Housing Affordability: Top-Down Design and Spontaneous Order

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Abstract

The spatial structure of large cities is a mix of top-down design and spontaneous order created by markets. Top-down design is indispensable for the construction of metropolitan-wide infrastructure, but as we move down the scale to individual neighborhoods and lots, spontaneous order must be allowed to generate the fine grain of urban shape. At what scale level should top-down planning progressively vanish to allow a spontaneous order to emerge? And what local norms are necessary for this spontaneous order to result in viable neighborhoods that are easily connected to a metropolitan-wide infrastructure? Examples from Southeast Asia show that an equilibrium between top-down designed infrastructure and neighborhoods created through spontaneous order mechanisms can be achieved. This equilibrium requires the acknowledgement by the government of the contribution of spontaneous order to the housing supply. Spontaneous order ignored or persecuted by government results only in slums.

1. Planning and Spontaneity

Design and Spontaneous Order

The spatial structure of large cities is a mix of top-down design and spontaneous order created by markets. Spontaneous order appears in the absence of a designer's intervention when markets and norms regulate relationships between immediate neighbors. Most evolving natural structures, from coral reefs to starlings' swarms, are created by spontaneous order.

Top-down design is indispensable for the construction of infrastructure that spans urban metropolitan areas. Spontaneous order cannot create a metropolitan road network or a storm drainage system. However, as we move down the scale from metropolitan area to individual neighborhoods and toward individual lots, top-down design becomes less useful and should progressively disappear to let spontaneous order generate the fine grain of urban shape. At the neighborhood level, unfortunately, top-down design often usurps the role of spontaneous order in allocating land between households. This substitution of spontaneous order by top-down planning is responsible for the existence of slums in developing countries and for very high housing rents unaffordable to the lowest income population in developed countries.

Urban managers are suspicious of spontaneous order, associating it with chaos and anarchy. They try to replace it with top-down design. Top-down design could be direct and explicit as in Brasilia, or it could be indirect and take the form of detailed regulations and zoning maps, as in most of the world's large cities. At their more detailed level, design or regulations attempt to define and constrain individual households' consumption of land and floor space. Because households have preferences and constraints that top-down planners cannot possibly know, design or regulations defining households' minimum housing consumption results in either resource misallocation or unaffordable housing.

At what level should top-down planning progressively vanish to allow spontaneous order to emerge? And what local norms are necessary for this spontaneous order to result in viable neighborhoods that are easily connected to a metropolitan infrastructure produced by top-down design? The examples taken from some East Asian cities described below show that an equilibrium between top-down designed

infrastructure and neighborhoods created through spontaneous order mechanisms can be achieved. This equilibrium requires the government to acknowledge the contribution of spontaneous order to the housing supply. In cities where the government ignores or works against spontaneous order, large part of the population have to live in slums with no urban services.

Top-down design at the micro level

Planners use a number of rationales to justify the extension of top-down design to the micro aspects of individual consumption of land and floor space. Planners have to plan infrastructure and social services based on future population densities. Therefore, they must estimate future densities in different parts of a city. Too often, planners transform these density projections into zoning plans, which become regulations.

Estimating future density is a legitimate urban planning task. It is wrong, however, to transform a planning projection into a regulation, thereby putting households into a regulatory straightjacket. Planners justify the regulation of densities by claiming that the maximum designed capacity of infrastructure should set the upper limits of densities. However, in most large cities the price of urban land is usually much higher than the cost of infrastructure per unit of land. Therefore, for a given population it is much cheaper to adjust the capacity of existing infrastructure to a higher population density than to acquire more land and build additional infrastructure to accommodate the same population. Planners therefore should abstain to transform their projection into regulations, but should adjust infrastructure capacity to the densities that result from the choices of individual households, whether these densities are conforming to projections or not.

This paper will not attempt to dispute all the aspects of the "need to plan" logic used by planners. It will only address the impact that minimum land and floor consumption regulations have on housing affordability. These regulations fix minimum sizes for lot, floor space, parking, and access street width. They also set the permissible ratio between the area of a lot and the floor space that may be built on it by setting a maximum floor area ratio, or FAR.

These regulations de facto prevent any spontaneous order from emerging in residential neighborhoods. They prevent households from making the necessary trade-off between location, land prices, building heights, and floor area consumption. Because regulations usually set minimum consumption of land and floor space and not a maximum, they have a high negative impact on the poorest households who might trade-off a lower consumption to be able to settle in a preferred location. For low-income households, regulations rather than consumers' choices are therefore driving individual housing consumption. High-income households would usually consume by choice more land and floor space than the ones set by the minimum standards regulations. For higher income households, therefore, minimum consumption regulations are usually not binding.

Top-Down Design Preventing Land Supply Elasticity instead of Allowing It

One of the major roles of local government should be to allow land to be developed rapidly in response to demand, wherever that demand emerges. Top-down design to expand a network of trunk infrastructure is necessary to insure a flow of affordable land as a city population increases.

We should logically expect that planners would plan for an ample supply of developed land to allow for spatial expansion when housing prices are increasing due to the constraints on supply imposed by density regulations. However, paradoxically, the expansion of many cities is usually constrained by other types of top-down regulations consisting in green belts or urban growth boundaries. These regulations prevent the spatial expansion of cities while simultaneously maximum density regulations are de facto increasing land consumption. Regulatory constraint on land supply reflects another conflict between spontaneous order created by markets and top-down design preferred by planners.

Why would planners restrict land supply by limiting the extension of cities with green belts and urban growth boundaries while simultaneously increasing land demand by regulating minimum densities? Preventing "sprawl" and hence reducing the length of commuting and the use of individual transport are the most common rationale used to justify green belts and urban growth boundaries. But in constraining land supply planners create an artificial land scarcity resulting in high land prices and high housing prices, reducing the housing consumption of the lowest income households.

Many urban master plans put curbing sprawl as their major spatial development objective, in spite of the obvious impact on housing prices. The choice of this anti-growth objective reflects the existence of a large popular constituency distraught by the disorderly appearance of the partially built areas typically seen at cities' fringes. Because functioning land markets require willing buyers and willing sellers, it is unlikely that land transactions and subsequent lot development at a city fringe occur in a uniform manner in adjacent lots. For markets to work, buyers must be able to refuse the offer of some sellers and reciprocally. The functioning of land markets results in developed lots spread among unbuilt land parcels that are often still partially agricultural. The messy aspect of the urban fringe seems to generate the popular aversion for sprawl. By imposing limits of city extensions planners feel that they are imposing rationality on the market by obliging households to develop land in a continuous manner without leaving any empty lots between buildings.

An aesthetic adverse reaction to the messiness of urban fringes therefore contributes to high land prices and to a reduction of the poorest households' housing consumption. Top down planning, in turn, react to this low consumption by regulating minimum housing standards consumption. The impact on the poor of these minimum housing standards regulations are described below.

2. The Affordability of Minimum Regulatory Standards and the Informal Sector

Planners are convinced that by imposing minimum residential development standards they will increase the accuracy of their population density projections for infrastructure planning, preventing the creation of unsanitary houses and, in developing countries, preventing the creation of slums.

