

# Homeownership, Renting and Market Failures: Evidence from Indian Slums

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## Abstract

Housing rents are a major part of a slum household's expenditure. I exploit a large scale 'big-push' national urban renewal policy reform in India between 2005 and 2012 to empirically evaluate the multi-dimensional effect of rental reforms and housing provisions on home ownership, rental expenditures and quality of dwelling for slum households. One of the main benefits accruing to the affordable housing policy was to provide the entitlement of the land to the female head of the households as a measure of women empowerment. Combining a novel pooled cross-sectional household survey data for year 2002, 2008, 2012 and nighttime lights activity data at district level, I find the reform significantly increases the real rents by 18.2% and the probability to transition to homeownership by 16.7 percentage points. Females are 2.4 percentage points more likely to be the head of the household. The findings highlight the role of market failure.

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## 1 Introduction

After the financial reforms of 1991, India has been growing at a very fast pace. The growth is driven by cities. 31.16% of India is already urbanized with four metropolitan cities namely, Delhi, Mumbai, Chennai and Kolkata and further urbanizing at a faster pace, creating mega cities like Hyderabad and Bangalore (Census, 2011). 117,000 people migrated to Delhi in year 2016 (Economic Survey of Delhi, 2018/19). Rural to urban migration creates slums (Katz et al., 2001 [17]), which represents the shortage of affordable housing. Roughly 21.9% of Indian population lives under poverty line and has a vivid income gap between the rural and urban incomes (Planning Commission of India, 2013). The economic opportunity provided by the cities leads to the slums clusters around residential locations, major office centers, industrial areas or touristic locations (Barnhardt et al., 2015 [5]). Yet, in order to accommodate the huge inflow of people there are costs associated at the city level in the form of regional inequality that picks pace with the increased level of industrialization and urbanization (Cutler and Glaeser, 1997 [8]). The limited availability of urban land space restricts spatial planning, creates additional need for housing and puts pressure on land and stress on civic amenities like health, education, water, sanitation etc. Underdeveloped infrastructures, lack of effective policy like service provisioning and dilapidated housing for poor households, lack of tenure and market failures lead to social and economic disparities among the lives of slum residents.

The research question contributes to the field of urban economics literature by investigating the impact on the welfare of the slum dwellers when

the 'governance gap' void is filled by an acute governance reform at all levels of administrative functioning. I exploit a national policy intervention, the JNNURM-IHSDP program from year 2005-2012 to empirically estimate the multi-dimensional impact of the policy on housing rental expenditure, homeownership, women empowerment and the overall quality of dwelling for slum households living in districts exposed to the policy intervention.

Drawing on a novel pooled cross sectional slum household survey data from National Sample Survey Organization of India and district level night-time lights from NOAA-DMSP, I use difference-in-difference methodology to investigate the above claim and aim to provide a credible estimation. However, the results should be interpreted with caution as causal interpretation of the estimates can not be entirely established. The reasons for such a limitation is attributed to the paucity of pre-policy data.

By exploiting the rent control reforms as one of the mandatory reform clause of the policy, the study addresses an important research gap by investigating the economic well-being of the slum dwellers in the absence of 'rent seeking, non-state agents or slumlords'. On average, the estimates indicates that the reform led to a significant increase in real rents by 35%. The results shed light on the importance of market failures even in case of a major 'big push' government administered policy interventions.

The estimates also suggests that the reform increases the probability of homeownership by 15% , females are by 2.7% more likely to be the head of the slum household. The estimates for the quality of dwelling suggests improvement in quality score by 1.9% to 10.8% for certain indicators. The overall index deteriorates over time.

The remainder of this paper is organized as follows. In Section 2, I summarize the related literature. In Section 3, I present in detail the institutional aspects of slums in India. In Section 4, I present various data sources and the final data set constructed for the purpose of analysis. In Section 5, I present the JNNURM-IHSDP policy intervention framework. In Section 6, I present the identification strategy. Section 7 discusses the empirical findings of the impact of the program on real rents, homeownership, changing gender perception in the Indian household and quality of dwelling. Section 8 concludes the paper.

## 2 Literature Review

The 'Modernization Theory' states the importance of urbanization in lives of the poor. The theory argues that slums represent a transitory phase in the life cycle of a rural migrant. (Marx et. al., 2013 [19]). Eventually over years, the households move into the formal housing paving way for generations to reap the benefits of a city life. Slums acts as a platform for a typical rural migrant to seize the economic opportunities of urban and economic growth by providing geographical proximity to the city.

However, the slum dwellers find themselves trapped in poverty for generations because of multiple factors. Such factors include market failures, lack of acute governance and coordination problems that not only worsens the conditions of living for slum dwellers but also acts as an impediment to boost investment inertia to develop in social and human capital. Azariadis and Drazen (1990) [2] argues that a lack of investment inertia in the slums,

gives rise to a 'low skill-low equilibrium' situation for slum inhabitants. Low skilled slum labor force often do not meet the critical threshold to compete adequately in the labor market.

In a seminal paper by Murphy et. al.,(1989) [20], slum upgradation requires large private investments. The marginal returns from small upgradations are quite small. Moreover, there is a lack of general willingness on account of slum dwellers to pay for improved public goods in poor urban areas. Highly illiquid, informal property rights, lack of tenure and land titles provides disincentives for a typical slum household to improve the quality of dwellings. Such disincentives lead to decline in the quality of neighborhood around the slums.

Davis (2006) [9], using the example of Mumbai slums argues that an extreme coordination failures and a presence of 'governance gap' makes life in slums difficult. Governance mechanism are intrinsic to a slum dwellers life and often their absence is filled by private actors, bureaucratic entrepreneurs, gangs, and local agents which can lead to more entrenched tenancy rights. The non-government actors pursue a self interest of maintaining the status-quo of the slums. Slums often presents an opportunity for rent extraction. Proximity to the city life comes at a cost of unjustified high rent premiums extracted by slum landlords, non-state actors in absence of a formal public allocation mechanism.

I contribute to the research gap by investigating the multi-dimensional aspect of the lives of urban poor, in terms of tenure security, land titles, rents and the quality of dwelling when the 'governance gap' is filled by an acute public allocation mechanism at all tiers of political and administrative

layers. For this purpose, I study the effect of the nation-wide urban poor housing policy (JNNURM- IHSDP) of Government of India from 2005-2012. This was the largest standalone single policy framework of the decade 2000 with a national coverage for all urban areas of the country. In addition, all existing national policies were subsumed under this policy.

Many empirical studies explore the relationship between tenure security and investment in land in rural setting, (Banerjee et. al., 2002 [3]). I further, contribute to the literature by analyzing the relationship at the urban level.

Durand-Lasserve et. al. (2007) [11] argues that a formal land titles reduces tenure security for two reasons. Firstly, formal land titles allow for lawfully enforced evictions and secondly, such projects often benefits the 'slumlords' at the cost of hurting at the bottom of the pyramid. The informal ownership rights exerted by slumlords are well-recognized locally and can lead to outright evictions or increased rents in the titled areas. This finding lends support to the empirical findings of the research question, where I find that the slum households living in districts that benefited from the JNNURM-IHSDP policy saw an increase in their real rents by an average of 35%.

Barnhardt et al. (2017) [5] argue that the option of taking refuge in slums in the city is rather a choice. Demonstrating a case for public housing assignment in the city of Ahmedabad (India) the authors argues that relocation of slums is a welfare loss that rips them off their social capital, namely informal social insurance and ties. 34% of slum dwellers continued living in public housing and the remaining returned back to the slums after fourteen years of the housing assignment.

The JNNURM-IHSDP policy employed to investigate the research ques-

tion addresses major hurdles to public policy intervention that negatively affects the welfare returns from the development process of the slum life. The policy overcomes the conflict of interest between central government and municipal authorities, high transaction costs, opaque governance mechanism, enumerative hurdles of a representative slum population, genuine political commitment, legal recognition of informal/illegal slum squatters for an inclusive urban planning, encouragement of public- private partnership, enabling efficient functioning of land markets. Such factors are by definition different from market failures.

Land titles provides collateral for poor urban household giving them access to credit markets to finance small business investments and educate their children. This in turn encourages investments in home up keeping and upgradation. Such investments are viewed as safe by the households, (Hernando de Soto, 2000 [10]).

Using 2001 National Household Transportation Survey for US, Glaeser et al. (2008) [15] puts forward the linkages between the transportation networks and costs, as well as the centralization of poverty in urban areas or inner cities. The argument was also advocated by LeRoy and Sonstelie (1983) [18]. They argue that the income elasticity of demand for land is significantly lower for poor people than for the richer class. Hence, the authors validate the puzzle regarding the existence of urban poor in central cities. The importance of analyzing neighborhood characteristics owes to the fact that they can have significant effects on social economic outcomes as proposed by Durlauf (2003) [12] and Oreopoulos (2003) [22]. Feng et al. (2015) [14] and Cutler and Glaser (1997) [8] argue that spatial segregation of blacks and white in



terms of housing choices and neighborhood negatively affects employment and educational outcomes of blacks. This point is of particular interest to the study as I aim to investigate the heterogeneous impact of the policy on slum households with varying socio-economic background.

However, the majority of studies evaluating neighborhood effects either private housing market or public housing schemes seems to find a positive impact on quality of life and an ambiguous impact on economic outcomes. In general, they focus on poor people living in community or low tier houses. I explore a specific stratum of a lower social class, i.e., illegal and unorganized slums which are very common for many developing countries where a similar pattern can be seen.

For the purpose of the study, I use a novel comprehensive national sample household survey for years 2002, 2008 and 2012 conducted by national statistical office in India. The survey covers all types of households in India at village level but the information available to researchers is restricted to district level. The dataset is measured on various socio-economic variables of a household. The survey explicitly states the location area of the household. I consider households living in notified and non-notified slum areas. These households constitute as a typical slum household for this study. The surveys covers 5818 households in the year 2002, 7510 households in year 2008, and 5318 households in year 2012. The advantage of the data set is that the unit of survey is a household. Often such nation-wide repeated surveys are difficult to achieve. To the best of my knowledge, I have not come across any empirical studies that uses the same survey data. Most of the studies uses another slum survey data which does not cover household characteristics and

the unit of survey is a slum cluster instead of a household.

