracts. Using hedonic regression techniques a difference of around 21% in the rental value of identical housing units was found when passing from oral to written rental contracts in informal settlements. Considerable differences in the risk faced by households having different rental contracts were found, although both oral– and written–contract renters faced risks associated to informality. The policy implication of slum heterogeneity is that the welfare effects of slum policies will probably differ according to pre–existing fragmentations of the informal housing sector. Results from the empirical analysis presented in **Chapter 6** support this argument. In the latter, a negative and significant effect of the *Metrocable* intervention on the level of housing consolidation in Medellín was found for *squatter settlements* and no effect was found for *pirate urbanizations.* In addition, policy makers might induce different distributional effects by delimiting policies' boundaries, which indirectly legitimize sections of the informal city (i.e. informal renters or owners, time of stay in the city, etc.).

The side – effects of slum policies

At the city level

The analysis presented in **Chapter 3** and **Chapter 7** on the *Slum Rehabilitation Scheme* (*SRS*) reveals one of the possible consequences of its implementation at a city level: changes in the population–density distribution. Our research revealed how the past 14 years of the policy's implementation have lead to a densification of wealthier neighborhoods located outside *Island City*. The economic rationale behind this is the following: Given the market incentives provided by the SRS policy, developers have a preference to rehabilitate low–density slums in wealthier neighborhoods, which allow them to profit from the conferment of *in-situ* ADRs and high–density slums in poor neighborhoods, which allow them to profit from the conferment of Transfer Development Rights (*TDRs*) that can be used in wealthier neighborhoods. While the densification of the city's wealthier neighborhoods is not, by itself, good or bad, it does have some indirect consequences on the provision and adaptation of urban infrastructure. To date, the SRS policy does not allow for the private sector to internalize the total cost of adapting new infrastructure to assure that the increased demand–the product of higher population densities that exceed planned capacities–can be met. Moreover, even if the policy allows for this cost to be internalized, it is difficult for the public sector to predict where the areas needing additional investments in infrastructure will be, and react in time. The latter comes from the failure of the policy in identifying generating and consuming areas according to their infrastructure capacities. The research question developed in **Chapter 10** evidenced consistent water–provision problems in rehabilitated slums, suggesting infrastructure bottlenecks in the water–provision system and confirming some of the hypothesis set forth in **Chapter 7.**

As functioning today, the so–called 'free' policy has shifted the burden of slum rehabilitation to the private sector, but has hidden costs in the form of urban infrastructure adaptation that are still supported by the public sector. The creation of a public provision fund–alimented by taxes collected upon rehabilitated slum dwellers–and its recycling for the adaptation of new infrastructure could be an option to solve this problem. Another possibility is to actualize 'infrastructure development charges' charged to project developers and assure their payment, although this might be difficult given the institutional and political economic context surrounding slum rehabilitation in Mumbai. However, even if the city had sufficient funds to finance the adaptation and managed to identify areas needing investments in infrastructure, the 'timing' problem remains as, given the time needed for infrastructure adaptation, increased demand will continue to precede supply.

At the individual level

Residential mobility and poverty recycling

This dissertation presents the first comprehensive study regarding the magnitude, causes and consequences of post–rehabilitation residential mobility. Results presented in **Chapter 8** suggested higher levels of residential mobility following slum rehabilitation, an increase in households' expenses in items related to entering formality (such as unitary prices adjusted to the legal sector) and a considerable increase in housing value. Two–and–a–half years after moving in, 10% of the *original occupants* had left rehabilitation apartments although the majority of them (82%) moved to formal housing and did not return to slums. The principal reasons for leaving were the high cost of living in new apartments and the incompatibility between the housing solutions provided and households' preferences. While the first reason reveals how 'normal standards of living' are simply not affordable for a part of the slum population, the second evidences the difficulties that a standardized policy has in meeting the heterogeneous needs of slum dwellers. In this regard, while usually seen as a 'problem' slums are sometimes more adapted to the needs and constraints (i.e. incremental improvements and savings in form of materials, forms of payment) of poor households. Our analysis revealed that with the SRS policy little *poverty recycling* had occurred and that residential mobility lead to a higher net slum absorption, as 44% of *newcomers* previously lived in slums. It would be interesting to make similar analysis in other context and with different policies, as the generalization of this result is not automatic. It is possible that resettlement policies, in which slums are relocated to distant areas, or policies applied to slums that are poorer and less connected to the formal sector leads to higher proportions of residential mobility associated with poverty recycling.