In cities in developing countries, they do not succeed on either count. In Mumbai in 2013 for instance, about 60% of the population was living in informal settlements that do not meet the government's minimum regulatory standards. The population density in the slums is a multiple of the one projected in the original plan.

There is a clear causal relationship between minimum housing standards regulations and the extension of slums. This seems like a bold assertion, so let us deconstruct the mechanism that links regulatory minimum standards to the existence of informal settlements.

The income of urban households varies enormously within every city. In countries where the level of urbanization has not yet stabilized, this variation is wider than in countries with a stable urbanization level. The migrants who have recently arrived from the countryside initially have low labor productivity that results in very low income. Eventually their income will increase, but other migrants will replace them, maintaining a large pool of very low-income households. This is the case even in cities like Mumbai, where average real incomes have been constantly increasing during the last 20 years. These low-income households are the major victims of minimum regulatory standards.

Housing consumption is always directly related to income. Government subsidies can increase the consumption of housing for the poorest households, but these subsidies are usually scarce or often misdirected toward higher income groups. As a result, most poor households have to rely on their own resources to find a shelter that will allow them to participate in the urban economy.

Regulating minimum housing consumption does not increase the housing standards of low-income households; it only moves them from the formal to the informal sector. The higher the housing standards set by regulations, the larger will be the number of households living in informal neighborhoods. The housing market, whether formal or informal, always responds to demand. The informal market, which by definition ignores minimum standards regulations, is a form of spontaneous order. The downside of the housing units provided in the informal market is not their shape or arrangement but the very fact that they are informal, i.e. that their existence is not legally recognized.

Households that are being forced by regulations into the informal housing market are facing many hurdles that will contribute to keep them in poverty in the future. First, their security of tenure is weakened, either because government might expel them without proper compensation or because any tenure dispute must be settled outside the legal system. Second, they will likely be excluded from the normal networks of municipal services like water supply, sewerage, storm drainage, and refuse disposal.

As a result of minimum standards regulations, the existence of an informal housing sector is ubiquitous in developing countries. In developed countries, the existence of an informal sector is rare both because enforcement is stronger, households are wealthier, productivity is higher and housing

assistance by government is better targeted, usually through income support. Households are therefore better able to meet minimum regulations.

The housing units provided by markets – formal or informal – may be grossly inadequate for poor households. However, they have a significant advantage over housing units that meet high regulatory standards: they exist in the real world. By contrast, housing units that meet the regulatory requirements are often never built in the quantity needed to house all low-income households.

While increasing the housing consumption of low-income households should remain a prime objective of spatial development policy, the formalization of all informal sector housing should be the immediate starting point of a housing strategy.

A housing policy should be judged not by its lofty objectives but by the yearly increase in the welfare of the lowest income households. This welfare should be measured, in a first phase by the quantity of urban services consumed (water supply, sewer, drainage and refuse disposal), and only in a latter phase by the increase in the quantity of land and floor space consumed.

The starting point for measuring housing improvement is therefore to conduct a detailed inventory of current consumption of both urban services and land and floor space per household.

Knowing what type of shelter the market is currently providing for a given income makes it possible to develop a policy that can result in a better shelter than the current market product. The policy may include supply-side solutions, such as increasing the land supply, improving the transport network, decreasing transactions costs, etc. or demand-side solutions, such as increasing the availability of housing finance or providing housing vouchers to low income households.

Relating Households' Income to Housing Consumption

To evaluate the impact of minimum standards in a specific city we need to match the households' income distribution with the housing standards that the market will provide for each income group. In simpler words, we need to see how housing consumption varies with households' income under current market conditions. The four graphs shown in Figure **1** help to illustrate the methodology.

On the top left part of Figure **1**, households' incomes are represented horizontally while consumption is represented vertically. Housing consumption can be represented either by the area of the dwelling, or by the area of land occupied per household or by a weighted index representing individual housing consumption including floor and lot area, water consumption, sanitation, etc. The residential consumption curve ***ab*** represents the variations in housing consumption as income increases. The consumption is measured through surveys and reflects current market conditions. The shape of this curve, always positively sloped, is specific to each city. The curve ***ab*** always passes through the origin 0 as under market conditions a zero income allows only zero consumption. The zero consumption point corresponds to homeless households who do not receive any welfare benefits.

The lower left part of Figure **1** shows the distribution of households by income. The horizontal axis displays households' incomes using the same scale as in the upper graph; the vertical axis shows the number of households by income interval. The area under curve ***C*** represents the total number of households within income interval. As the graph shows, this curve is heavily skewed to the left in most cities.

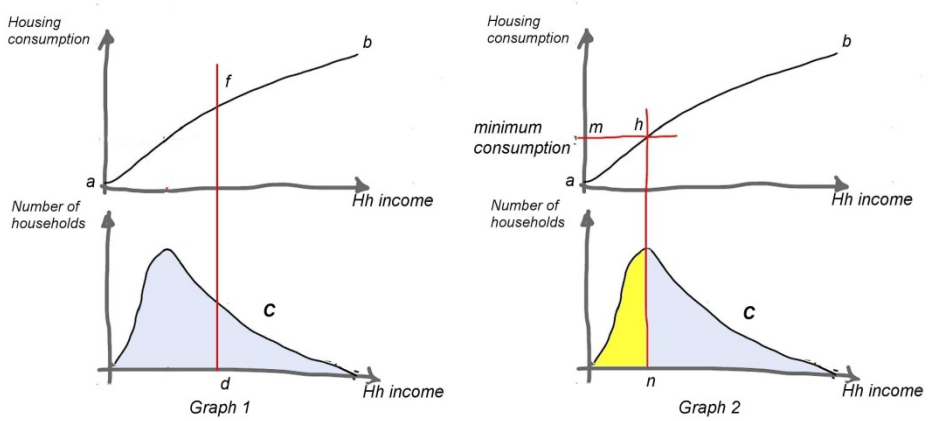


Figure 1: Households income and minimum standards regulations.
Source: Author.

The two graphs on the left part of Figure **1** represent a profile of housing consumption under free market conditions. The graphs allow us to match any level of shelter consumption with a number of households. For instance, Graph 1 of Figure **1** lets us draw a vertical line ***df*** intersecting the x axis at

income ***d*** and the consumption curve ***ab*** at ***f***. The number of households that can afford a housing consumption lower than or equal to ***f*** is represented by the area under curve ***C*** to the left of line ***df***.

The low housing consumption of the poorer households is a legitimate concern for government. What is the best way to increase the housing consumption of poorer households compared to their current consumption obtained through markets?

The most common governmental response is to outlaw low consumption by setting up minimum standards regulations. For instance, a government may decide to set a minimum floor area size to prevent developers from building any dwelling with a lower area than the set minimum. This solution, which is quasi-universal in the urban regulations of cities across the world, rests on the assumption that low consumption is not caused by poverty but by unscrupulous developers who build shoddy products. Outlawing shoddy products will solve the problem! Unfortunately, the outcome of this approach in developing countries shows us outlawing low housing standards is equivalent to outlawing poverty. It obviously doesn't work!