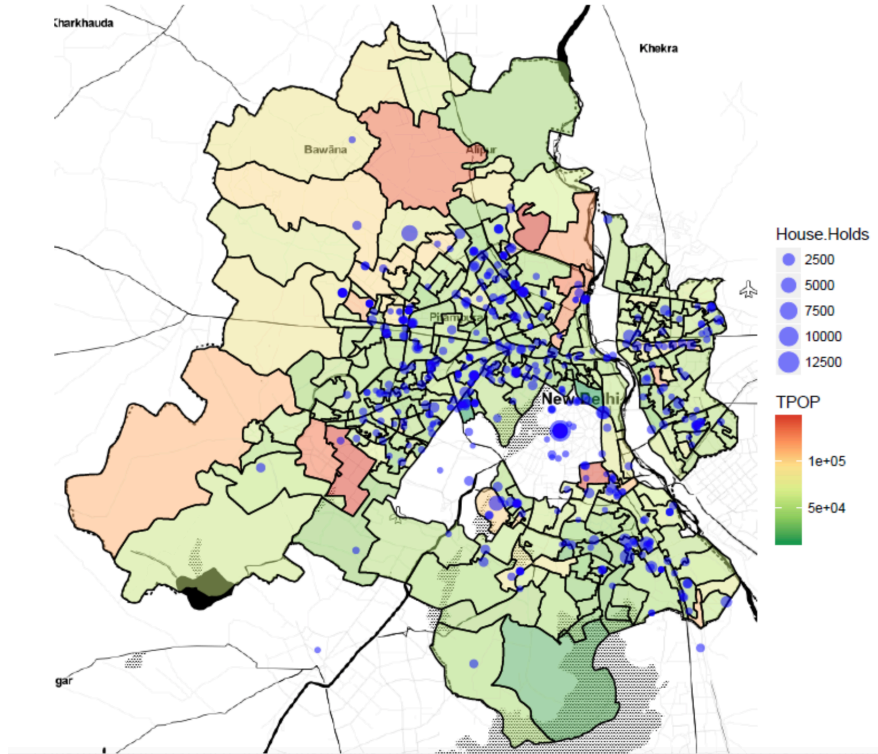
### 3 Slums in India

Slums are a global but surprisingly, an urban phenomenon. Slums in urban areas particularly, in big cities like Delhi in India, are a source of cheap labor supply for activities like chauffeur, vegetable vendors, domestic help etc.

According to the Slum (Improvement and Clearance) Act of 1956 a slum is a compact settlement with a collection of poorly built tenements, mostly of temporary nature, crowded together usually with inadequate infrastructure, inadequate sanitary and drinking water facilities in unhygienic conditions in that compact area (commonly known as Jhuggi Jhopri (JJ)).? These slums are segmented into various categories. The categorization of slums and minimum number of households required to be labeled as slum varies according to different agencies in India.

According to one of the national survey organization a slum pocket is defined as a cluster of minimum 20 households and is categorized as a notified or a non- notified slum. *Notified slums* are all areas subsumed under the slum act of 1956 as 'slums' or areas recognized as slum by State, UT Administration or Local Government, Housing and Slum Boards, which may have not been formally notified as slum under any act. For e.g., majority of Old Delhi (famously known as walled city) falls under this category. On the other hand, *non-notified slums* are squatter settlements called as Jhuggi Jhopri Clusters (JJC) and are considered to be an illegal encroachment on land (DUSIB 2010). Usually, over the years the government legalizes these

slums by either rehabilitating or by providing in-situ upgradation of these slums.



**Figure 1: Jhuggi Jhopri Clusters (JJC)/  
Non Notified Slum Clusters in Delhi**

Source: Author's own calculation. The figure maps the distribution of illegal slum clusters at the municipal ward level in Delhi, India. The blue dots represent the number of households in a particular slum cluster. The heat color pattern of the municipal ward represents the total population of the respective ward.

78% of slums are not located on private but built on public land owned by municipal bodies (54%), railways (14%), state government, or other public entities. Approximately 64% of slums are surrounded by residential areas (Government of the National Capital Territory of Delhi 2010, UNDP 2009 [26]). Census (2001) estimated that 16.3% of population in Delhi was located

in urban slums, which is higher than the national average of 14.8%. Other cities like Mumbai, Kolkata, Hyderabad, Bangalore, and Chennai are also witnessing an increase in the slum population. 66% of all statutory towns in India have slums, 17.4% of total urban households live in slums according to Census of India (2011). Over a quarter of urban population is poor with consumption below poverty line (Tendulkar 2009 [25]).

## 4 Data

In order to analyze the impact of the JNNURM-IHSDP policy, I construct a comprehensive repeated cross section dataset for year 2002, 2008, 2012 at the district level combining multiple datasets as described below.

### 4.1 Slum Household Data

National Sample Survey Office (NSSO) is an organization of the Ministry of Statistics and Program Implementation of the Government of India (MoSPI). NSSO conducts nationwide detailed household surveys on various socio-economic indicators in successive rounds for an assessment of housing stock and formulation of housing policies and programs. The collection of the data on housing condition of the dwelling units and basic housing amenities is available since 7<sup>th</sup> round (October 1953 - March 1954) to the 69<sup>th</sup> round (July 2012-December 2012).

The survey covers indicators of (i) household characteristics for e.g., household size, occupation, religion, social group, household type, endowments, tenurial type, dwelling location in which the dwelling unit is located,

distance to work, monthly per capita consumer expenditure, etc. (ii) particulars of living facilities, such as major source of drinking water, availability of bathroom, use of latrine, type of latrine, electricity for domestic use, etc. (iv) particulars of dwelling such as number of rooms, floor area of the dwelling, ventilation of the dwelling, total numbers of married couples in the household, kitchen type, floor type, wall type, roof type, etc. (v) particulars of construction and repair undertaken by the households during the last 365 days for residential purpose.

For the purpose of the study, I extract the information on households living in notified and non notified slum areas. The district-wise location of a household is known from year 2002 onwards. The variables of interest considered are house rents, type of slum, gender of the household head, tenurial status of the household, social group, distance to work, type of dwelling, and various well being indicators of a dwelling.

## 4.2 Policy Coverage Data

In January 2019, the Ministry of Housing and Urban Affairs (MoHUA) in India published a detailed monitoring report of successful housing projects at the town and city level for all districts in every Indian state.

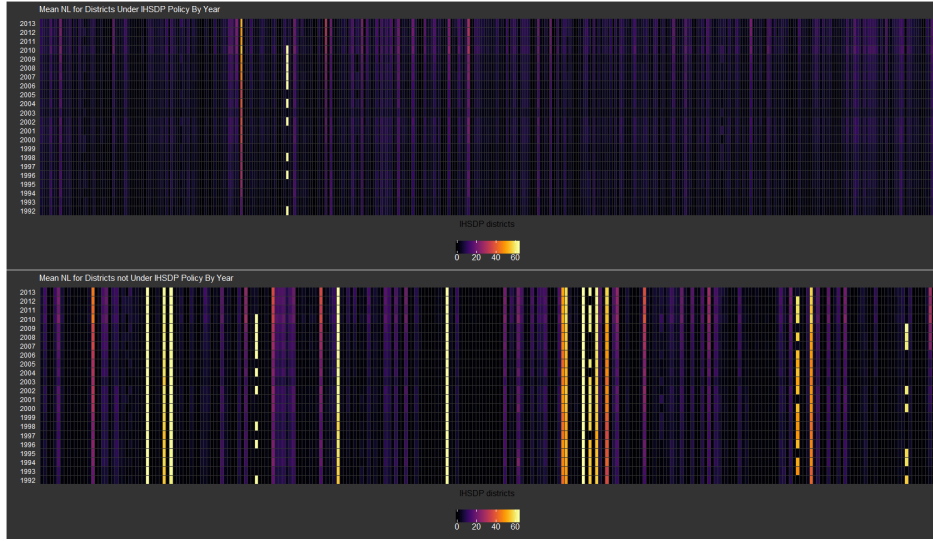
To identify a successful housing policy I consider every mentioned town or city where at least 50% or more of the completed dwelling units were taken into occupation by the beneficiary households. However, the report states both the number of sanctioned housing units and completed units along with the initial date of the sanctioned project. It may not be necessary that all

the sanctioned units have been completed until the end of the policy period 2012. Therefore, in order to get a true effect of the policy, I consider the occupation rate of the completed units.

If a town/city/urban area with at least 50% of dwelling take up rate falls within a certain district boundary, that district is classified as a treatment group,  $D$ . Districts that were not covered under the IHSDP policy are taken as control group.

### 4.3 Nighttime Light Activity Data

The official estimates for GDP are only available at state level which makes it harder to account for economic activity at district level. Therefore, in order to get economic activity at granular level of districts, I use a set of Nighttime Lights (NTL) as a proxy for district GDP. The US Air Forces (USAF) Defence Meteorological Satellite Program (DMSP) operates a series of satellites, which carry sensors that detect light emission from the earth's surface at night. A value of light intensity from 0 (darkest) to 63 (brightest) is for every pixel around the globe. Night lights is a reliable measure of not only economic activity but also for various socio-economic indicators e.g., poverty, income, spatial development, etc. around the world. (Elvidge et. al., 2012 [13]; Chakravarty and Dehejia 2017 [7]; Henderson et. al., 2012 [16]). I create a nighttime Light Intensity dataset for 631 districts for years 1992 to 2013 by spatially overlaying the luminosity data with the shape files of districts of India to obtain an average value of the illuminated pixels in the districts. Chakravarty and Dehejia (2017) [7], argue that there exists a



**Figure 2:** Nighttime Light Distribution of Districts in India

Source: Author's own calculation. The matrix plot depicts the distribution of nighttime light intensity in all districts of India by JNNURM policy status from year 1993-2013.

high, 75-80 % correlation between state light indices and state GDP across the years 1992 to 2013.

The matrix plot in Figure 2 shows the distribution of average nighttime light intensity over the period 1992-2013 separately for treated and control group. Each grid on the horizontal axis represents a district under the treated or control group. The vertical grid measures the nighttime light intensity of the districts in horizontal axis over different years. The average growth rate of all districts that were assigned the IHSDP policy grew at 8% over the time period 1992-2012, double than that of the districts in the control group.

I further merge all three datasets by states and districts to construct a final dataset for the empirical investigation. The final dataset contains 5818 distinct households for year 2002, 7510 distinct households for year 2008 and

5318 households for year 2012. There are 241 districts in the treated group and 123 districts in the control group.

## 5 The JNNURM Program

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched in 2005 as the single largest governance reform-driven initiative of the Government of India (GOI) for a planned development of Indian cities and towns. The mission was implemented in conjunction with Ministry of housing and Urban Poverty Alleviation (MoHUPA) along with the respective state governments, Urban Local Bodies (ULB), city-level institutions and private partnerships.

The mission initially covered seven-year period i.e. up to March 2012 which was extended up to March 2014 for completion of the already approved projects. During March 2013, the Mission period was extended by one more year i.e. up to March 2015 to complete.

To create economically productive, efficient, equitable and responsive cities, the Urban Renewal Mission focused on (i) improving and augmenting the economic and social infrastructure of cities; (ii) ensuring basic services to the urban poor including security of tenure at affordable prices; (iii) initiating wide-ranging urban sector reforms whose primary aim is to eliminate legal, institutional and financial constraints that have impeded investment in urban infrastructure and services; and (iv) strengthening municipal governments and their functioning in accordance with the provisions of the Constitution (seventy-fourth) Amendment Act, 1992. It provides for public disclosure of



local spending decisions together with earmarking of budgetary allocations for basic services to the poor.

The mission comprised of two components e.g. Basic Services for Urban poor (BSUP) and Integrated Housing and Slum Development Program (IHSDP) which aimed at integrated development of slums through projects for providing shelter, basic services and other related civic amenities with a view to providing utilities to the urban poor with governance reform as an overarching third component. Under both the components, the participatory state governments and the ULB were mandated to implement a set of (i) mandatory (ii) optional reforms in order to access financial help from the central ministry<sup>1</sup>.