The evaluation of the evolution of living expenses before and after rehabilitation reveal how the higher the divergence between the formal and informal economic sectors, the higher the shock experience by slum households when passing from informal to formal houses. One of the possible policy implications of our results is that step–by–step interventions similar to the ones implemented in some developing countries, in which slums are first provided with water or electricity and later on titles, could serve to diminish these shocks and adapt the urban infrastructure to provide its services to the whole population. Another is that innovations or adaptations of slum policies that allow the creation of temporary buffer zones between the two sectors could help households to adapt to new living conditions more easily. These are discussed in the next section as one of the possible perspectives for research.

Tenure security, access to credit and housing investments

The study of *Urban Renewal Projects* in **Chapter 6** confirmed the complexity of human behavior under incomplete tenure rights. The analysis of the effects of the *Metrocable* intervention and *Urban Integral Projects* in Medellín revealed how tenure security can be easily disrupted by changes in the presence of state (the law). The hypotheses linking the implementation of *Urban Renewal Projects* and changes in housing investment are the following: On one hand, investments made for *URP*s could be interpreted by the local community as an 'acceptance' of the settlement, generating higher perceptions of security. On the other hand, the higher presence of local authorities (the law) might be seen as a 'menace' which might reduce the community's perception of security and lead to lower investments in housing. We found a significant diminution of investments in housing following a greater presence of the state due to the implementation of the *Metrocable* intervention. However, the policy's effect was concentrated on *squatter* settlements and no effect was found on *pirate urbanizations*. It is possible that p*irate urbanizations*, having a higher legitimacy in the occupation of the territory and being in the city for longer, are not affected by changes in the presence of state given their level of tenure security. Our results align with previous literature development that argues that not only through the provision of titles do policies affect housing investment (Razzaz 1993, Gilbert 2002 an Payne 2001). Compared to the *Metrocable* intervention, we found no significant effect of *Urban Integral Projects* on the level of housing consolidation. The latter could be related to the higher integration and participation of the communities involved in the *Urban Integral Projects* which lead to a compensation of the 'acceptance' effect and the 'menace' effect.

The analysis of the effects of the *Slum Rehabilitation Scheme* on households presented in **Chapter 9** evidenced an improvement of households' access to credit after rehabilitation, compared to their situation before and to the control group. The latter suggest that slum rehabilitation generated a higher integration of slum households in the formal economy and confirms one of the most recurrent statements associated to titling policies in literature (De Soto 1990, De Soto, 2000). However, results also revealed that titles were sometimes not enough to diminish credit constraints and that having a sufficient and secure income is also important.

2. Perspectives for future research

Some of the possible future research perspectives that will allow complementing the questions addressed in this dissertation are the following:

Evaluate the consequences of slum–upgrading intervention in the integration of slum communities in the formal economy. So far, most of the studies related to this subject have evaluated whether titling policies

improve households' access to credit from formal credit institutions. It would be interesting to see if, for instance, titling or slum – upgrading policies induce a higher integration of households to the formal labor market. This question might be of special relevance in the case of spatially targeted interventions that seek a higher integration of marginalized settlements to the city, like the *Urban Integral Projects*. For instance it might be possible that prior stigmatization of these settlements and labor market discrimination decreases as marginalized settlements get redeveloped.