Let us explore the consequences of regulating minimum consumption standards. Graph 2 on the right side of Figure **1** shows the same income distribution and consumption curve as Graph 1. Assume that the consumption curve represents the floor area per household as household income increases. The regulators are going to select a minimum floor area ***m*** on the y-axis. Formal developers will not be able to build houses with an area below ***m***. A horizontal line from ***m*** intersects the consumption curve ***ab*** at ***h***. If the regulation is effective in preventing floor area consumption lower than ***m*** then the new consumption curve will be limited to the segment ***hb***. The number of households that cannot then afford legally built housing due to the regulation are represented by the area shown in yellow, left of ***n*** under curve ***C*** on Graph 2.

What is likely to happen to these households? In order to consume the minimum floor space ***m***, they need at least an income of ***n***. Unless the government is able to quickly provide them with either subsidized houses that meet the minimum standard ***m*** or an income equal to ***n***, they will likely remain in their current housing, which government has declared substandard and will therefore constitute the

informal housing stock. Because their houses are now illegal, they will lose out on several advantages of formal housing. They will not be able to obtain connections to municipal water supply, sell their house on the formal market, or obtain mortgages. If the city is growing, more households with an income below ***n*** will be added and they will only be able to find shelter in informal areas. Setting a regulatory minimum standard therefore results only in more hardship, a loss of property rights, and a loss of legal protection for the households who cannot afford these standards. This process has repeated itself in many cities throughout Asia, Latin America, and Africa.

Regulators set minimum standards based on perceived abstract needs. They do not take into account the number of people that would need financial subsidies to meet these minimum standards. Setting minimum housing standards is harmful to poor households when the government doesn't have the resources to subsidize the housing of households whose consumption is below the minimum standard. The higher the standard is set, the larger the number of people negatively impacted.

This example uses regulatory minimum floor area as the sole indicator of quality, but the same approach is used for setting minimums on all aspects of housing consumption: minimum lot size, minimum setbacks, minimum width for streets, minimum number of parking spaces, etc. Some minimum consumption standards are expressed as maximum. For instance, many zoning plans impose a maximum number of units per hectare, or a maximum building height or floor area ratio. This is the equivalent of imposing a minimum land consumption. For instance, a maximum density of eight housing units per hectare, as imposed in many neighborhoods of Mexico City, is equivalent to imposing a consumption of 1,250 square meters of land per housing unit. A maximum floor area ratio of 1.33, as imposed in most Mumbai municipalities, is equivalent to imposing a minimum land consumption of 75 square meters for every 100 square meters of floor space built.

These minimum consumption standards compound to make housing unaffordable to a significant fraction of the population. Regulators do not typically bother even to calculate the resulting minimum market cost for housing that they implicitly implied by the setting minimum standards. Urban households that cannot afford housing in the formal market defined by regulations are then pushed into the informal

market. Living in an informal house has a lot of implicit costs: it considerably reduces property rights while also preventing access to mortgages and municipal services.

Minimum regulatory standards are not the only cause of unaffordable housing prices for a segment of the urban population. Governmental regulations reduce the supply of developable land by imposing urban growth boundaries (as in Portland, Oregon and Auckland, New Zealand), creating green belts (London, Seoul) or by generally preventing urban expansion under various ideological names: smart growth, urban containment, sustainable city, etc. These also contribute to higher housing costs.

3. Affordable Housing Provided by Government

Demand-Side Subsidies

As we have seen on the graphs of Figure **1**, markets -- formal or informal -- always provide a shelter solution to any income group. At the bottom of the income distribution, the housing consumption provided by free markets might be so low that it is socially unacceptable—for the households with income close to zero, the market provide also a shelter consumption close to zero, homelessness. When this is the case, and after any regulatory supply constraints that may have existed have been removed, the government might well embark on a program of housing subsidies to boost the consumption of the lowest income households. However, because the low housing quality is caused by the very low income of a portion of the urban population, the obvious solution should be to boost this income by increasing the lowest incomes through cash subsidies. These cash subsidies, in the form of vouchers, could be used to buy or rent the same units that other higher income households are buying. If the vouchers are provided in sufficient quantity, the new profile of consumption will follow the red line ***mhb*** shown on the graph of Figure **2**.

If vouchers are provided in such a way that every household can afford a housing consumption at least equal to ***m*** then there is no need for minimum standard regulations. The market has no reason to produce housing units at standards below ***m,*** as there would no longer be a market for them.

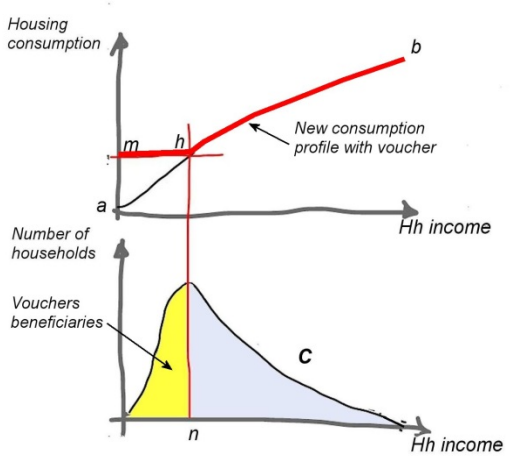


Figure 2: Housing consumption profile with vouchers.
Source: Author.

Until the vouchers are provided in such quantity that the desired minimum consumption is reached, there is no need for minimum regulatory standards. Without minimum regulatory standards the market will provide formal housing units at standards below ***m*** until the vouchers render this supply obsolete. If the program is slow to deliver vouchers, or if it is poorly designed, the market will constitute a safety valve by providing new units at standards below ***m*** until the voucher program is fixed.

If vouchers are the obvious solution why aren't they used more often? And why do governments in most countries continue to provide alternative solutions that generally do not significantly increase the housing consumption of poor households? Vouchers have one important political liability: they are transparent subsidies. It is easy to calculate how much the government will have to set aside to feed the voucher program so that consumption ***m*** is reached in a given number of years. There might be reluctance on the part of citizens to transfer so much taxpayer money to a small group of the population, and in developing countries, to recent migrants.

Governments then resort to less transparent systems that appear to address the housing problems of the poor without explicitly devoting a large sum of the city budget to them. Politicians will prefer supply side subsidies, which are usually much more opaque than demand side subsidies. This is, in my opinion, why supply side subsidies are still so common in cities across the world, from New York to Mumbai.

Supply-Side Subsidies

The government, having prevented the formal market from providing housing at a price that the poorer households can afford, will still claim to be concerned by the plight of the poor in finding affordable housing. The government will then substitute itself to the market by constructing subsidized housing units. In this case, the top-down design will have completely replaced any spontaneous order, as a government design committee will have decided every detail in the construction of the housing without any say from the end user household. Contrary to the demand side subsidies that are given directly to households, the supply side subsidy will be entirely tied to specific housing units in specific buildings whose location and shape are the outcome of top-down design.