The first component i.e. BSUP was implemented in 65 Mission Cities/Urban Agglomerations with more than four million population (Census 2001). These cities are at the forefront of economic importance (E.g, Mumbai, Delhi), cultural, religious and touristic importance (Eg, Varanasi, Amritsar). The second component i.e. IHSDP covered the remaining 887 cities/urban areas/small towns, relatively less developed than the identified 65 BSUP mission cities. The two components of JNNURM were mandated to pursue 3 key pro-poor reforms, namely (a) earmarking of 25% of municipal budget for the urban poor for provision of basic services including affordable housing to the urban poor; (b) implementation of 7- Point Charter, namely provision of land tenure, affordable housing, water, sanitation, education, health and social security to the poor in a time-bound manner ensuring convergence with other programs and (c) reservation of 25% of developed land in all housing

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<sup>1</sup>For details of the reforms, refer to the appendix concerning this chapter.

projects, public or private, critical for slum improvement. In order to implement the JNNURM-IHSDP program from year 2005-2012, repeal of the Urban Land (Ceiling and Regulation) Act (ULCRA) 1976 was done in different stages for different states. The interplay of JNNURM with this act is difficult to take into account directly due to the difficulty of accessing detailed data on ULCRA 1976. However, intuitively the JNNURM-IHSDP program data indirectly takes this into account since the monitoring report in detail mentions about the housing projects sanctioned, started and completed.

## **5.1 The JNNURM - IHSDP Scheme**

Under the IHSDP Program, the already existing pro-poor schemes like VAMBAY and NSDP were subsumed in order to implement a single comprehensive program nationwide. The IHSDP was designed to explicitly target urban slum dwellers from all sections of the society with the objective to provide a holistic slum development. These urban slum dwellers comprise of urban poor i.e., Economically Weaker Section (EWS) and Low-Income Groups (LIG).

### **5.1.1 The JNNURM - IHSDP Scheme: Governance Setup**

Slum dwellers in the urban agglomerations living in dilapidated conditions were eligible to provision of (i) affordable new houses, land tenure (ii) In-Situ slum upgradation and rehabilitation (iii) basic infrastructure facilities like water, sanitation, storm water drains, community bath, toilets, sewers, street lights (iv) community infrastructure like provision of community cen-

ters (for pre-school education, non-formal education, adult education, recreational activities), community primary health care center (v) social amenities like pre-school education, non-formal education, adult education, maternity, child health, health care including immunization and social security.

The scheme applied to towns and urban areas with elected local bodies and was implemented through a State level nodal agency, as appointed by the State Government. In addition, the State governments were authorized to prioritize towns and cities on the basis of their existing infrastructure, economically and socially disadvantaged sections of the slum population and difficult areas. However, the selection of the beneficiaries was made by the State level nodal agency or ULB's.

Detailed Project Reports (DPRs) were to be prepared by the implementing agencies for funding in order to access Central assistance (grant). Release of Central share to nodal agency was dependent on availability of State share and submission of utilization certificates in accordance with the provisions of General Financial Rules (GFRs).

The sharing of funds was distributed as 80:20 between Central Government and State Government/ULB/Parasatal agencies. The funds from the central ministry were allocated to the States on the basis of the States urban slum population to total urban slum population in the country.

States/Implementing Agencies were also allowed to raise their contribution from their own resources or from beneficiary contribution/ financial institutions. For special category States<sup>2</sup> the ratio of funding pattern between

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<sup>2</sup>special category States are North Eastern States and hilly States, namely Himachal Pradesh, Uttaranchal and Jammu and Kashmir

Center and the States was 90:10.

The State Governments, ULBs and parasatal agencies were required to execute a Memorandum of Agreement (MoA) with the Government of India committing to implement an agenda of reform program<sup>3</sup> both at the state level and ULB level. MoA laid down specific milestones to be achieved for each item of reform. Signing of this tripartite MoA was a necessary condition to access Central assistance.

### 5.1.2 The JNNURM - IHSDP Scheme: BENEFITS

The benefits accruing to the subsidized affordable housing included:

- The title of the land should be in the name of the female head of the household<sup>4</sup>
- Contribution by the beneficiary was stipulated to be 12% of the cost of housing in case of poor slum dwellers. In case, if a beneficiary belonged to the lower strata of social groups (caste system) namely, SC/ST/BC/OBC/PH, the contribution was reduced to 10%.
- A minimum dwelling area of 25 s.q. meters was allocated to the beneficiary. The constucted dwelling should include two room accommodation with kitchen and a toilet.
- Ceiling cost for a dwelling unit was 80,000 INR (approximately 1000 USD) per unit for cities. An additional, 12.5% was permissible for special category/hilly States and difficult/far flung areas.

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<sup>3</sup> refer to the appendix concerning this chapter

<sup>4</sup>In exceptional cases, title in the name of male beneficiary was permitted

- Amendment of Rent Control Laws balancing the interest of landlords and tenants.

### 5.1.3 The JNNURM - IHSDP Scheme: Rent Control Laws

Housing is a state subject in India. The enactment and enforcement of these laws vary from state to state. There have been three generations of rent control legislations, the first one being introduced in Bombay in 1918. The third generation law is the 'Model Rent Control Legislation' 1992 (MRCL) which are as follows:

- Prohibition of rent increases by the landlords beyond a standard limit ensured in the law.
- Tenure security and prohibition of unlawful evictions except in case of certain violations like non-permissible subletting, for bona fide by the landlord, wear and tear of the building and non payment of rents.

Amendment of rent control laws under JNNURM sought to revise certain provisions of rent laws that are as follows:

- Provision for the revision of rents over time since the rents were determined below the market or economic rents. The monetary value for such revisions varied from state to state.
- Due and timely payment of all property taxes by the landlords and timely payment of rents by the renter. The tenants are not obliged by law for day to day maintenance of the property.

Though only very few states adopted such amendments under the JNNURM program.

## 6 Identification Strategy

I investigate the multi-dimensional implications of the exposure to IHSDP program for the the slum households living in the exposed district. I study the direct and the indirect effect of the policy precisely, the housing rental expenditure, homeownership, women empowerment and the overall quality of dwelling. First, in purview of implementation of the rent control reforms as one of the mission mandates : *what is the impact of the reform on the average housing rents paid by the slum households exposed to the IHSDP program?* Second, *Did the policy (i) increase the probability of home-ownership for slum households, specifically for females, (ii) improved the overall quality of the occupied dwelling, along the provisions mentioned in the JNNUR-Mission*

A slum household in a district is exposed to the policy based on the detailed monitoring report of successful housing projects at the town and city level for all districts in each State (Ministry of Housing and Urban Affairs, Monitoring report, January 2019). To identify, a successful housing policy I consider every mentioned town or city where at least 50% or more of the completed dwelling units were taken into occupation by the beneficiary households. If a town/city/urban area with at least 50% of dwelling take up rate falls within a certain district boundary, the slum household in that district is classified as a treatment group,  $D$ . Slum households in districts that were not covered under the IHSDP policy are taken as control group. Thus, a successful take up rate in the urban area and the region (district) of residence jointly determines an individual's slum households exposure to the program. There are 7284 distinct households distributed over 123 districts

in the control group and 11086 distinct households in 241 districts in the treated group.

For identification, I exploit the difference-in-difference methodology to identify the parameter of interest,  $\delta$  that potentially allows for a causal interpretation. The empirical approach estimates the average treatment effect on treated.

I define the Time ( $T_i$ ) as the pre/post policy period as follows<sup>5</sup>:

$$T_i = \begin{cases} 1 & \text{if } t_i = 2008, 2012 \\ 0 & \text{if } t_i = 2002 \end{cases} \quad (1)$$

Similarly, the unit of Treatment ( $D_{ij}$ ) for individual slum household  $i$  in the district  $j$  and policy area/urban area  $k$ :

$$D_{ijk} = \begin{cases} 1 & \text{if } d_{ijk} = \text{IHSDP district} \\ 0 & \text{if } d_{ijk} = \text{No IHSDP district} \end{cases} \quad (2)$$

I test the following regression equation:

$$y_{ijk} = \alpha + \beta T_i + \gamma D_{ijk} + \delta(T_i * D_{ijk}) + \chi z'_i + \eta r_j + a_{jk} + \mu_{ijk} \quad (3)$$

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<sup>5</sup>The implementation of the policy could be stagnant since land is a state subject. However, to tackle this issue firstly, the data describes in detail the projects sanctioned, started and completed for all towns and states. Secondly, the estimated results are provided with State fixed effects.

In equation 3,  $y_{ijk}$ , is the outcome variable for the individual slum household  $i$  residing in district  $j$  and if exposed to the IHSDP policy area  $k$ . The outcome variables include logarithm of real rents, gender of the household, the tenurial status and the deprivation score of quality of dwelling, respectively. Equation 3 is estimated separately for each of the outcome variables mentioned. The coefficient of interest is  $\delta$ .  $\alpha$  and  $\mu_{ijk}$  denotes the constant and the idiosyncratic error term, respectively.

The  $\delta$  captures the average difference between the difference in outcome among the slum households residing in districts when exposed to the policy and the difference in outcome among the slum households residing in districts which were never exposed to the concerned policy, in both pre and post policy period.

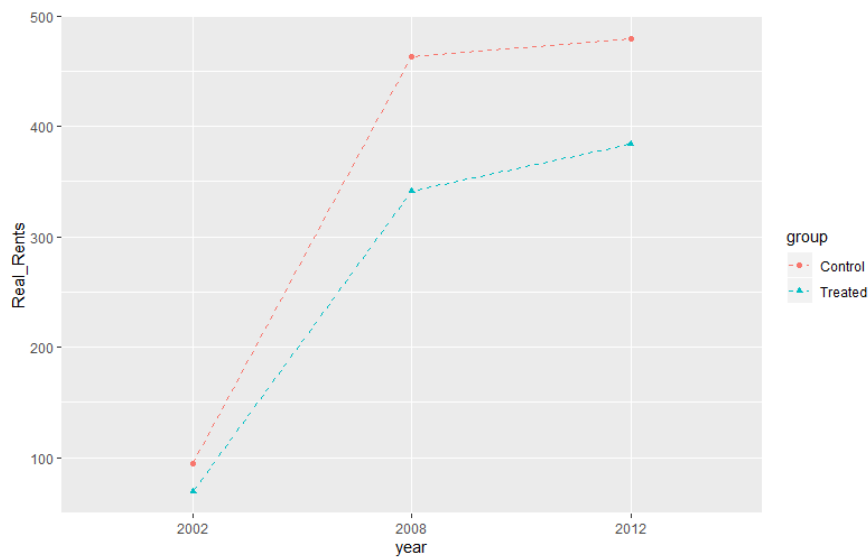
The regression equation 3 helps to remove biases associated with a common time trend unrelated to the exposure to the policy. It also removes biases in post-intervention period comparisons between the treatment and control group that could be the result from permanent differences between those groups. The estimates can be effected by individual household level characteristics like the type of slum area, social identity of the household etc. The  $z'_i$  is a vector of household level controls. The vector  $r_j$  specifies region specific controls: GDP and  $a_{jk}$ , is the region specific effect.

The underlying economic trends, political and institutional intensity of the program might vary across treated districts and control districts. Therefore, it can pose a potential threat to the identification of effect, violating the parallel trends assumption. However, a particular state can comprise of both the treated and control districts which implies that the underlying



social outlook of a particular state affects the district in a similar way.

A graphical visualization of the parallel trends assumption for logarithm of mean real rents over time for the treated group and the control group is demonstrated in Figure 3. Similarly, Figure 4 shows the distribution of nominal housing rents (in INR) of the slum households in the treatment and control groups, respectively.