Study the benefits of policy innovations or adaptations that reduce the shock of passing from the informal to the formal sector: In both of the cases studied a series of policy innovations were introduced to attenuate or help families adapt to the cost associated to formality. In Mumbai, property taxes are subsidized in a linearly decreasing way for a period of 20 years for rehabilitated slum dwellers. In Medellin three examples of policy adaptations were found in the *Moravia* relocation project. The first consisted of the installment of ramps leading from the first to the third floor, allowing constructors to elude standard regulations–which oblige the installment of lifts in buildings having more than five floors–and avoid the payment of additional maintenance and administration fees by relocated slum dwellers. The second, which was agreed upon between the local government and the *Moravia* community prior to the implementation of the policy allowed relocated slum dwellers to keep the same *Estrato*[1] for a couple of years. The third emerged due to a series of problems detected in the payment of administrative bills related to the provision of lighting and water in buildings' community spaces. To solve the 'free–rider' behavior of relocated slum dwellers who wanted to profit from the latter without paying, the local government, along with the utility company, decided to include these costs in households' individual electricity and water bills. Similar adaptations were found in other slum upgrading policies such as the Safe Electricity and Loss Reduction (SELR) program implemented in a slum in Sao Paulo, Brazil.

Evaluate the long term effects of slum policies. Existent literature related to slum studies has concentrated on the evaluation of the short terms effects of slum policies (2-5 years) and little has been done to evaluate the long terms effects (10-20 years). While many of the questions we have covered in this dissertation are also relevant at a long term some phenomenon's can take longer time periods to occur and might be difficult to observe when evaluating shorter time periods.

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[1] *Estrato* refers to a classification of residential buildings or houses used by the Colombian state in which the level of poverty, the provision of basic services, among others, is considered. Six different levels of *estratos* exist, level 1 and 2 which correspond to the poorer and less – consolidated residential buildings usually benefit from subsidies in the provision of basic services, education and other social programs.

Annex

Summary statistics and other findings, Mumbai SRS Household Survey

Summary statistics

<p align="center">Table 3. Summary statistics</p>

		CONTROL	TREATED
Socio-economic			
Female_hoh		1,123	1,123
		(0,020)	(0,021)
Age_hoh		44,25	43,088
		(0,789)	(0,801)
hhsize		5,223	4,844
		(0,135)	(0,118)
Religion (%)			
	Hindu	73,85	90,71
	Muslim	0,79	0,79
	Christian	5,00	1,77
	Other	3,85	6,19
Mother tongue (%)			
	Marathi	62,31	57,71
	Hindi	29,23	14,54
	Telegu	1,15	0,44
	Gujarathi	0,77	25,11
	Other	6,54	2,20
Housing			
Time slum		29,565	28,26
		(1,034)	(0,950)
Time_transit *		1,775	3,983
		(0,148)	(0,074)
Time_rehab *		3,431	2,475
		(0,141)	(0,062)
Pucca_house		0,981	0,815
		(0,009)	(0,026)
Surface bigger than 21 sq.mt		0,296	0,599
		(0,028)	(0,033)
Separate kitchen		0,142	0,075
		(0,022)	(0,018)
Separate bathroom		0,169	0,053
		(0,015)	(0,023)
Toilet inside house		0,019	0,004
		(0,009)	(0,004)
Structure Type (%)			
	Only ground floor	35,38	85,02
	Mezzanine	0,79	0,79
	G+1	61,54	13,22
N		260	227

*for control groups refers to the expected time until moved to transit camps and the expected time until rehabilitated