Governments will provide subsidies to builders to construct houses that follow a design set by regulators. These supply side subsidies take mainly two forms: "public housing," where governments design and build houses that are sold or rented to beneficiaries at a large discount over costs; and "inclusionary zoning," where subsidies are given to private developers in the form of a floor area bonus over the area that is legally permissible in a given location. The developer is then obliged to set aside a fixed percentage of units (usually 20%) at a price or rent below market.

In the first, the government or a substitute entity directly builds houses that it allocates to selected beneficiaries. The subsidies are given to the supplier to make up the difference between construction costs and sale price to selected beneficiaries. South Africa's on-going Comprehensive Plan for the Development of Sustainable Human Settlements is an example of a supply side subsidy program providing houses to beneficiaries in full property. This is an exception. The government remains the owner in most supply side subsidy programs, renting apartments to beneficiaries. Quite often, the rent charged to tenants does not even cover the maintenance of the buildings – this is true in the case of New York City Housing Authority.


New York - Sugar Hill Housing project -2013


Ahmedabad - Public Housing project -2004

Figure 3: Public Housing projects in New York and Ahmedabad
Sources: New York Sugar Hill Housing Project photo by Trevor Patt (http://bit.ly/1CxE5BX), licensed under CC BY-NC-SA 2.0. Ahmedabad photo by author.

Public housing developments are notorious for their poor design and poor environmental quality. This should come as no surprise. The real clients that public housing is built for are not the households that will eventually live there but the governmental committee that selects design, location and prices. The recently inaugurated Sugar Hill public housing project in New York City and an older public housing project (2002) in Ahmedabad, India, illustrate the design problem inherent to supply side subsidy projects (Figure **3**).

The second supply side subsidy solution – usually called inclusionary zoning – assumes that the households who can afford to pay market price for housing will also pay for those who cannot. This solution is becoming the most attractive for politicians, as its subsidies are the most opaque. They are so opaque, in fact, that the public usually thinks that wealthy developers are paying for housing the lower and middle classes and that it costs nothing to the average tax payer. Cities as diverse as Mexico City, New York, and Mumbai are currently attempting to use inclusionary zoning regulations to solve the affordability problems caused by arbitrary regulations.

Under inclusionary zoning regulations, developers provide a fixed percentage of "affordable housing" units at a rent or price fixed by the government in exchange for a derogation of current zoning laws -- in general a higher floor area ratio than the current zoning allows. This type of subsidy is becoming more attractive to government as it doesn't seem to require any cash subsidy. Inclusionary zoning is possible only in cities where the regulations are so repressive that relaxing them on a block or two provides a large

payoff for the developer. The subsidy paid to developers to provide affordable housing is therefore transferred from the high rents caused by regulations paid by all the households. It is ironic that preventing negative externalities is the justification for regulations, but, in the case of inclusionary zoning, these regulations are waved with no apparent negative effect, confirming that the regulations were imposed arbitrarily in the first place.

To my knowledge, neither type of supply side subsidies – public housing or inclusionary zoning – has ever successfully solved the affordability problem faced by many low-income urban households. The large amount of subsidization that is required for public housing drastically limits the scope of the program. In the same way, the number of affordable housing units produced by inclusionary zoning is limited to a fraction (about 20%) of the number of high-income housing units produced by developers. In most cities high income households are much less numerous than low-income households; the supply of affordable housing is therefore limited.

Supply side subsidies are unfortunately still the most common way to attempt to solve the housing affordability problem faced by low income households. However, in a few countries that face rapid urbanization, such as Indonesia and Vietnam, different solutions have emerged based on spontaneous order. The abandonment of top-down design in favor of spontaneous order allows low-income households to adjust their housing consumption to what they can afford. It also enables them to make a choice between different design standards -- with varying floor space, lot area, street width or number of floors -- in different locations. The alternatives to top-down design and to supply side subsidies are described below.

4. Spontaneous Settlements Unconstrained by Regulations

Spontaneous settlements and housing affordability

Low-income households looking for a dwelling in large cities have to make trade-offs between location, lot and floor area, width of access streets and availability of urban services. As seen above, they should not rely on government planners to make these trade-offs for them. A number of countries allow low-income households to select the set of housing standards that would maximize their welfare. In these

countries, households who can only afford very low standards are not stigmatized by living in informal settlements. Governments recognize that their low standards are the result of very low income and as a consequence subsidize part of their infrastructure, instead of attempting to subsidize their entire housing consumption.

Three successful examples, described below, occur in Indonesia, Vietnam, and China. In these countries, within a given perimeter, low-income settlements with no top-down regulations are organized in small condominium-like communities that set their own internal rules. The governments deal with them as communities. They have to follow government standards only for their connections to city-wide networks like water, sewer, power and refuse disposal.

However, large spontaneous settlements do not always succeed just because they are spontaneous. The early approval of government is necessary. When the spontaneous settlements are so large that they require an internal trunk infrastructure network to connect to metropolitan wide infrastructure, their viability as low income communities are jeopardized. The example of the El Mounira settlement in Cairo, discussed below, while providing affordable housing outside government regulations, cannot be considered successful because of its lack of linkage to the metropolitan infrastructure and the impossibility to establish this link without a major surgical civil work program.

Kampongs in Indonesia

As Indonesian cities expanded into the densely populated island of Java, they absorbed many large villages. The economy of these villages shifted from rural agricultural to urban industry, but they kept their village social structures and norms as a modern city developed around them. These new urban neighborhoods kept the Indonesian name of kampong, which means village. The government has consistently accepted that the land development standards in kampongs would not be subject to top-down design but would be run by local norms. These local norms are not equivalent to an absence of rules, but are driven by locally accepted “good neighbor norms.” For instance, neighbors are not allowed to drain any water in adjacent plots, no windows can be open on walls built on property lines, etc. No norms

regulate land or floor consumption. No norm establish the minimum width of streets. While some streets can accommodate limited car traffic, many individual plots are only accessed through footpaths.

For over 30 years, housing in Indonesia has benefited from a consistent policy aimed at upgrading the infrastructure of kampongs using a combination of government subsidies and households cash and labor contributions. The housing stock in kampongs has constantly improved over the years both because of the investments made by their inhabitants and because of the constant upgrading provided by the government. The investments in infrastructure made by the government, plus the continuity of policy over many years, have also convinced households living in kampongs that the government had no intention to use eminent domain to displace them to redevelop the land under different use. This exceptional stability in government policy over many decades has resulted in a housing stock that is constantly evolving while being entirely demand driven.

The infrastructure provided in the kampongs ensure that no matter how small and simple a dwelling is, the household living in it has access to safe water supply, sanitation, storm drainage and social services. The government has used top-down planning only to bring this infrastructure to the neighborhood boundaries. Within the boundaries of the kampong, the government has left households free to use spontaneous order to allocate land, floor space, and local roads according to their own priorities.