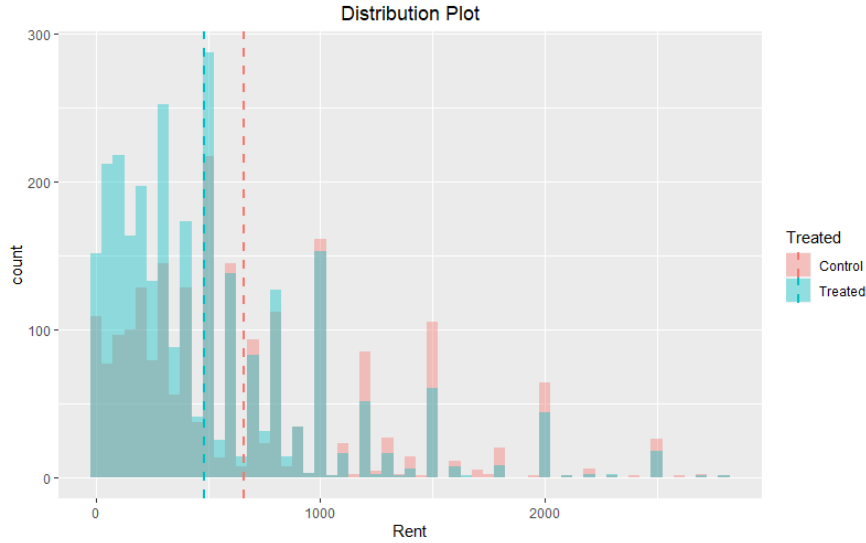


**Figure 3:** Mean Real Rents (INR): By Treatment Status

Source: Author's own calculation. The figure depicts the distribution of real rental expenditure for slum households in treated and controlled districts.

Empirical test of the assumption for each state (controlling for state level characteristics e.g., population, education enrollment socioeconomic characteristics) is left for a further investigation at a later stage.

Another potential threat to the underlying identifying assumption is the slum households may be influenced by the treatment status of the neighboring districts and may migrate to the districts exposed to treatment. An increased migration induces measurement error and bias the estimates of the program



**Figure 4:** Slum Housing Rents (in INR) Distribution Plot

Source: Author’s own calculation. The figure depicts the histogram of rental expenditure for slum households in the treated and controlled groups.

effects obtained by comparing the outcomes according a household’s district of residence (Rosenzweig and Wolpin, 1988 [23]). In order to address this issue, I make use of the survey question on migration where households were asked if they moved to the present area in the last one year. Approximately, 98% of the population responded as ‘being not migrated’. This is also evident from Table 1, the treated slum households stay an average of 6 more years in the district of residence.

As argued by Chakravarty and Dehejia (2017) [7], the nighttime light intensity dataset is a good measure of economic activity. The level of economic activity influences not only the house price dynamics but also influences the average consumption basket a typical household consumes. House rent dynamics can be explained by economic activity. Estimates in Table 4, suggests that the effect of economic activity is statistically significant but economi-

cally negligible on real rents.

## 7 Empirical Results

### 7.1 Descriptive Results

In Table 1, I present the summary statistics of the important variables that helps in building the identification. The number of male and females in a typical slum household is balanced. However, according to the Census of India 2011, the gender ratio is skewed towards male, accounting for 947 females per 1000 males. On average, the slum households in the districts exposed to the IHSDP policy incur a monthly rental expenditure of approximately 80 INR (1 USD) more than the slum households in the non exposed district. The average basket of consumption for the exposed households is higher in proportion to the average basket of goods consumed by households in the control group. The rationale behind such a pattern was inspected by the consumption puzzle in economics arguing a declining trend in consumption in urban India. Banerjee and Duflo (2011) [4], on the contrary attributed the decline in the trend as change in priorities of consumption good.

The average consumption expenditure estimate can be suggestive of the above mentioned evidence. The slums in treated and control group are located in urban areas. Slum households located in areas with much better economic perspectives are consuming on average less than the one located in areas with less economic development. The consumption disparity among the urban slum households can only be verified with further data item-wise

analysis of the consumption expenditure, which is out of the scope of this study.

The average area of a typical dwelling unit constructed in districts exposed to the policy is higher than the districts not exposed to the policy. The average dwelling size in the exposed districts is 268 sq.feet as compared to an average of 236 sq.feet, approximately. Availability of land and other supply side measures influences house price dynamics (Saiz, 2010 [24]). Areas with constrained land have higher house prices compared to non constrained areas. However, on the contrary the results in table 1, indicates that the districts with less economic activity have higher housing rents compared to the other urban areas of interest.

This gives further validity for the empirical investigation of the impact of policy on slum house rents. Table 4, provides statistical support in favor of the argument. The estimated effect of the economic activity in the current and the previous period is positive and statistically significant for some periods but the economic impact is negligible.

Changes in household demographic can also explain housing dynamics (Angelini et. al., 2014 [1]; Bourassa et. al., 2015 [6]). The survey defines the household as a group of people living together under the same roof and sharing a common kitchen. Therefore, these group of people constitute as the members of the household. The descriptive statistics indicates the change in the composition of the household over a period of one year both in the treated and controlled districts. The results are suggestive of the findings from many empirical and theoretical studies advocating slums as a social trap (Marx et. al., 2013 [19]). Slums act as avenues of escape from rural poverty but suffers

from low equilibrium social and human capital.

In Table 2, I present the summary statistics of the important variables that helps in constructing the 'Quality of Dwelling Deprivation Score' (QODDS). The quality of dwelling and basic services was an important rationale behind the JNNURM-IHSDP policy. I follow the methodology proposed by Nolan et. al. (2018) [21] and assign weights ranging from 0-2, in a decreasing order to the 15 most important indicators of a quality of a dwelling, namely, drinking water, bathroom, toilet, electricity, drainage, garbage disposal method, approach road to the dwelling, kitchen, roof, wall, floor, condition of the dwelling and quality of the dwelling.

For individual, indicators, I assign the highest weight if a household has a best quality indicator or the lowest, otherwise. Aggregating over different indicators for an individual household, I then construct an overall household level QODDS which ranges from 0 to 24.5.

The results from the Table 2, show that the slum household living in districts exposed to the policy area are on average overall worse off than the households in the control areas, by an approximately, 0.60 points. However, the treated households perform well on type of dwelling structure constructed by 0.10 points compared to the control group. Therefore, it provides a further evidence of the prevalence of the IHSDP policy implementation.

**Table 1: Descriptive Statistics I**

	group	vars	n	mean	sd	median	trimmed	min	max
<b>household composition</b>									
male	Control	8	11321	2.4	1.4	2.0	2.3	0.0	13.0
male	Treated	8	6856	2.5	1.4	2.0	2.3	0.0	16.0
female	Control	9	10716	2.3	1.4	2.0	2.2	0.0	17.0
female	Treated	9	6832	2.4	1.4	2.0	2.2	0.0	14.0
<b>household expenditure (INR)</b>									
Rent	Control	12	3509	601.7	689.2	400.0	476.2	0.0	10000.0
Rent	Treated	12	1565	638.9	620.1	500.0	536.5	0.0	6000.0
real rent(cpi)	Control	13	3509	290.0	390.2	137.9	210.9	0.0	4646.8
real rent(cpi)	Treated	13	1565	360.2	333.5	275.9	312.4	0.0	4137.9
nominal avg cons(monthly)	Control	15	11529	4178.1	3248.7	3200.0	3652.7	150.0	40000.0
nominal avg cons(monthly)	Treated	15	7031	4724.2	4522.7	3800.0	4131.2	106.0	200000.0
real avg cons(monthly)	Control	16	11529	1866.6	1876.3	1069.0	1543.9	31.1	17241.4
real avg cons(monthly)	Treated	16	7031	2649.3	2190.3	2206.9	2382.6	73.1	92936.8
<b>dwelling characteristics</b>									
no of living rooms	Control	17	11244	1.5	1.5	1.0	1.3	0.0	80.0
no of living rooms	Treated	17	6945	1.6	1.3	1.0	1.4	0.0	80.0
no of other rooms	Control	18	6576	1.4	1.5	1.0	1.3	0.0	90.0
no of other rooms	Treated	18	4818	1.6	1.0	1.0	1.6	0.0	9.0
<b>construction</b>									
floorarea (sqft)	Control	23	383	236.5	210.5	180.0	196.5	0.0	1500.0
floorarea (sqft)	Treated	23	71	268.1	213.3	220.0	235.7	0.0	900.0
<b>source of finance of construction</b>									
own	Control	30	4005	3853.8	27865.7	0.0	100.7	0.0	1100000.0
own	Treated	30	3965	1485.2	16037.3	0.0	0.0	0.0	450000.0
govt	Control	31	5835	554.7	8150.2	0.0	0.0	0.0	336000.0
govt	Treated	31	11	42454.5	28894.2	30000.0	39222.2	14000.0	100000.0
financial institutions	Control	32	9363	150.4	4287.9	0.0	0.0	0.0	250000.0
financial institutions	Treated	32	3965	480.5	11132.1	0.0	0.0	0.0	400000.0
moneylenders	Control	34	176	20556.9	31936.0	8000.0	12851.5	150.0	200000.0
moneylenders	Treated	34	45	28072.0	39129.3	11000.0	20541.6	500.0	200000.0
friends and relatives	Control	35	153	21031.6	35470.4	10000.0	14657.7	30.0	350000.0
friends and relatives	Treated	35	55	22541.8	33938.0	5000.0	16062.2	350.0	115000.0
others	Control	36	3581	148.1	2236.1	0.0	0.0	0.0	75000.0
others	Treated	36	3965	86.9	2226.2	0.0	0.0	0.0	100000.0
<b><math>\Delta</math>household composition (last365days)</b>									
members moved in	Control	40	5865	0.1	0.5	0.0	0.0	0.0	8.0
members moved in	Treated	40	3055	0.0	0.3	0.0	0.0	0.0	5.0
members moved out	Control	41	5969	0.0	0.3	0.0	0.0	0.0	9.0
members moved out	Treated	41	3055	0.0	0.3	0.0	0.0	0.0	5.0
stayduration_presentarea	Control	42	7869	20.5	16.6	16.0	18.5	0.0	99.0
stayduration_presentarea	Treated	42	3064	26.1	18.5	25.0	24.6	0.0	88.0
<b>mean nighttime lights</b>									
nl-t	Control	43	32938	19.2	21.0	7.9	16.1	0.0	63.0
nl-t	Treated	43	22172	7.0	4.7	6.2	6.4	0.3	49.0
nl-t-1	Control	44	32938	19.0	21.0	7.9	16.0	0.0	63.0
nl-t-1	Treated	44	22172	6.8	4.4	6.0	6.2	0.2	49.1
nl-t-2	Control	45	32938	18.7	20.7	7.5	15.6	0.0	63.0
nl-t-2	Treated	45	22172	6.6	4.8	5.2	6.0	0.2	53.8
nl-t-3	Control	46	32938	16.7	20.2	5.9	13.3	0.0	63.0
nl-t-3	Treated	46	22172	5.2	3.7	4.4	4.6	0.2	46.9