Livelihood

Table 4. All income members and main income members summary statistics

	CONTROL	TREATED
All Income members (mean)		
Number_earners	1,631	1,588
	(0,063)	(0,060)
Skilled	0,340	0,301
	(0,027)	(0,027)
workhome	0,054	0,024
	(0,014)	(0,009)
workdays (per week)	4,692	4,708
	(0,122)	(0,121)
workhours (per day)	10,280	10,451
	(0,261)	(0,158)
days_illness (last month)	3,892	1,900
	(1,301)	(0,493)
Main Income members		
Female	0,127	0,110
	(0,021)	(0,021)
Skilled	0,392	0,344
	(0,030)	(0,030)
workhome	0,042	0,030
	(0,014)	(0,012)
workdays (per week)	6,216	6,224
	(0,045)	(0,037)
workhours (per day)	10,322	10,673
	(0,286)	(0,180)
days_illness (last month)	5,833	2,000
	(2,003)	(0,632)
Income		
Don't know	0,46	
0-2500	8,76	2,93
2501-5000	45,16	21,95
5001-7500	17,97	38,05
7501-10000	18,43	23,41
10001-12500	4,15	11,71
more than 12500	5,07	1,95

**Figure 4. Main income earner daily working hour's distribution**
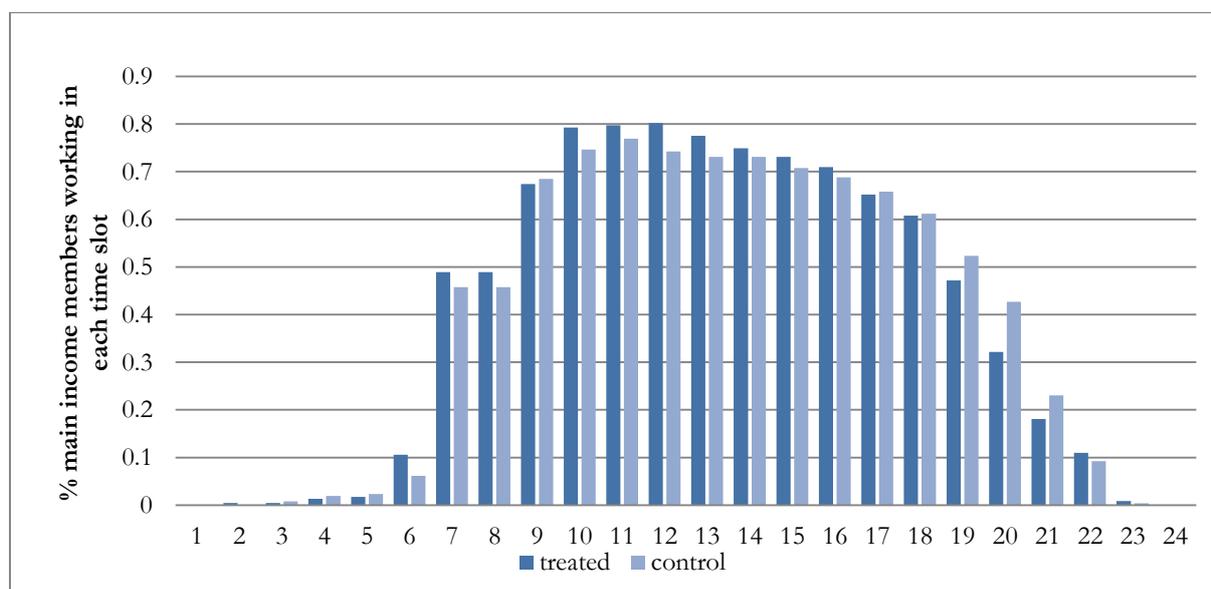
Figure 5. Total household income distribution
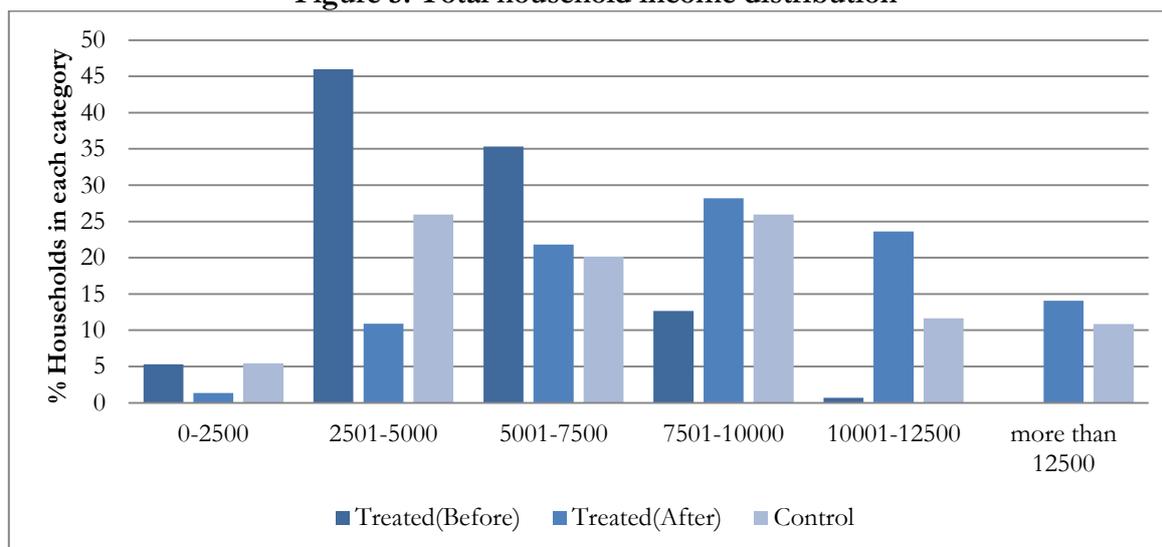
*In 2009 Rupees. Income values for the treated group before rehabilitation were adjusted with inflation.