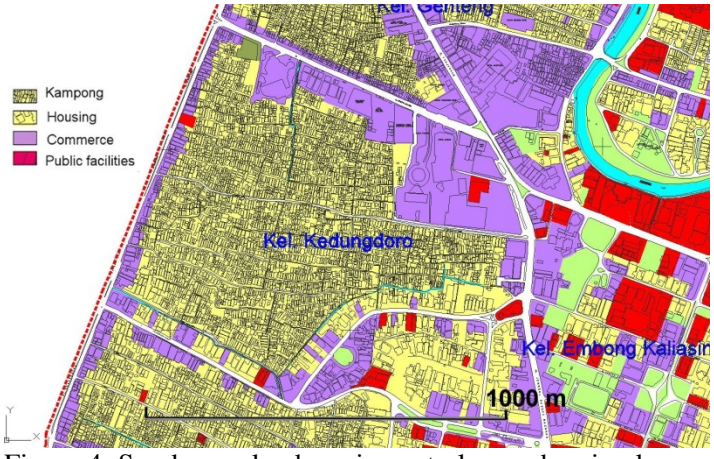


Figure 4: Surabaya - land use in central area showing kampongs and commercial areas.
Source: Surabaya land use map, Surabaya City Government, 2008.

Kampongs constitute an invaluable stock of affordable housing to those who cannot afford a car or are ready to trade-off the convenience of a car for the centrality of a kampong's location. The original rights of way for narrow lanes and footpaths have been kept intact even after significant improvement in drainage; water supply has been made available and streets have been paved. As a result, most of the houses located inside the kampongs are hardly accessible by cars. These low road standards prevent land prices from aligning themselves with those of the more traditional houses built along vehicular roads in adjacent communities. The housing stock located in kampongs constitute a parallel housing market for low-to-middle income households. Most kampongs are densely populated, centrally located and close to commercial areas and job clusters as shown on land use map of the center of Surabaya, Indonesia (Figure **4**). The lack of car access or at least the impossibility of parking a car on a residential lot makes the kampongs' population more likely to make motorcycles, electric scooters or public transit their preferred mean of transport.

Kampongs are making an efficient use of land. In Figure **5**, the map of a kampong is presented side by side with that of a residential middle class area. The lots are much smaller (average about 100m2) in kampongs than in middle class housing (about 240m2) and the resulting density is more than double. The area devoted to roads is about one third of the one in the middle class area. The kampong's map, on the left side of Figure **5**, shows also the wide variation in plot sizes, insuring also a variety of incomes within the same neighborhood. A study of housing prices and rents in kampongs would also probably show wide price differences depending on accessibility and proximity to a vehicular road. This difference in prices within the same neighborhood would ensure that a wide range of lower income groups could be accommodated in a kampong without social segregation.

Are kampongs' current low space standards able to evolve in the future? Kampongs represent about 35% of the current housing stock of Surabaya. What will happen when in, say 20 years, income rises to such a level that households, even at the bottom of the income scale, will be dissatisfied with their low space standards?

Figure 5: Kampong and middle class residential land use
Source: GIS vectorization and analysis of segments of Surabaya 2008 land use map by Marie-Agnès Bertaud.

It is likely that adjacent lots will get progressively consolidated into larger lots where higher houses can be built. This is already happening in the most accessible parts of the kampongs. These higher houses would be aligned on wider setbacks from the lanes, eventually allowing better vehicular access. After a few decades, some lanes in the better-located kampongs would not look too different from the middle income housing development shown in Figure **5**. It is important, however, that this evolution be demand-driven from the inside of the kampong and under the control of the local community. Any government or large developer-driven "urban renewal" scheme would be detrimental and would progressively erase the advantages that a parallel markets offer to low income households.

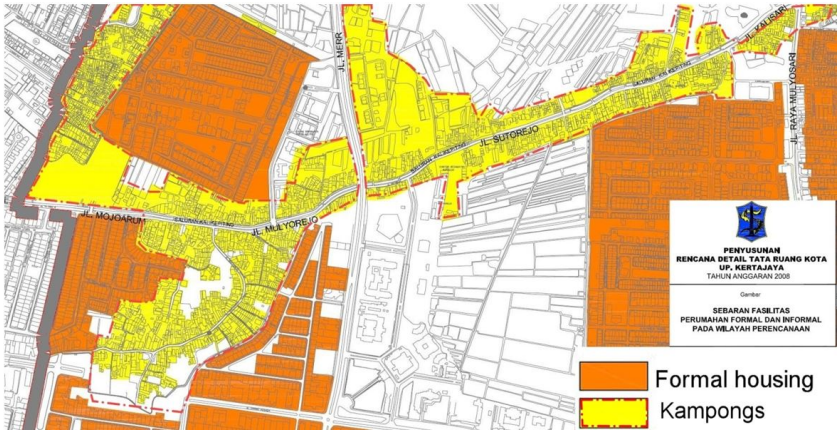


Figure 6: New kampong formation in Surabaya suburbs.
Source: Surabaya zoning map, Surabaya City Government, 2010.

New kampongs are being created in the expanding suburbs of Surabaya and are integrated immediately into governmental zoning plans (Figure **6**). These new kampongs form around existing villages and expand informally. The planning authorities' acceptance of the low spatial planning standards (plot size and local access road width) in newly developed areas ensure that a constant flow of demand-driven low-cost housing is being built and added to the Surabaya housing stock.

Providing social services and subsidies to improve kampongs is a much more cost efficient way of ensuring a flow of affordable low cost housing than the more traditional "low cost housing" supply-driven programs currently in place in many other countries.

Vietnamese Vertical Urban Villages

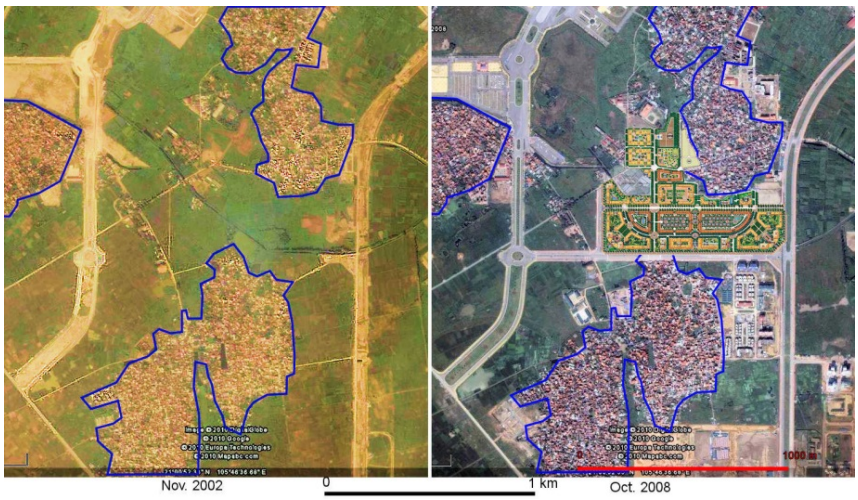


Figure 7: Hanoi expansion around urban villages.
Sources: Google Earth, 2002 and 2008.