**Table 2:** Descriptive Statistics II

	group	n	mean	sd	median	trimmed	min	max
<b>Overall Score</b>								
QODDS1	Control	7284	8.10	3.80	8.00	7.90	0.00	22.00
QODDS2	Treated	11086	8.70	4.00	8.50	8.60	0.00	20.50
<b>Individual Score</b>								
Source of drinking water	Control	7283	0.30	0.60	0.00	0.20	0.00	2.00
Source of drinking water	Treated	11085	0.30	0.60	0.00	0.20	0.00	2.00
Bathroom	Control	7284	1.20	0.80	1.00	1.30	0.00	2.00
Bathroom	Treated	11085	1.40	0.80	2.00	1.40	0.00	2.00
Toilette	Control	5623	0.10	0.40	0.00	0.00	0.00	1.50
Toilette	Treated	7209	0.20	0.40	0.00	0.10	0.00	1.50
Electric wire	Control	6783	0.50	0.40	0.50	0.50	0.00	1.00
Electric wire	Treated	9880	0.60	0.40	0.50	0.60	0.00	1.00
Structure cond.	Control	7281	0.90	0.70	1.00	0.90	0.00	2.00
Structure cond.	Treated	11085	1.00	0.70	1.00	0.90	0.00	2.00
Structue type	Control	352	0.60	0.80	0.00	0.40	0.00	2.00
Structue type	Treated	573	0.50	0.80	0.00	0.40	0.00	2.00
Drainage	Control	7283	0.50	0.40	0.50	0.50	0.00	1.00
Drainage	Treated	11086	0.60	0.40	0.50	0.60	0.00	1.00
Garbage disposal	Control	7282	0.50	0.50	0.00	0.40	0.00	1.00
Garbage disposal	Treated	11086	0.50	0.50	0.00	0.50	0.00	1.00
Flooded last5yrs	Control	7282	0.20	0.40	0.00	0.10	0.00	1.00
Flooded last5yrs	Treated	11085	0.10	0.30	0.00	0.10	0.00	1.00
Approach road	Control	7282	0.70	0.70	0.50	0.60	0.00	2.00
Approach road	Treated	11084	0.70	0.70	1.00	0.70	0.00	2.00
Ventillation	Control	7281	1.20	0.70	1.00	1.30	0.00	2.00
Ventillation	Treated	11084	1.20	0.70	1.00	1.30	0.00	2.00
Kitchen	Control	7282	0.80	0.30	1.00	0.80	0.00	1.00
Kitchen	Treated	11082	0.80	0.30	1.00	0.80	0.00	1.00
Floor	Control	7284	0.40	0.70	0.00	0.20	0.00	2.00
Floor	Treated	11083	0.50	0.80	0.00	0.40	0.00	2.00
Wall	Control	7284	0.30	0.60	0.00	0.10	0.00	2.00
Wall	Treated	11085	0.40	0.60	0.00	0.30	0.00	2.00
Roof	Control	7284	0.50	0.50	0.50	0.40	0.00	2.00
Roof	Treated	11084	0.60	0.50	0.50	0.50	0.00	2.00

## 7.2 Effect on Real Rents

I estimate equation 4 with a linear model for two cohorts of slums households, those who live in districts exposed areas receiving the policy treatment and for those who do not.

$$y_{ijk} = \alpha + \beta T_i + \gamma D_{ijk} + \delta(T_i * D_{ijk}) + \chi z'_i + \eta r_j + a_{jk} + \mu_{ijk} \quad (4)$$

where,  $y_{ijk}$ , is the outcome variable for the individual slum household  $i$  residing in district  $j$  and if exposed to the IHSDP policy area  $k$ .  $T_i$  'policy period dummy' indicating the a value of 0 for households in 2002 and 1 for households in 2008 and 2012.  $D_{ijk}$  is the 'treatment dummy', which denotes a slum households exposure to the policy. As mentioned in the section above, household's exposure to the policy is the function of their residence of district and the urban area of the district that received the policy.  $\alpha$  and  $\mu_{ijk}$  denotes the constant and the idiosyncratic error term, respectively. The  $z'_i$  is a vector of household level controls. The vector  $r_j$  specifies region specific controls: GDP and  $a_{jk}$ , is the region specific effect.  $\delta$  is the parameter of the interest that captures the intended effect. In Table 3<sup>6</sup>, I present the estimates of equation 4. Columns (1)-(4) are based on an unbalanced panel.

The result in Table 3 suggest that a difference in difference framework, significantly explains the effect of the policy on the real rents for households that were exposed to the treated district during the period of policy coverage i.e., the average treatment effect on the treated. The policy coefficient is

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<sup>6</sup>I additionally mention year fixed effects in table 3. The results do not change in magnitude and direction after adding year fixed effects.



statistically significant at 5% significance level and is sizeable in economic terms. The policy has a positive effect on real rents. The real house rents for slums households exposed to the policy increases by an average of 18.2%.

**Table 3:** Policy Effect on Real Rents

	<i>Dependent variable: Real Rents (INR)</i>				
	<i>Linear Panel</i>			<i>OLS</i>	
	(1)	(2)	(3)	(4)	(5)
Treated	-0.518*** (0.043)	-0.224*** (0.040)	-0.688*** (0.042)	-0.506*** (0.082)	-0.173** (0.058)
Time				1.298*** (0.079)	1.278*** (0.068)
Policy				0.355*** (0.094)	0.182** (0.073)
Constant			5.355*** (0.031)	4.247*** (0.073)	4.295*** (0.071)
State Fixed Effects	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>
Year Fixed Effects	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>
Observations	5,039	5,039	5,039	5,039	5,039
R <sup>2</sup>	0.028	0.006	0.050	0.250	0.385
Adjusted R <sup>2</sup>	0.022	0.006	0.050	0.250	0.380
Residual S.E.			1.490	1.324	
F Statistic	145.042*** (df = 1; 5004)	31.931*** (df = 1; 5035)	265.419*** (df = 1; 5037)	560.060*** (df = 3; 5035)	84.446*** (df = 37; 5001)

*Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01  
(standard errors are clustered at the state level.)*

The individual and regional control variables, do not affect the policy coefficient. Table 4 to table 6 indicates that most of the individual level covariates has a significant impact on the policy coefficient. Slums household with a legal identity pay 22% more real rents than slums households with illegal identity. However, there seems to be a social disparity among the slum households belonging to different social groups. The group 'other backward

classes' is the lowest in the hierarchy of the caste system and the estimate for this group is captured by the constant term. Real rents are negatively related with the social identity of the a typical household. The effect is the largest for social group which is relatively better than the lowest group along the social dimensions. This is corroborative of the fact that the households at the lowest strata of the society are at a disadvantaged position.

However, Table 4<sup>7</sup> demonstrates that the level of economic activity has an economically negligible effect on the real house rents paid by the slum dwellers. The results holds the same for economic activity of previous few years. This further strengthens the claim that increase in real rents are driven by the policy effect. The fluctuations in the direction of the effect also reflects the fact that for certain years the clarity in the measurements of the nighttime lights from the satellite are obstructed by certain external elements.

Table 5<sup>8</sup> shows the effect of the locational choices on the real rents. Slum households living the 10-15 kms away from their place of work pay 16% significantly more compared to the one's who do not need to travel. The results stands contrary to the housing dynamics. Academic literature on housing argues that the housing rents are the highest near the employment hubs.

A possible reason for the results in Table 5, could be that the slums often squatter near the places of work, commercial districts and industrial areas. A

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<sup>7</sup>I additionally mention year fixed effects in table 4. The results do not change in magnitude and direction after adding year fixed effects.

<sup>8</sup>I additionally mention year fixed effects in table 5. The results do not change in magnitude and direction after adding year fixed effects.

presence of slum clusters deteriorates the land quality of such places thereby, decreasing the prices. Most of the slum clusters are found either on the public land or a government owned land (National Statistical Survey Office of India, 2008). This corroborates the empirical findings of Banhardt et. al. (2017) [5] who argue that slum households relocated to farther areas return back to the slums near their place of work after a period of 15 year.

Slum settlements not only provides proximity to the place of work but also provides a social network amongst the similar sections of society.

Slums living in houses with proper structure pay more rent as compared to ones living in improper structures, as suggested in Table 6<sup>9</sup>. In addition, slums households using their dwelling unit both for commercial and residential purpose pay 23%, approximately less real rents on average than the others. Often, such dwellings are of not so good quality which affects the price of the property.

In Table 7<sup>10</sup>, I further present a robust argument in advocacy of the policy coefficient by stating an explicit control experiment. I take a subsample of six<sup>11</sup> states in India that had stringent rent control reforms in place before the implementation of the IHSDP policy. As anticipated, the policy coefficient for a sample of these states is negative and is not statistically different from zero. This implies that the policy had no effect on real house rents for this cohort of treated districts. The policy coefficient for a sample of treated districts excluding districts from the above mentioned six states

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<sup>9</sup>I additionally mention year fixed effects in table 6. The results do not change in magnitude and direction after adding year fixed effects.

<sup>10</sup>I additionally mention year fixed effects in table 7. The results do not change in magnitude and direction after adding year fixed effects.

<sup>11</sup>six states are namely, Karnataka, Nagaland, Rajasthan, Manipur, Mizoram, Odisha.

is statistically significant, positively related and sizeable in economic terms. The coefficients in column (1) and (3) are similar and ranges from 0.35 to 0.43.

### 7.3 Effect on Homeownership and Household Head

I, estimate equation 5 with a linear probability model for the probability of a slum household becoming a homeowner or having a female as the head of the household.

$$y_{ijk} = \alpha + \beta T_i + \gamma D_{ijk} + \delta(T_i * D_{ijk}) + \chi z'_i + \eta r_j + a_{jk} + \mu_{ijk} \quad (5)$$

where,  $y_{ijk}$ , is the outcome dummy for homeownership or female as the household head for an individual slum household  $i$  residing in district  $j$  and if exposed to the IHS DP policy area  $k$ .  $T_i$  'policy period dummy' indicating a value of 0 for households in 2002 and 1 for households in 2008 and 2012.  $D_{ijk}$  is the 'treatment dummy', which denotes a slum households exposure to the policy. As mentioned in the section above, household's exposure to the policy is the function of their residence of district and the urban area of the district that received the policy.  $\alpha$  and  $\mu_{ijk}$  denotes the constant and the

**Table 4:** Policy Effect on Real Rents: Controls

	<i>Dependent variable: Log Real Rents</i>		
	(1)	(2)	(3)
Treated	-0.173*** (0.058)	-0.592*** (0.061)	-0.166*** (0.062)
Time	1.278*** (0.068)	1.202*** (0.109)	1.291*** (0.071)
Policy	0.182** (0.073)	0.327*** (0.080)	0.196** (0.078)
$\Delta$ Mean Nightlights <sub>t</sub>		-0.015*** (0.002)	
$\Delta$ Mean Nightlights <sub>t-1</sub>		0.0004 (0.0003)	
$\Delta$ Mean Nightlights <sub>t-2</sub>		0.002** (0.001)	
$\Delta$ Mean Nightlights <sub>t-3</sub>		-0.004* (0.002)	
$\Delta$ Mean Nightlights <sub>t-4</sub>		0.003** (0.001)	
$\Delta$ Mean Nightlights <sub>t-5</sub>		-0.004* (0.002)	
$\Delta$ Mean Nightlights <sub>t-6</sub>		0.005** (0.002)	
$\Delta$ Mean Nightlights <sub>t-7</sub>		0.002* (0.001)	
$\Delta$ Mean Nightlights <sub>t-8</sub>		0.001*** (0.0003)	
$\Delta$ Mean Nightlights <sub>t-9</sub>		0.001 (0.001)	
Male			0.028* (0.015)
Female			0.011 (0.015)
Slum type (1=Legal)			0.202*** (0.041)
Social group: others			0.087* (0.048)
Social group: scheduled caste			-0.194*** (0.053)
Social group: scheduled tribe			-0.088 (0.118)
Constant	4.295*** (0.072)	4.391*** (0.075)	4.047*** (0.094)
State Fixed Effects	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	5,039	5,039	4,338
R <sup>2</sup>	0.385	0.282	0.387
Adjusted R <sup>2</sup>	0.380	0.280	0.380
F Statistic	84.446***	141.164***	62.945***
F Statistic	(df = 37; 5001)	(df = 14; 5024)	(df = 43; 4294)

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(standard errors are clustered at the state level.)