Expenditure and durable goods

Table 5. Expenditure by items (mean of percentage expenditure in each item)

Variable	Mean expenditure to total expenditure		Mean difference
	CONTROL	*TREATED*	
Food	0,580	0,544	0,037***
	(0.011)	(0.008)	(0.014)
Education	0,104	0,082	0,022**
	(0.008)	*(0.006)*	*(0.010)*
Transport	0,065	0,050	0,014***
	(0.004)	*(0.002)*	*(0.005)*
Health	0,075	0,036	0,039***
	(0.005)	*(0.003)*	*(0.006)*
Water	0,035	0,020	0,015***
	(0.003)	*(0.002)*	*(0.003)*
Waste Collection	0,000	0,001	0,000
	(0.000)	*(0.000)*	*(0.001)*
Electricity	0,040	0,094	-0,055***
	(0.005)	*(0.003)*	*(0.006)*
House maintenance	0,000	0,049	-0,047***
	(0.001)	*(0.003)*	*(0.003)*
Clothing	0,070	0,061	0,009
	(0.006)	*(0.006)*	*(0.001)*
Remittance	0,000	0,000	0,002
	(0.002)	*(0.000)*	*(0.006)*
Savings	0,010	0,018	-0,008**
	(0.002)	*(0.003)*	*(0.003)*
Loans	0,008	0,012	-0,004
	(0.003)	*(0.004)*	*(0.009)*
Entertainment	0,007	0,011	-0,004
	(0.002)	*(0.001)*	*(0.005)*
Society charges	0,000	0,021	-0,021***
	(0.000)	*(0.003)*	*(0.002)*

*** Significantly different at the 1 percent level, ** Significantly different at the 5 percent level., Standard errors in parenthesis