Vietnamese cities have adopted similar policies as Indonesia's kampong program. As cities expand, planners carefully avoid encroaching on existing villages while connecting them to the city-wide infrastructure network. The two Google Earth images in Figure **7**, taken in 2002 and 2008, show the top-down design of the metropolitan infrastructure network expanding in suburban areas, connecting formal high-income developments and the villages generated by spontaneous order.

Figure 8: Hanoi-Urban village growing vertically.
Source: Author.

Within an urban village's perimeter, no specific top-down regulations are applied. Houses are mostly townhouses built on narrow plots about 3 meters wide. They are traditionally 2 or 3 levels high. But as demand for housing increases the village townhouses can often grow up to 6 or even 7 levels (Figure **8**). The village house owner expands vertically, eventually renting rooms or apartments to new households, adapting the standards to the demand. There are no city-imposed standards in these villages, only good neighbor norms. The supply for new market-provided low cost housing is extremely elastic because of the possibility of vertical expansion compatible with local tradition. Some recent migrants rent only one room, others an entire floor or two.

The municipality makes deals with the village leaders to expand the infrastructure within the village, which is treated as a condominium with its own internal tariffs, rules and regulations.

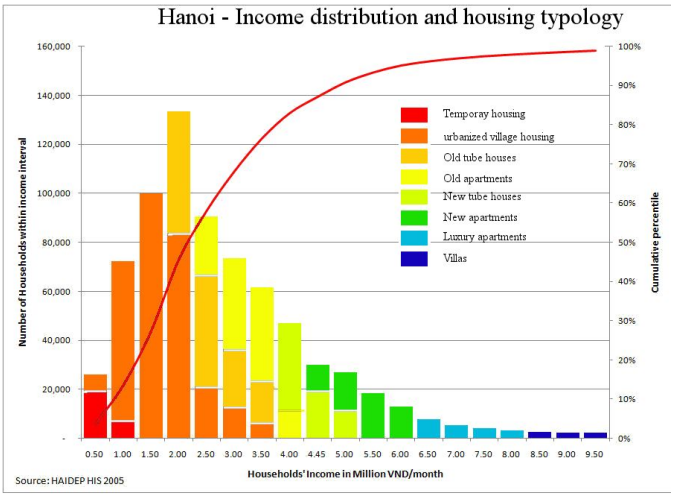


Figure 9: Hanoi - Households' income distribution and housing typology.
Sources: Income distribution HAIDEP HIS 2005, housing typology by author.

The graph in Figure **9** shows the housing typology of Hanoi superimposed on the household income distribution histogram. The graph is similar to the theoretical graph shown in Figure **1**. It shows that, with the exception of few temporary housing units representing less than 3% of the housing stock, the great majority of Hanoi's low-income households are housed in formal housing. The typology categories "urbanized village housing" and "old tube houses" give shelter to households below the 50th percentile of the income distribution. Because of the absence of minimum standards imposed from above, the supply of the housing stock is elastic and adapts to the growing demand. The contribution of the government is to connect these houses to the metropolitan network and to provide social services. The design and cost of the houses themselves and their access roads are the responsibility of the households who use them and by definition adapt to local demand.

Shenzhen Handshake Buildings[1]

As in Indonesia and Vietnam, most Chinese cities expanded into a countryside already dense with existing villages. While the fields cultivated by farmers were expropriated to make room for cities expansion, the villages themselves were usually preserved for financial reasons. The municipal government compensated villagers for the acquisition of their fields based on a multiple of the value of the current crops. However, the acquisition of the built-up area occupied by villages would have required the government to relocate village households into new modern apartments at least equal in area or larger than the current size of their dwellings. This made the expropriation cost of village housing much more expensive than that of the fields around them. Villages were then spared expropriation and demolition and, consequently, "urban villages" became enclaves in the urban area of modern Chinese cities.

The urban villages were not only spared demolition but were also able to retain their peculiar form of land tenure, which in China is different from that of urban land. In a Chinese village, each household is

[1] For a more complete history of handshake villages, see:
Song, Y., Zenou, Y. & C. Ding, C. (2003). The Role of China's Urbanizing Villages. In *Urbanization in China: Critical Issues in an Era of Rapid Growth*. Cambridge: Lincoln Institute of Land Policy, 145-168, and Burns J. J. (2013). The Chengzhongcun. Urban Traces of the Village. *Mas Context* 19. Retrieved from http://www.mascontext.com/issues/19-trace-fall-13/the-chengzhongcun-urban-traces-of-the-village.

allowed to use a plot of about 150 square meters to build its house. The allocation is done by the village collective, which is a form of communal management of the village. While villagers are not allowed to sell their residential plot of land, they are allowed to build whatever structure they want on it, and they are also allowed to rent the whole or part of it at a market rate. While villagers lost the farming land that provided them with a livelihood, they gained the use of an urban plot of land that they could develop following norms entirely based on supply and demand and free of municipal urban regulations. They quickly took advantage of this opportunity and in most cities of China built additional floor space on their plot for their own use of for rental. Local market demand determined entirely the construction standards, the use of land and floor space and the rent level. In Chinese cities, "urban villages" constitute free markets islands seldom encountered even in cities with a long market economy tradition. Let us look at the positive and negative impact of self-organized enclaves in the city of Shenzhen that has been created largely through top down design.

Shenzhen evolved into a megacity, reaching about 15 million people in 2014, from what was in 1980 a cluster of fishing villages. Because Shenzhen lacked an historical urban core, like Beijing or Shanghai, the newly designed city center was very close to many existing villages that became enclaved in the new city as it grew. These villages were built around narrow winding streets. Shenzhen's villagers, realizing that the very high price of the land in proximity to their villages provided an opportunity to maximize their rent income, redesigned the layout of their villages to maximize the floor area that could be built by unit of land. They designed square plots on a grid pattern of about 12 meters, with access streets varying from 1.6 to 6 meters, the most usual being around 2.6 meters. On each lot, they built apartment buildings between 5 to seven floors, usually without elevators. Because of the narrowness of streets separating buildings, these villages became known as "handshake villages".

Shenzhen spontaneous residential settlements are unique in the world because they consist in large new urban formal constructions entirely market driven without any constraint from municipal or national regulations. However, their existence is legal and the villages are extremely well connected to the city wide infrastructure and enjoy the same urban services as other part of the city.

Top down land use regulations are designed to prevent or attenuate negative externalities. Let us try to evaluate whether in Shenzhen, the positive externalities created in "handshake villages" offset the negative ones.

Figure **10** shows a group of "handshake villages" located between 1and 2.5 kilometers from the city center of Shenzhen. These villages, circled by a red line on Figure **10**, occupy an area of about 31 hectares providing housing to a population of about 100,000 people. The villages are surrounded by more traditional types of housing estates designed according to national regulations. The traditional type of housing mostly built in the 80s and 90s consists in parallel slabs of apartments from 6 to 8 floors separated from each other by a distance set by national regulations.