**Table 5:** Policy Effect on Real Rents: Controls

	<i>Dependent variable:</i>	
	Log Real Rents	
Treated	-0.173*** (0.058)	-0.161*** (0.059)
Time	1.278*** (0.068)	1.325*** (0.069)
Policy	0.182** (0.073)	0.171** (0.074)
<i>Distance to work</i>		
not required to travel		-0.213*** (0.067)
less than 1 k.m.		-0.148** (0.060)
5 k.m. to 10 k.m.		0.038 (0.047)
10 k.m. to 15 k.m.		0.167*** (0.055)
15 k.m. to 30 k.m.		0.144** (0.065)
30 k.m. or more		0.111 (0.088)
Constant	4.295*** (0.072)	4.279*** (0.075)
State Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	5,039	5,022
R <sup>2</sup>	0.385	0.394
Adjusted R <sup>2</sup>	0.380	0.389
F Statistic	84.446*** (df = 37; 5001)	75.227*** (df = 43; 4978)

*Note:* \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(standard errors are clustered at the state level.)

**Table 6:** Policy Effect on Real Rents: Controls

<i>Dependent variable:</i>			
Log Real Rents			
Treated	-0.173*** (0.058)	-0.176*** (0.059)	-0.368*** (0.055)
Time	1.278*** (0.068)	1.294*** (0.068)	1.218*** (0.070)
Policy	0.182** (0.073)	0.166** (0.074)	0.171** (0.072)
Residential-cum -commercial		-0.213*** (0.066)	
Residential-cum -others		0.547** (0.218)	
Independent house			0.371*** (0.041)
Apartment			0.423*** (0.050)
Constant	4.295*** (0.072)	4.312*** (0.072)	3.977*** (0.053)
State Fixed Effects	Yes	Yes	No
Year Fixed Effects	Yes	Yes	Yes
Observations	5,039	5,037	5,036
R <sup>2</sup>	0.385	0.387	0.266
Adjusted R <sup>2</sup>	0.380	0.382	0.265
F Statistic	84.446*** (df = 37; 5001)	80.755*** (df = 39; 4997)	303.702*** (df = 6; 5029)

*Note:* \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(standard errors are clustered at the state level.)

**Table 7: Policy Effect on Real Rents:  
State-wise Policy Adoption**

	<i>Dependent variable: Log Real Rents</i>		
	<i>All States</i> (1)	<i>States before JNNURM</i> (2)	<i>States in JNNURM</i> (3)
Treated	-0.506*** (0.082)	0.212 (0.281)	-0.564*** (0.086)
Time	1.298*** (0.079)	2.170*** (0.246)	1.192*** (0.083)
Policy	0.355*** (0.094)	-0.490 (0.301)	0.435*** (0.099)
Constant	4.247*** (0.073)	3.717*** (0.235)	4.294*** (0.077)
Observations	5,039	598	4,441
R <sup>2</sup>	0.250	0.243	0.244
Adjusted R <sup>2</sup>	0.250	0.239	0.244
Residual S.E.	1.324	1.219	1.333
F Statistic	560.060*** (df = 3; 5035)	63.556*** (df = 3; 594)	478.313*** (df = 3; 4437)

*Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01  
(robust standard errors are reported in the paranthesis.)*



idiosyncratic error term, respectively. The  $z'_i$  is a vector of household level controls. The vector  $r_j$  specifies region specific controls: GDP and  $a_{jk}$ , is the region specific effect.  $\delta$  is the parameter of the interest that captures the intended effect.

In Table 8<sup>12</sup>, I present the estimates of equation 5 when the outcome variable is homeownership. Columns (1)-(3) are based on an unbalanced panel.

The estimate in Table 8, suggests that the policy increases the probability of becoming a homeowner significantly by 16.7 percentage points. In economic terms, the policy had a considerable successful impact of providing housing to the slums households. However, for a legal slum household the probability to become a homeowner is 3.8 percentage points more compared to the illegal slums. This finding is in line with the fact that the legal identity of households acts as an eligibility-incentive to avail of various government social schemes.

Table 9<sup>13</sup>, shows the estimates of equation 5 when the outcome variable is a dummy which take value 1 if a female is the household head . Columns (1)-(2) are based on an unbalanced panel.

One of the benefits accruing to the IHSDP scheme was that the female head of the household was entitled to be the owner of the dwelling constructed. Since, the data availability does not capture a direct variable to measure the effect of the policy on this front, I therefore, use a variable which

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<sup>12</sup>I additionally mention year fixed effects in table 8. The results do not change in magnitude and direction after adding year fixed effects.

<sup>13</sup>I additionally mention year fixed effects in table 9. The results do not change in magnitude and direction after adding year fixed effects.

can be suggestive of the above fact. A household was asked to report the gender of the head of the household. As evident from Table 9, the policy increased the probability of a female being the head of the household by 2.4 percentage points. Moreover, this effect does not vary with the legal status of the slum household.

The impact of the policy is statistically different from zero at 5% significance level for both homeownership and women empowerment.

#### 7.4 Effect on Quality of Dwelling

I estimate equation 6 with a linear model to test for the improvement in the quality of dwelling of a slum household.

$$y_{ijk} = \alpha + \beta T_i + \gamma D_{ijk} + \delta(T_i * D_{ijk}) + \chi z'_i + \eta r_j + a_{jk} + \mu_{ijk} \quad (6)$$

where,  $y_{ijk}$ , is the outcome variable logarithm of 'Quality of Dwelling Deprivation Score' (QODDS) for an individual slum household  $i$  residing in district  $j$  and if exposed to the IHSDP policy area  $k$ .  $T_i$  'policy period dummy' indicating the a value of 0 for households in 2002 and 1 for households in 2008 and 2012.  $D_{ijk}$  is the 'treatment dummy', which denotes a slum households exposure to the policy. As mentioned in the section above, household's exposure to the policy is the function of their residence of district and the urban area of the district that received the policy.  $\alpha$  and  $\mu_{ijk}$  denotes the constant

**Table 8:** Policy Effect on Tenure

	<i>Dependent variable: Tenure</i>		
	<i>(1= Homeowner)</i>		
	(1)	(2)	(3)
Treated	-0.078*** (0.014)	-0.078*** (0.014)	-0.137*** (0.022)
Time	-0.178*** (0.014)	-0.178*** (0.014)	-0.317*** (0.021)
Policy	0.167*** (0.016)	0.168*** (0.016)	0.251*** (0.025)
Slum type <i>(1=Legal)</i>		0.038*** (0.008)	-0.118*** (0.023)
Legal*Time*Treated			-0.131*** (0.033)
Legal*Treated			0.089*** (0.028)
Legal*Time			0.220*** (0.027)
Constant	0.672*** (0.017)	0.639*** (0.018)	0.741*** (0.022)
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	18,370	18,370	18,370
Log Likelihood	-12,131.510	-12,118.660	-12,075.170
Akaike Inf. Crit.	24,339.020	24,315.330	24,234.340

*Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(standard errors are clustered at the state level.)*

**Table 9:** Policy Effect on Gender of the hhd head

<i>Dependent variable: Gender of hhd head</i>		
<i>(1 = Female)</i>		
	(1)	(2)
Treated	-0.007 (0.009)	-0.007 (0.009)
Time	0.041*** (0.010)	0.041*** (0.010)
Policy	0.024** (0.011)	0.024** (0.011)
Slum type <i>(1 = Legal)</i>		0.003 (0.005)
Constant	0.133*** (0.012)	0.130*** (0.013)
State Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	18,366	18,366
R <sup>2</sup>	0.019	0.019
Adjusted R <sup>2</sup>	0.017	0.017
Residual Std. Error	0.325	0.326
F Statistic	9.642*** (df = 37; 18328)	9.395*** (df = 38; 18327)

*Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(standard errors are clustered at the state level.)*

and the idiosyncratic error term, respectively. The  $z'_i$  is a vector of household level controls. The vector  $r_j$  specifies region specific controls: GDP and  $a_{jk}$ , is the region specific effect.  $\delta$  is the parameter of the interest that captures the intended effect.

The initially constructed QODDS score ranges from 0 to 24.5 where a lower values score indicates an improvement in the overall quality and higher score indicates, otherwise. The overall score is constructed using 15 most important indicators <sup>14</sup> of quality of dwelling. Each of the indicator is assigned a value of 0 to 2, in a similar decreasing manner. The methodology adopted corresponds to Nolan et al. (2018) [21]. To create a final QODDS score which is the outcome variable used in equation 6, I divide the initial score of each household by 24.5 and multiply with 100.

In Table 10<sup>15</sup>, I present the estimates of equation 6. The results in the column (1) are based on an unbalanced panel. The policy did not improve the overall quality of dwelling score. The policy deteriorates the quality of the dwelling score by 8.5%. The policy coefficient is statistically significant at 1% significance level and is sizeable in economic terms. In addition, being a legal slum household improves the quality of dwelling by 23% approximately, an estimate of significantly sizeable economic impact. This result corresponds to the finding of Nolan et al. (2018) [21], using slum level dataset for the same time period arguing in the same direction. However, being a homeowner also

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<sup>14</sup>15 important indicators are namely, source of drinking water, availability of bathroom, availability of toilette, type of electric wire, type of drainage, method of garbage disposal, if the household experienced a flood, condition of the approach road to the dwelling, type of ventilation, floor type, wall type, roof type, structure type and the type of kitchen.

<sup>15</sup>I additionally mention year fixed effects in table 10. The results do not change in magnitude and direction after adding year fixed effects.

significantly improves the quality of dwelling by 2.4%.

Another interesting finding in Table 10, shows that an ownership of the land given by the variable, 'land possessed'<sup>16</sup> by a household significantly improves the quality of the dwelling by a range of approximately, 8% to 42%, depending on the size of land owned. Ownership of the land can provide incentives to an individual household to voluntarily invest in the quality of their dwelling over and above the government social incentives. Such a finding highlights the importance of tenure security which can enhance the voluntary participation required by the slum households to ensure the success of social reforms. It also act as a strong catalyst in upgrading the standard of living of the urban poor.

I further investigate the improvement in the quality score at individual indicator level. The results are presented in Table <sup>17</sup> 11, 12 and 13. For an individual slum household the policy has a positive and statistically significant impact on indicators concerning bathroom, own kitchen and infrastructural facilities like flood status of the household, improvement in the type of approach road to the slum household and location of the household.

The estimates for the average score ranges from -1.2% to -9.3%. This indicates a partial success of the policy for all kinds of slum households and is suggestive of underlying various political and administrative hurdles in the implementation of the policy. However, a legal slum household on average

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<sup>16</sup>As defined by statistical office (NSSO) - "Land possessed is given by land owned (including land under owner like possession) + land leased in - land leased out + land held by the household but neither owned nor leased in (e.g., encroached land). However, from the survey data it is not clear if the land owned takes care of the valuation of the dwelling.