Figure 6. Expenditure by items (mean of percentage expenditure in each item)
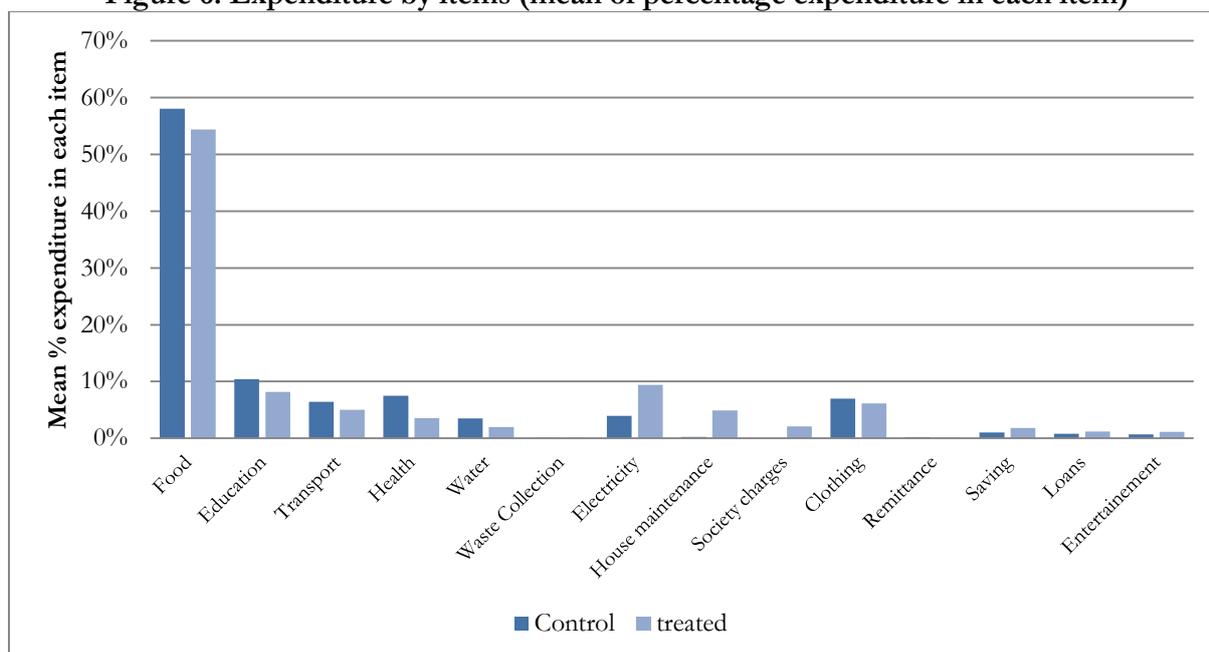
Table 6. Savings, durable goods and shortfalls

	Treated(Before)	Treated(After)	Control
Usually save money (Yes - %)			
Yes, regularly	0,9	7,9	8,9
Yes, seasonally	16,7	17,1	7,3
Yes, occasionally	16,7	8,3	11,5
No, never	65,8	66,7	72,3
Usually Face Shortfalls (%)			
Yes, regularly	29,4	25,9	38,5
Yes, seasonally	15,4	15,8	10,0
Yes, occasionally	14,9	18,9	16,2
No, never	40,4	39,5	35,4
Durable goods (%)			
Telephone	8,8	24,7	17,7
Sewing machine	4,8	8,4	8,5
Mobile	22,5	80,2	81,2
Tape recorder	9,3	27,3	11,5
vcr_vcp	4,0	7,5	4,2
gas stove	40,1	0,0	78,8
kerosene stove	61,2	18,5	53,8
pressure cooker	64,3	81,5	81,9
bicycle	3,5	5,7	5,4
motorcycle	1,8	3,5	5,4
richshaw	1,8	1,3	0,4