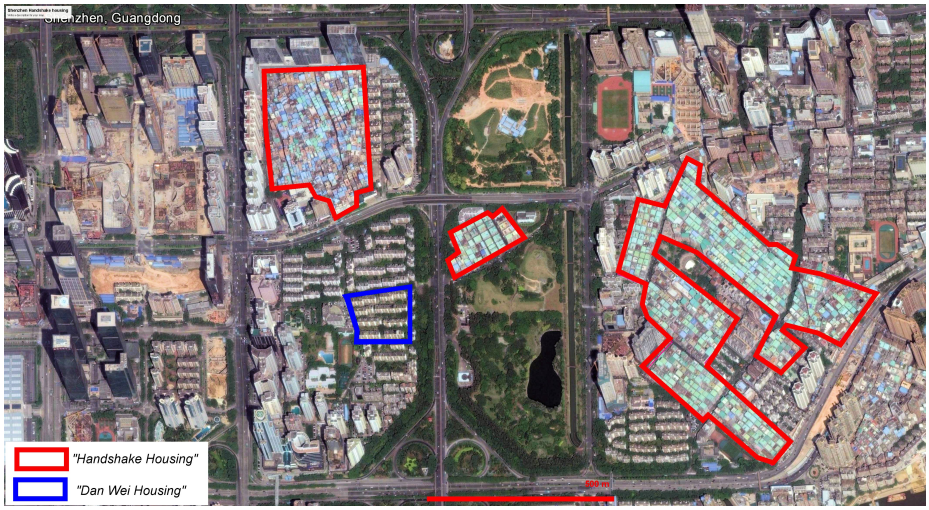
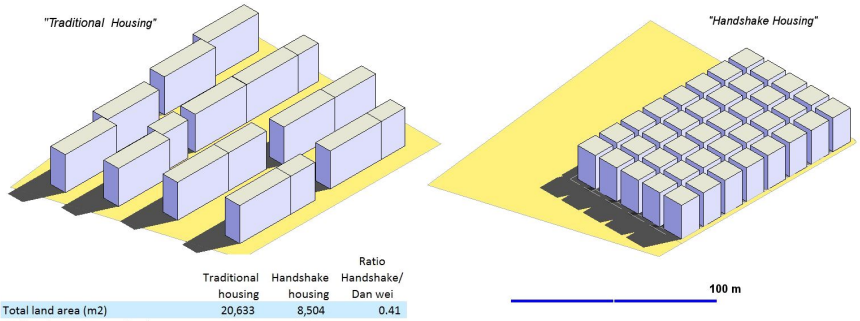


Figure 10: Shenzhen "handshake villages" close to the city center.
Source: Google Earth, 2014.

The villagers when developing "handshake housing" knew that the value of their plots was entirely based on their location close to the city center and its dense network of urban transport. Their only asset was the plot of land assigned to them by the village collective. They had to maximize the return on their land asset. As former farmers, they were familiar with the emerging private rental market created by rural migrants who could not afford to buy apartments in new neighborhoods built by formal developers. They were also well aware that underusing the potential value of their land would immediately expose them to expropriation. As land values increased around them in formal developments, their own assets

could become prey to a sort of hostile take-over from government developers. To prevent future expropriation they had to create a real estate value that would make any future expropriation by the government too expensive.



	Traditional housing	Handshake housing	Ratio Handshake/ Dan wei
Total land area (m2)	20,633	8,504	0.41
Building foot print area (m2)	5,027	8,506	1.69
Number of floors	8	7	0.88
Total floor area (m2)	40,216	40,225	1.00
Floor area ratio	1.95	4.73	2.43
Estim.floor area/person (m2)	18	12	0.67
Estim.Number of people	2,200	3,400	1.55
Estim. Population density (p/ha)	1,100	4,000	3.64
Estim. Land area per person (m2)	9	3	0.27

sources: measurements on Google Earth images . Dan wei housing: lat: 22.5367 - lon:114.0667 Handshake : lat: 22.5372 lon:114.0760

Figure 11: Schematic typical land use in a "handshake village" compared to a typical housing development in the same neighborhood.
Source: Author.

To create high real estate value, farmers had to maximize the unit of floor space built by unit of land while taking account the characteristics of the demand from migrant workers for rental housing. Migrant workers want a place to sleep and to store their belongings in a location from where a maximum number of jobs are accessible. They do not particularly care about the view from their room. They are young and active and therefore do not consider it a hardship to climb 7 floors without elevator. The housing units built correspond to this market.

Comparing land use parameters between “handshake housing” and more conventional housing estate conforming to municipal regulations (Figure **11**) shows that “handshake housing” produces two and half more floor space per unit of land than conventional housing. As land price in this central part of Shenzhen is far more expensive than construction cost (US$ 8,000 /m2 for land vs $400 to $800/m2 for construction) , the more intensive use of land in “handshake village” make a lot of sense. Using the current rents per m2 in the area for each type of residential building, respectively $6 in “handshake housing” and $12 in traditional housing, we can see on the table of Figure **12** that the return from rent per

square meter of land is higher for handshake housing than in traditional housing, although the rent charged per square meter in traditional housing is double the one charged in “handshake buildings”.

		Traditional housing	Handshake housing	Ratio Handshake/ Dan wei
Total land area (m2)		20,633	8,504	0.41
Building foot print area (m2)		5,027	8,506	1.69
Number of floors		8	7	0.88
Total floor area (m2)		40,216	40,225	1.00
Floor area ratio		1.95	4.73	2.43
Estim.floor area/person (m2)		18	12	0.67
Estim.Number of people		2,200	3,400	1.55
Estim. Population density (p/ha)		1,100	4,000	3.64
Estim. Land area per person (m2)		9	3	0.27
net floor area (m2)	0.8	32,173	32,180	
month rent per net m2 of floor ($/m2)		12	6	
monthly rent per m2 of land		19	23	

Figure 12: Return from rent in Handshake housing and traditional housing.
Source: Author.

Given the extremely high land price in Shenzhen CBD, the intensive use of land in “handshake buildings” makes a lot of sense. It produces a large demand driven supply of housing affordable to new migrants. The high rate of return on land insures that the “handshake housing” is unlikely to be demolished in the future. It is a case where the poor have been able to outbid the rich when competing for expensive land by consuming less land and floor space per person.

The “handshake housing” units as they have emerged in Shenzhen are not an ideal type of housing. The lack of direct sunlight is tolerable because Shenzhen is located in a subtropical zone, it would not be advisable in the climate of Beijing or Shanghai. The extremely narrow road access makes them acceptable only in small clusters. Ideally, these clusters should not be more than 200 meters deep, to allow access for emergency. Fire hazard could be greatly decreased by installing fire hydrants and sprinklers, which are still much cheaper to install than using more land for wider streets. This type of housing is adequate for young migrants who do not spend much time home, and are justified only in central areas where land is extremely expensive.

The supply of housing affordable to new urban migrants in locations that are close to jobs is one of the most difficult problems to solve in large cities. The Shenzhen solution is unique because the users of land where able to allocate land and floor space to reflect their own priorities. In the long run, when rural

migration slows down in China, there might be no more demand for this kind of migrant worker housing. The rents will then decrease and the high land value will make it easy to demolish and redevelop the area to fit the new demand.