<sup>17</sup>I additionally mention year fixed effects in table 11, 12 and 13. The results do not change in magnitude and direction after adding year fixed effects.

has much better conditions of dwelling on all indicators with statistically significant and economically sizeable impact. The reason for the macro and micro success of the dwellings in the legalized slums is their status authorization. Legal slums are the front runners to avail any kind of government policies and schemes.

**Table 10:** Policy Effect on Quality of Dwelling

	<i>Quality of Dwelling Deprivation Score</i> <sup>1</sup>
	(1)
Treated	-0.035** (0.016)
Time	-0.242*** (0.017)
policy	0.085*** (0.019)
Slumtype (1=Legal)	-0.229*** (0.009)
Tenurial status (1=Homeowner)	-0.024*** (0.009)
Land possessed (0.02-0.21h)	-0.131*** (0.021)
Land possessed (0.21-0.41h)	-0.080** (0.036)
Land possessed (0.41-1.01h)	-0.051 (0.035)
Land possessed (1.01-2.01h)	-0.259*** (0.053)
Land possessed (2.01-3.01h)	-0.404*** (0.064)
Land possessed (3.01-4.01h)	-0.420*** (0.094)
Land possessed (4.01-6.01h)	-0.374*** (0.135)
Land possessed (6.01-8.01h)	-0.249* (0.147)
Land possessed (>=8.01h)	-0.641*** (0.157)
Land possessed (<0.005h)	0.121*** (0.010)
Constant	3.432*** (0.023)
State Fixed Effects	Yes
Year Fixed Effects	Yes
Observations	18,334
R <sup>2</sup>	0.182
Adjusted R <sup>2</sup>	0.180
F Statistic	82.944*** (df = 49; 18284)

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(robust standard errors are reported in the paranthesis.)

<sup>1</sup> 'h' means hectares. The deprivation score ranges from 0 to 100.  
The quality of dwelling improves as the score approaches towards 0.



**Table 11: Policy Effect on Quality of Dwelling:  
By Individual Characteristic**

	Quality of Dwelling Deprivation Score <sup>1</sup>				
	Source of drinking water (1)	Bathroom (2)	Toilette (3)	Electric wire (4)	Drainage (5)
Treated	-0.090*** (0.011)	0.054*** (0.013)	-0.041*** (0.011)	-0.033*** (0.008)	-0.010 (0.008)
Time	-0.020* (0.011)	-0.107*** (0.013)	-0.076*** (0.011)	-0.128*** (0.008)	-0.162*** (0.008)
Policy	0.088** (0.012)	-0.050*** (0.015)	0.069*** (0.013)	0.080*** (0.009)	0.115*** (0.009)
Slum type ( <i>l=Legal</i> )	-0.044*** (0.005)	-0.116*** (0.007)	-0.030*** (0.005)	-0.053*** (0.004)	-0.125*** (0.004)
Constant	0.318*** (0.014)	0.791*** (0.016)	0.161*** (0.012)	0.340*** (0.010)	0.557*** (0.010)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	18,368	18,369	12,832	16,663	18,369
R <sup>2</sup>	0.145	0.112	0.139	0.201	0.172
Adjusted R <sup>2</sup>	0.143	0.110	0.136	0.199	0.170
F Statistic	81.650*** (df = 38; 18329)	60.991*** (df = 38; 18330)	54.343*** (df = 38; 12793)	110.042*** (df = 38; 16624)	99.897*** (df = 38; 18330)

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$   
(standard errors are clustered at the state level.)

<sup>1</sup> The deprivation score ranges from 0 to 100.

The quality of dwelling improves as the score approaches towards 0.

**Table 12: Policy Effect on Quality of Dwelling:  
By Individual Characteristic**

	Quality of Dwelling Deprivation Score <sup>1</sup>				
	Garbage disposal (1)	Flooded (2)	Approach road (3)	Ventilation (4)	Floor (5)
Treated	-0.067*** (0.010)	0.007 (0.007)	0.042*** (0.012)	-0.0002 (0.012)	-0.043*** (0.014)
Time	-0.011 (0.010)	0.040*** (0.007)	-0.041*** (0.012)	-0.058*** (0.012)	-0.115*** (0.013)
Policy	0.115*** (0.011)	-0.093*** (0.008)	-0.039*** (0.014)	-0.012 (0.013)	0.116*** (0.016)
Slum type (1=Legal)	-0.112*** (0.005)	-0.030*** (0.004)	-0.092*** (0.006)	-0.065*** (0.006)	-0.081*** (0.007)
Constant	0.299*** (0.012)	0.096*** (0.009)	0.326*** (0.014)	0.722*** (0.015)	0.285*** (0.015)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	18,368	18,367	18,366	18,365	18,367
R <sup>2</sup>	0.178	0.102	0.116	0.073	0.114
Adjusted R <sup>2</sup>	0.177	0.100	0.115	0.071	0.112
F Statistic	104.800*** (df = 38; 18329)	54.487*** (df = 38; 18328)	63.544*** (df = 38; 18327)	37.804*** (df = 38; 18326)	61.845*** (df = 38; 18328)

Note: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

(standard errors are clustered at the state level.)

<sup>1</sup> The deprivation score ranges from 0 to 100.

The quality of dwelling improves as the score approaches towards 0.

**Table 13: Policy Effect on Quality of Dwelling:  
By Individual Characteristic**

	Quality of Dwelling Deprivation Score <sup>1</sup>				
	Wall (1)	Roof (2)	Structure condit. (3)	Structure type (4)	Kitchen (5)
Treated	0.027** (0.012)	0.006 (0.010)	-0.023* (0.012)	-0.027 (0.044)	0.004 (0.006)
Time	-0.079*** (0.011)	-0.098*** (0.010)	-0.056*** (0.012)	-0.041 (0.050)	-0.038*** (0.006)
Policy	0.042*** (0.013)	0.026** (0.011)	0.005 (0.014)	-0.016 (0.063)	-0.012* (0.007)
Slum type (1=Legal)	-0.100*** (0.006)	-0.108*** (0.005)	-0.099*** (0.006)	-0.174*** (0.029)	-0.024*** (0.003)
Constant	0.242*** (0.013)	0.422*** (0.013)	0.474*** (0.015)	0.454*** (0.058)	0.560*** (0.008)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	18,369	18,368	18,366	925	18,364
R <sup>2</sup>	0.112	0.110	0.106	0.172	0.079
Adjusted R <sup>2</sup>	0.111	0.108	0.105	0.142	0.077
F Statistic	61.111*** (df = 38; 18330)	59.818*** (df = 38; 18329)	57.462*** (df = 38; 18327)	5.793*** (df = 32; 892)	41.113*** (df = 38; 18325)

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

(standard errors are clustered at the state level.)

<sup>1</sup> The deprivation score ranges from 0 to 100.

The quality of dwelling improves as the score approaches towards 0.

## 8 Concluding Remarks

The JNNURM-IHSDP policy of housing and service provisioning to slum dwellers significantly increased the probability of homeownership rate by 16.7 percentage points. As envisaged by the policy, a female was 2.4 percentage points more likely to be the head of the household after the reform. However, the estimates suggest the rental reform aspect of the program increased the real rents by 18.2%. This was contrary to objective of the mission. Hence, the analysis provide a strong support for evidence of market failures that act as an impediment to an efficient functioning of housing markets in slum areas. The results further lends support to the heterogeneous impact of the policy across different types of slums, where slums with legal identity benefit more than the ones without the legal identity. Variations in socio economic status of a slum household can also explain the heterogeneity of the impact.

However, there are certain limitations that needs to be further addressed in the empirical investigation. Stable Unit Treatment Value Assumption should be tested empirically. I would in future test the validity of the results by using other datasets e.g., census and panel census IHSDS. Controlling for other district level variables like slum population, social amenities, regional proportion of social groups is an important exercise that needs to be further carried out. Another issue that may arise is that the presence of other state level pro poor policies might effect the validity of the results. However, such an empirical investigation needs an exhaustive data which is hard to attain at this level. Moreover, all the prior national and subnational policies were subsumed under the umbrella of JNNURM lending confidence in the results.

## References

- [1] Angelini, Viola, Brugiavini, Agar, and Weber, Guglielmo. “The dynamics of homeownership among the 50+ in Europe”. In: *Journal of Population Economics* 27.3 (2014), pp. 797–823.
- [2] Azariadis, Costas and Drazen, Allan. “Threshold externalities in economic development”. In: *The Quarterly Journal of Economics* 105.2 (1990), pp. 501–526.
- [3] Banerjee, Abhijit V, Gertler, Paul J, and Ghatak, Maitreesh. “Empowerment and efficiency: Tenancy reform in West Bengal”. In: *Journal of political economy* 110.2 (2002), pp. 239–280.
- [4] Banerjee, Abhijit and Duflo, Esther. “More than 1 billion people are hungry in the world”. In: *Foreign Policy* 186 (2011), pp. 66–72.
- [5] Barnhardt, Sharon, Field, Erica, and Pande, Rohini. “Moving to opportunity or isolation? network effects of a randomized housing lottery in urban india”. In: *American Economic Journal: Applied Economics* 9.1 (2017), pp. 1–32.
- [6] Bourassa, Steven C et al. “Determinants of the homeownership rate: An international perspective”. In: *Journal of Housing Research* 24.2 (2015), pp. 193–210.
- [7] Chakravarty, PRAVEEN and Dehejia, Vivek. “India’s Income Divergence: Governance or Development Model?” In: *Briefing paper* 5 (2017).

- [8] Cutler, David M and Glaeser, Edward L. “Are ghettos good or bad?” In: *The Quarterly Journal of Economics* 112.3 (1997), pp. 827–872.
- [9] Davis, Mike. “Planet of slums”. In: *New Perspectives Quarterly* 23.2 (2006), pp. 6–11.
- [10] De Soto, Hernando. *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. Civitas Books, 2000.
- [11] Durand-Lasserve, Alain et al. “Social and economic impacts of land titling programmes in urban and peri-urban areas: a review of the literature”. In: *World Bank Urban Research Symposium, Washington DC, May*. 2007.
- [12] Durlauf, Steven N. “Neighborhood effects”. In: *Handbook of regional and urban economics*. Vol. 4. Elsevier, 2004, pp. 2173–2242.
- [13] Elvidge, Christopher D et al. “The Night Light Development Index (NLDI): a spatially explicit measure of human development from satellite data”. In: *Social Geography* 7.1 (2012), pp. 23–35.
- [14] Feng, Xiaoqi, Flowerdew, Robin, and Feng, Zhiqiang. “Does neighbourhood influence ethnic inequalities in economic activity? Findings from the ONS Longitudinal Study”. In: *Journal of Economic Geography* 15.1 (2013), pp. 169–194.
- [15] Glaeser, Edward L, Kahn, Matthew E, and Rappaport, Jordan. “Why do the poor live in cities? The role of public transportation”. In: *Journal of urban Economics* 63.1 (2008), pp. 1–24.