Figure 7. Durable goods (percentage of households in each group having durable good)
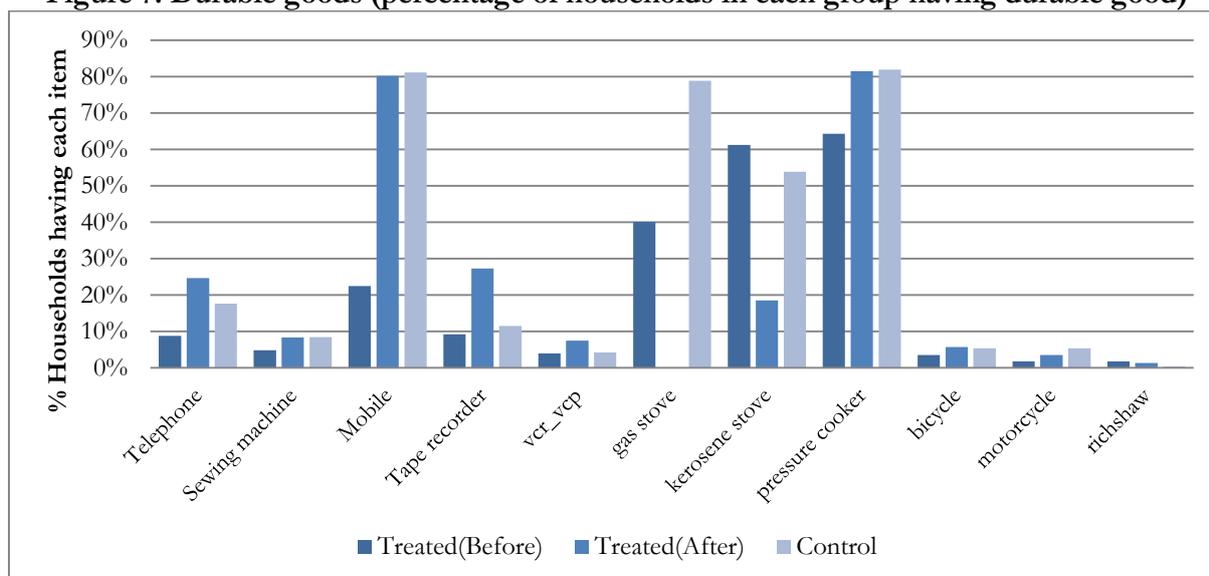
Slum formation and rehabilitation (qualitative results)

Table 7. Main reasons for moving to slum

	Control	Treated	Control	Treated
Reasons for moving to slum				
Related to labor market (close to work/good local labor market)	29,2	29,0	1	2
Affordable housing	17,1	16,5	4	3
Space available or house available	21,3	32,5	2	1
Close to transport	5,5	3,6	5	6
Close to school	5,2	4,2	6	5
Family members/ people same language	19,9	13,3	3	4
Others	2,4	0,9	7	7

Table 8. Satisfaction with rehabilitated apartments (only for treated)

	% of treated
Satisfaction with rehabilitation apartments	
Extremely satisfied	19,3
Satisfied	72,4
Indifferent	4,4
Dissatisfied	2,6
Extremely dissatisfied	1,3

Table 9. Satisfaction with rehabilitated tenements by item (most to least important)

What households like about rehabilitated tenements	Control (%)	Treated (%)	Control (cat)	Treated (cat)
Surface	22,7	6,6	1	8
Structure	8,5	7,9	6	5
Living in building	12,7	23,7	3	1
Ownership	11,9	18,4	5	3
Kitchen	3,5	8,8	8	4
Bathroom	7,3	7,5	7	6
Toilet	21,2	19,3	2	2
Piped water connection	12,31	7,46	4	7
Electricity connection	1,54	0,44	9	9

Table 10. Dissatisfaction with rehabilitated tenements by item (most to least disliked)

	Treated (%)	Treated (cat)
What households dislike about rehabilitated tenements		
Surface	23,7	5
Structure	11,9	7
Living in building	29,8	3
Living in higher floor	29,4	4
higher cost of living	14,1	6
quality of construction	30,1	2
new house not adapted	7,0	8
Other	51,9	1

Table 11. Satisfaction with the level of cleanliness of the neighborhood and perception of security in neighborhood