5. Unsuccessful Spontaneous Settlements

Spontaneous informal settlements are ubiquitous in the cities of developing countries. Most of them are not as successful as the examples shown above. The unfortunate example below is taken from an informal settlement in the North West suburb of Cairo.

Cairo Subdivisions

Cairo has elaborate land use regulations that are seldom enforced. A number of master plans have prevented the formal extension of Cairo in the agricultural areas closest to the city center. The Al Mounira neighborhood is located in one of these areas where building is not permitted, but where the proximity to the center city (5 km from Midan el Tahrir) makes it unavoidable that the land will be developed.

Because of its proximity to the rest of the city, the market price of land for housing construction became a multiple of the price of agricultural land. As a result, farmers sold their fields illegally to informal developers who built apartments for the low-income population of Cairo. The result is shown in Figure **13**. The apartments are affordable; they are built to answer the demand from a specific income group. The supply is elastic, as more farmland is developed to accommodate new demand. However, the settlement has an enormous downside. The market has been unable to set aside enough land to provide internal arterial roads, most roads are only 3 to 4 meters wide. Because the settlement is illegal, it is not connected to any metropolitan network and it does not receive any social services.

Because the government wanted to prevent development in this agricultural area, planners have never developed any major network of access roads. In order to discourage further illegal growth the government doesn't provide services in these areas.

This example confirms that a large city cannot be made of an aggregation of spontaneous order neighborhoods without being connected to a network of city wide infrastructure, which has to be created

by a top-down design. It also confirms that when faced with illegal residential settlements government should consider whether the regulations that made them illegal were appropriate in the first place, and if they were not, abolish the regulations and try to integrate the illegal settlements in the infrastructure of the metropolitan area.

Figure 13: Cairo - Spontaneous settlement in Cairo Al Mounira
Source: Google Earth, 2013.

The housing units created in Al Mounira would have the same advantages as the ones built in Shenzhen "handshake housing," if they had been aggregated in small enclaves of no more than 4 or 5 hectares each and with access to infrastructure and other types of land use. Because the entire area including several square kilometers are supposed to stay "green" according to the master plan, no formal development is ever going to develop in the area. In the future, the upgrading of this area will be very costly as it would require a large "Haussmann on the Nile" operation, with large resettlement costs.

The problem of Al Mounira was not created by its builders, who legitimately responded to the housing demand from a large number of households for whom settling there was the best alternative. Planners created the problem by choosing to ignore the high land price of the area and by deciding

arbitrarily that new infrastructure should be built instead in new cities at more than 25 kilometers from Midan al Tahrir.

6. Rules for Allowing the Creation of Successful Spontaneous Residential Settlements

Housing is a bundle of standards: lot size, floor area but also location, proximity to transport and amenities, level of services, environmental quality of neighborhood, etc. Households have to make trade-off between these standards. Each households make different trade-offs depending on their taste and priorities. Minimum standards put an arbitrary lower limit on land and floor space consumption, preventing households from making trade-off with other standards. The number of housing types, using different combination of plot sizes, floor area, width of access street and open space is therefore limited by regulations. For higher income groups these limits are usually not binding, this is why these groups do not protest the arbitrary limitations imposed by minimum standards regulations.

Government role is to provide urban services, water, sewer, street lighting, refuse disposal, that households cannot build by themselves. The effort of government should therefore be to concentrate on these provisions of services and distribute them to all neighborhoods, irrespective of the trade-off made by households for their consumption of land and floor space.

A number of simple rules should allow successful example similar to Indonesian kampongs, Vietnamese urban villages, and Shenzhen's "handshake buildings" to be created in the future.

1) Introduce the concept of selected residential enclaves free from minimum standards regulations for plot size, floor area, floor area ratio and street width.
2) Increase housing mobility by decreasing transaction costs when buying, selling or renting housing units.
3) Connect all existing settlements, legal or illegal to the metropolitan infrastructure network; settlements may be treated as condominiums for their connection to the city wide infrastructure network.
4) Instead of minimum standards, use a system of stars similar to that used for hotels, to define what standards are permitted in which location. For instance, the one star category would provide 60

liter of water per capita per day, would have storm drainage and sewerage system and be connected to the municipal refuse disposal system. In a one star regulatory category the farthest house is located less than 800 m from an urban transport network.

It is clear from the above that the land regulatory system of the majority of cities around the world, from New York to Mumbai, should drastically revised to integrate top-down metropolitan infrastructure networks with spontaneous residential settlements reflecting the land use priorities of their inhabitants.

A recent paper by Gyourko and Molloy[2] perfectly summarize the problem created by a proliferation of poorly thought regulations described above. Here is a quotation from this paper:

"*A wide array of local government regulations influences the amount, location, and shape of residential development… Many theories have been developed to explain why regulation arises, including the role of homeowners in the local political process, the influence of historical density, and the fiscal and exclusionary motives for zoning. As for the effects of regulation, most studies have found substantial effects on the housing market. In particular, regulation appears to raise house prices, reduce construction, reduce the elasticity of housing supply, and alter urban form. Other research has found that regulation influences local labor markets and household sorting across communities… Although some specific rules clearly mitigate negative externalities, the benefits of more general forms of regulation are very difficult to quantify. On balance, a few recent studies suggest that the overall efficiency losses from binding constraints on residential development could be quite large*."

7. References

Bertaud, M.-A. *GIS vectorization and analysis of segments of Surabaya 2008 land use map*.

Burns J. J. (2013). The Chengzhongcun. Urban Traces of the Village. *Mas Context* 19. Retrieved from http://www.mascontext.com/issues/19-trace-fall-13/the-chengzhongcun-urban-traces-of-the-village.

[2] Gyourko, J. and R. Molloy. (2014). Regulation and Housing Supply, *NBER Working Paper 20536*. Retrieved from http://www.nber.org/papers/w20536.

Comprehensive Urban Development Programme in Hanoi Capital City (HAIDEP) HIS. (2005).

Satellite image of Hanoi, Vietnam. (2002). *Google Earth*.

Satellite image of Hanoi, Vietnam. (2008). *Google Earth*.

Satellite image of Cairo, Egypt. (2013). *Google Earth*.

Satellite image of Shenzhen, China. (2014). *Google Earth*.

Gyourko, J. and R. Molloy. (2014). *Regulation and Housing Supply*. NBER Working Paper 20536. Retrieved from http://www.nber.org/papers/w20536.

Song, Y., Zenou, Y. & C. Ding, C. (2003). The Role of China's Urbanizing Villages. In *Urbanization in China: Critical Issues in an Era of Rapid Growth*. Cambridge: Lincoln Institute of Land Policy, 145-168.

Surabaya land use map. (2008). *Surabaya City Government*.

Trevor Patt [Photo]. (2013). *Sugar Hill Apartments and Museum, New York City*. Retrieved from http://bit.ly/1CxE5BX. Licensed under CC BY-NC-SA 2.0