- [16] Henderson, J Vernon, Storeygard, Adam, and Weil, David N. “Measuring economic growth from outer space”. In: *American economic review* 102.2 (2012), pp. 994–1028.
- [17] Katz, Lawrence F, Kling, Jeffrey R, and Liebman, Jeffrey B. “Moving to opportunity in Boston: Early results of a randomized mobility experiment”. In: *The Quarterly Journal of Economics* 116.2 (2001), pp. 607–654.
- [18] LeRoy, Stephen F and Sonstelie, Jon. “Paradise lost and regained: Transportation innovation, income, and residential location”. In: *Journal of Urban Economics* 13.1 (1983), pp. 67–89.
- [19] Marx, Benjamin, Stoker, Thomas, and Suri, Tavneet. “The economics of slums in the developing world”. In: *Journal of Economic Perspectives* 27.4 (2013), pp. 187–210.
- [20] Murphy, Kevin M, Shleifer, Andrei, and Vishny, Robert W. “Industrialization and the big push”. In: *Journal of political economy* 97.5 (1989), pp. 1003–1026.
- [21] Nolan, Laura B, Bloom, David E, and Subbaraman, Ramnath. “Legal Status and Deprivation in Urban Slums over Two Decades”. In: *Economic and political weekly* 53.15 (2018), p. 47.
- [22] Oreopoulos, Philip. “The long-run consequences of living in a poor neighborhood”. In: *The quarterly journal of economics* 118.4 (2003), pp. 1533–1575.

- [23] Rosenzweig, Mark R and Wolpin, Kenneth I. “Heterogeneity, intrafamily distribution, and child health”. In: *Journal of human resources* (1988), pp. 437–461.
- [24] Saiz, Albert. “The geographic determinants of housing supply”. In: *The Quarterly Journal of Economics* 125.3 (2010), pp. 1253–1296.
- [25] Tendulkar, Suresh D, Radhakrishna, R, and Sengupta, Suranjan. “Report of the expert group to review the methodology for estimation of poverty”. In: *Government of India, Planning Commission* 32 (2009).
- [26] UNDP, UN. “Human Development Report 2009 Overcoming Barriers: Human Mobility and Development”. In: *United Nations Development Programme* (2009).



## 9 Appendix

## 9.1 Variables Definition

Table 14: Definition of Variables

Variable Name	Definition	Source
Nighttime lights	Index of night time light radiation The index take a value fom 0 (darkest) to 63 (brightest)	NOAA DMSP
Policy coverage	JNNURM city wise monitoring report	MoHUA
Rents	Monthly rent	Housing Conditions Survey (NSSO)
Males	Household size: male	Housing Conditions Survey (NSSO)
Females	Household size: female	Housing Conditions Survey (NSSO)
Nominal avg cons	Average monthly consumer expenditure (Rs. in whole no.)	Housing Conditions Survey (NSSO)
No of living rooms	Number of rooms in the dwelling: living rooms	Housing Conditions Survey (NSSO)
No of other rooms	Number of rooms in the dwelling: other rooms	Housing Conditions Survey (NSSO)
Floorarea (sqft)	Floor area of the dwelling	Housing Conditions Survey (NSSO)
Finance	Source of finance of construction during last 5 years: own	Housing Conditions Survey (NSSO)
Finance	Source of finance of construction during last 5 years: govt.	Housing Conditions Survey (NSSO)
Finance	Source of finance of construction during last 5 years: financial institutions	Housing Conditions Survey (NSSO)
Finance	Source of finance of construction during last 5 years: moneylenders	Housing Conditions Survey (NSSO)
Finance	Source of finance of construction during last 5 years: friends and relatives	Housing Conditions Survey (NSSO)
Finance	Source of finance of construction during last 5 years: others	Housing Conditions Survey (NSSO)
Move in	No. of members who moved into the household during last 365 days	Housing Conditions Survey (NSSO)
Move out	No. of members who moved out of the household during last 365 days	Housing Conditions Survey (NSSO)
Stayduration	Duration of stay in the slum (years)	Housing Conditions Survey (NSSO)
Source of drinking water	Major source of drinking water	Housing Conditions Survey (NSSO)
Bathroom	Type of bathroom	Housing Conditions Survey (NSSO)
Toilette	Type of toilette	Housing Conditions Survey (NSSO)
Electric wire	Type of electric wiring	Housing Conditions Survey (NSSO)
Structure cond.	Condition of structure	Housing Conditions Survey (NSSO)
Structure type	Type of structure	Housing Conditions Survey (NSSO)
Drainage	Drainage arrangement	Housing Conditions Survey (NSSO)
Garbage disposal	Type of garbage disposal (urban) method	Housing Conditions Survey (NSSO)
Flooded last5yrs	Whether experienced any flood during last 5 years?	Housing Conditions Survey (NSSO)
Approach road	Type of approach road / lane / constructed path	Housing Conditions Survey (NSSO)

Table 15: Definition of Variables

Variable Name	Definition	Source
Ventilation Kitchen Floor Wall Roof Slum type Social group	Ventilation of the dwelling unit Kitchen type Floor type Wall type Roof type Area type in which the house is located Type of social group	Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO)
Distance to work	Maximum distance (in km) to the place of work normally travelled by any member of the household	Housing Conditions Survey (NSSO)
Residential-cum-others/commercial Independent/apartment house Tenure Gender head Land possessed	Use of house Type of the dwelling Ownership of the dwelling Gender of the head of household Area of land possessed (0.00 ha)	Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO) Housing Conditions Survey (NSSO)

## 9.2 Descriptive Graph



**Figure 5:** Tenure Choice

Source: Author's own calculation. The graph depicts the distribution of the growth rate of nighttime light intensity from year 1992-2013 in controlled and treated districts.

### 9.3 Survey Methods and Sample Design

NSSO adopts the similar methodology for all surveys, however, little differences might exist. The methodology of NSSO urban slum survey can be described as follows.

*Outline of sample design:* A stratified multi-stage design was adopted for all surveys. The first stage units (FSUs) in the urban sector were Urban Frame Survey (UFS) blocks. For the survey of slums, there was unlike the other consumption surveys, no second stage of sampling involved for the selection of households. Nevertheless, the paragraphs that follow will refer to the sampling units for the slum survey as FSUs.

*Sampling Frame for First Stage Units:* For the urban sector, the list of latest updated/available Urban Frame Survey (UFS) blocks was considered as the sampling frame.

*Stratification in Urban sector:* Within the urban areas of a district, each town with population of 10 lakhs or more as per population census 2011 formed a separate basic stratum and the remaining urban areas of the district were together considered as another basic stratum.

Sub-Stratification: Each stratum was divided into 2 sub-strata as follows:

sub-stratum 1: all UFS blocks having area type slum areas  
sub-stratum 2: remaining UFS blocks

*Total sample size (FSUs):* A total number of 306 UFS blocks formed the state sample as against the 153 UFS blocks in the central sample.

*Allocation to strata/sub-strata:* Within each sector of a state/UT, the sample size was allocated to the different strata in proportion to the 12 stratum populations as per Census. Stratum allocations were distributed among the two sub strata in proportion to the number of blocks in the sub strata. The minimum allocation for each sub strata was 2. Equal number of samples had been allotted among the two sub rounds.

*Selection of UFS Blocks:* The NSS urban frame survey blocks were used for all towns and cities. From each stratum/substratum (formed from UFS towns), the UFS blocks were selected using simple random sampling without replacement (SRSWOR). The FSU samples were selected in the form of two independent sub-samples and an equal number of FSU samples were allocated to the two sub-rounds. Also, an additional sample of UFS Blocks in the form of sub-sample 3, equal to the number of sample UFS blocks in each of the sub-sample 1 and 2, was allocated to the sub-stratum 1 only.

*Survey on urban slums:* Information on each slum, notified or non-notified, found in the entire selected FSU was collected. In case the slum was spread over more than one FSU, only the part within the selected FSU was surveyed and considered as one slums.

## 9.4 Urban Reforms

<sup>18</sup> States/ULBs will be required to implement the mandatory reforms and optional reforms within the mission period <sup>19</sup>. The States/ULBs need to choose at least two optional reforms each year for implementation. The details of reforms which have already been implemented and/or proposed to be taken up should be included in the detailed project reports.

### 9.4.1 Mandatory Urban Reforms: Urban Local Body Reforms

(i) Adoption of modern, accrual-based double entry system of accounting in Urban Local Bodies. (ii) Introduction of system of e-governance using IT applications like GIS and MIS for various services provided by ULBs. (iii) Reform of property tax with GIS, so that it becomes major source of revenue

<sup>18</sup> source: Guidelines for Integrated Housing & Slum Development Programme (IHSDP), Ministry of Housing and Urban Poverty Alleviation, Government of India, December 2005.

<sup>19</sup>These reforms were implemented in different stages for different states. E.g., ULCRA 1976 was not changed in Mumbai (formerly: Bombay) and Kolkata (formerly: Calcutta). However, in the research design the IHSDP policy that I aim to quantify do not cover major metropolitan cities. It aims to cover only small urban towns and cities. Another leg of JNNURM program known as BSUP was designed to cover major metropolitan cities which forms the control group in the study. Also, the detailed data that I have used intuitively deals with the differential implementation problem.

for Urban Local Bodies (ULBs) and arrangements for its effective implementation so that collection efficiency reaches at least 85% within the Mission period. (iv) Levy of reasonable user charges by ULBs/Parastatals with the objective that full cost of operation and maintenance is collected within the Mission period. However, cities/towns in North East and other special category States may recover at least 50% of operation and maintenance charges initially. These cities/towns should graduate to full O&M cost recovery in a phased manner. (v) Internal earmarking within local body budgets for basic services to the urban poor. (vi) Provision of basic services to urban poor including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery of other already existing universal services of the government for education, health and social security.

#### **9.4.2 Mandatory Urban Reforms: State Level Reforms**

(i) Implementation of decentralization measures as envisaged in Seventy Fourth Constitutional Amendment. States should ensure meaningful association/engagement of ULBs in planning function of Parastatals as well as delivery of services to the citizens. (ii) Rationalisation of Stamp Duty to bring it down to no more than 5% within the Mission period. (iii) Enactment of community participation law to institutionalize citizen participation and introducing the concept of the Area Sabha in urban areas. (iv) Assigning or associating elected ULBs into city planning function over a period of five years; transferring all special agencies that deliver civic services in urban areas and creating accountability platforms for all urban civic service providers in transition.

#### **9.4.3 Optional Reforms**

(i) Repeal of Urban Land Ceiling and Regulation Act. (ii) Enactment of Public Disclosure Law to ensure preparation of medium-term fiscal plan of ULBs and release of quarterly performance information to all stakeholders. (iii) Revision of bye-laws to streamline the approval process for construction of buildings, development of sites, etc. (iv) Simplification of legal and pro-

cedural frameworks for conversion of agricultural land for non-agricultural purposes. (v) Introduction of Property Title Certification System in ULBs. (vi) Earmarking at least 20-25% of developed land in all housing projects (both Public and Private Agencies) for EWS/LIG category with a system of cross subsidization. (vii) Introduction of computerized process of registration of land and property. (viii) Revision of bye-laws to make rain water harvesting mandatory in all buildings to come up in future and for adoption of water conservation measures. (ix) Bye-laws on reuse of recycled water. (x) Administrative reforms, i.e., reduction in establishment by bringing out voluntary retirement schemes, non-filling up of posts falling vacant due to retirement etc., and achieving specified milestones in this regard. (xi) Structural reforms (xii) Encouraging Public-Private partnership.