	Treated(Before)	Treated(After)	Control
Satisfaction with neighborhood cleanliness			
Extremely satisfied	15,04	24,78	11,58
Satisfied	76,75	64,6	74,9
Indifferent	5,75	5,31	6,18
Dissatisfied	2,21	2,54	5,41
Extremely dissatisfied	0,44	1,77	1,93
Satisfaction with neighborhood safety			
Very safe	34,07	42,92	57,53
Safe	64,6	54,87	38,22
Unsafe	0,44	0,88	2,7
Extremely unsafe	0,88	1,33	1,54

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Les impacts des politiques à l'égard de l'habitat informel sur le bienêtre des ménages : le cas de Medellin (Colombia) et Mumbai (India)

RESUME : Les politiques à l'égard de l'habitat illégal jouent un rôle central dans l'effort de réduction de la pauvreté à l'échelle locale et nationale , étant donné que la pauvreté devient de plus en plus un phénomène urbain. Cependant, la réduction de la pauvreté est rarement définie comme objectif principal des politiques des bidonvilles, mais est une conséquence indirecte de leur application. Cette thèse a comme objectif l'amélioration de la compréhension des effets des politiques à l'égard des bidonvilles sur le bien-être des ménages. Deux cas d'études sont abordés: le *Schéma de Réhabilitation des Bidonvilles (SRB)* à Mumbai (Inde) et les *Projets Urbains Intégraux (PUI)* à Medellin (Colombie). Entre autre, nous répondons aux questions suivantes : Quelles sont les causes de la mobilité résidentielle post-réhabilitation ? Quels sont les impacts de la *SRB* sur l'accès au crédit ? Quels sont les effets des projets de renouvellement urbain sur le niveau de consolidation des logements ? Nous utilisons des méthodologies récentes d'économie empirique permettant de comparer des groupes bénéficiaires des politiques à des groupes non-bénéficiaires. Dans le cas de Mumbai, une enquête a été réalisée par l'auteur auprès de 510 ménages dans 9 bidonvilles cibles de la politique *SRB,* celle-ci ayant été mise en place dans quatre d'entre eux. Dans le cas de Medellin trois sources d'information ont été utilisés (L'Enquête Qualité de Vie, l'Enquête Medellin Solidaria et l'Enquête SISBEN) permettant le suivi d'un ensemble de bénéficiaires et de non-bénéficiaires des politiques, avant et après les opérations de rénovation urbaine.

Mots clés : bidonvilles, habitat informelle, politiques urbaines, politiques à l'égard des bidonvilles, évaluation des politiques publiques

The impacts of slum policies on households' welfare : The case of Medellin (Colombia) and Mumbai (India)

ABSTRACT : Slum policies play an important role in poverty alleviation efforts at the local scale and at the national scale – as poverty becomes increasingly 'urban' phenomena. However, poverty reduction is rarely positioned as the main objective of slum policies and, when occurring, is an indirect result of their application. The purpose of this thesis is to provide a more complete understanding of how slum policies affect households' welfare. To explore these issues, two slum-upgrading interventions are used as case studies: the Slum Rehabilitation Scheme in Mumbai (India) and Urban Integral Projects in Medellin (Colombia). This research has addressed issues ranging from the causes of post-rehabilitation residential mobility to the impacts of slum rehabilitation on households' access to credit as well as the effects of Urban Renewal Projects on housing consolidation. We used recent evolution in empirical economics methodologies that allow comparing policy beneficiaries to non-beneficiaries. In the case of Mumbai a household's survey was carried out by the author in 9 slum pockets, 4 of which had already been rehabilitated and 5 to-be rehabilitated slums. In the case of Medellin household level information was obtained from three secondary sources (the Quality of Life Survey, the Medellin Solidaria Survey and the SISBEN Survey) that allowed following a set of beneficiaries and non-beneficiaries before and after Urban Renewal Projects took place.

Keywords : slums, informal settlements, urban policies, slum policies, public policies evaluation