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LAND MARKETS, GOVERNMENT INTERVENTIONS, AND HOUSING AFFORDABILITY

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INTRODUCTION

Urban population growth and economic growth require cities to expand into the agricultural land on their periphery. How much land is required for this extension? How much planning and direct intervention by the government are needed, who should pay for extending services, and how should the costs be recovered? And how can we ensure that every participant in the urban economy has access to urban land?

Although these questions are not new and have probably been asked since the creation of the first cities, we are still struggling to find satisfactory answers. The solutions found for the problems posed by city expansion vary from city to city, but nowhere has a consensus appeared on what constitutes the best practices.

Failure to provide enough land for urban expansion results in high housing prices, exacerbates the creation of high-density slums, and generally lowers urban productivity. Conversely, a number of critics argue that cities are expanding too rapidly into valuable agricultural areas and are using land inefficiently.

The proper role of government in urban land development is often difficult to establish. In other sectors of the economy, the government's role is mostly limited to that of a regulator. However, in matters of land development, the government often takes a much more active role as a de facto developer because many public goods and the primary infrastructure network cannot easily be built privately. Even in strongly established and successful market economies, like South Korea, Japan, and Singapore, the direct intervention of the state in land development contrasts with its laissez-faire approach in other sectors of the economy. In Asia, the contrast in the approaches used in the cities of China and India illustrates the dilemma of these two opposite views: too little land areas developed in the case of India, and too much and the wrong kind in China, according to some critics.

The way urban land is developed in each country is intimately linked to its culture and history. Even if a country's way of developing urban land was found to be "optimum," assuming that this optimum could be defined, it is unlikely that the method could be transferred to other countries because of cultural incompatibility and different historical circumstances.

What is required, therefore, is not to identify an “optimum model” of land development to be copied but to develop for each city (1) an analytical method to identify the shortcomings of current land delivery mechanisms, (2) a set of land development objectives (equity, affordability, transportation efficiency, etc.), and (3) a reform path to modify the existing land delivery system to meet the development objectives.

The methodology proposed looking at the land delivery system from two angles: (1) the consumption of land by income groups and (2) the spatial distribution of land consumption. These two aspects, the distributive and the spatial, should never be separated. Too many governments try to solve the problem of land distribution by ignoring the spatial dimension. Increasing the land consumption of poor people by developing cheap land in faraway suburbs is not an acceptable trade-off.

This report is divided into five sections. The first section provides a brief historical perspective on the evolution of land and housing policy from the building technology focus of the 1960s to the current em-

phasis on land supply reforms. It points out the gap between the trends in the land economics literature and actual policies as implemented by governments. The next section proposes an analytical framework for analyzing the land delivery system from a distribution and spatial point of view and compares land consumption between countries and within cities. The third section analyzes the way government intervenes indirectly in the land market through regulations and infrastructure investments. Often apparently innocuous regulations tend to force an increase in land consumption and at the same time restrict land supply. Transportation infrastructure is often designed more to alleviate traffic than to open new land for development. The fourth section analyzes the current various land delivery systems in India, South Korea, China, and Thailand, within the framework developed in the first two sections. The last section proposes an agenda for action; first, by proposing a methodology for assessing how the current delivery system in a given city meets the different objectives of equity and transportation efficiency; and second, by establishing a framework for future research.

URBAN PLANNING AND LAND MARKETS: A BRIEF HISTORICAL PERSPECTIVE

Urban planners are responsible for preparing master plans that project the future “need” for urban land. In most cases, planners base their evaluation of future need for urban land on a normative approach—“so much land and floor space per household is needed”—and land markets and household income are seldom taken into account when making land use projections. Even the World Bank, UN Habitat, and the Cities Alliance, by using their current slogan “Cities Without Slums,” are de facto implying that the low housing standards of a significant part of the urban population of developing countries is due to a supply shortage. According to these institutions, governments and the donor community could alleviate this supply shortage in the short term by allocating sufficient resources to the problem.

In individual countries, the conceit of the existence of a housing supply shortage that could be solved by using a normative approach (minimum standards) is also common. In South Africa, for instance, the central government plans its entire allocation of resources for housing and residential infrastructure using the notion of a housing and infrastructure “backlog” based on national minimum norms.

Readers of the urban economics literature are not often aware of the gap between academic empirical and theoretical research and the practice dictating land and housing policies and budgets at the national and local government levels. However, increasingly, a small minority of professionals and politicians responsible for the day-to-day operations of local governments are becoming aware that the low housing standards in rapidly urbanizing cities will eventually be increased to a socially acceptable consumption level through

increased urban productivity, rising urban income, and an enlightened government understanding of how land markets work. This market approach is relatively new and is opposed to the traditional thinking that government could correct a market failure by directly building housing for poor people that meets a politically satisfactory standard.

To encourage this evolution of thinking at the operational level, it is important to review land and housing policy in developing countries during the last 50 years. This review concerns only the operational policies as practiced by governments and donor agencies, something quite different from the evolution of the urban economics literature during the same period, which has been mostly market oriented but has failed to have an impact on policy on the ground.

During the 1950s and 1960s, the poor quality of urban housing was attributed mostly to the lack of building skills in developing countries. At the time, the United Nations Center for Housing, Building, and Planning concentrated its technical assistance on spreading building technology, ranging from the use of stabilized mud blocks to the heavy prefabrication technique used in the Soviet Union.¹ At the time, the question of land and infrastructure was not considered to be an important housing issue. With his book *Freedom to Build*, John Turner (1972) created the first policy breakthrough repudiating the emphasis on construction technology and putting it back on access to land and the regularization of tenure for the informal sector.

In the 1960s and 1970s, policymakers for many central governments and municipalities thought that migration to cities was to be discouraged. They feared that migrants from rural areas would never find jobs in cities, and that cities might become too large to be

manageable. A number of research papers were even peddling the notion of optimum city sizes; implying that cities that had reached their optimum size should stop growing and therefore actively discourage migration and new land development.

Many governments had established national spatial plans that aimed to distribute migrations from rural areas into growth poles located away from the main existing urban centers. The idea that migrants from rural areas might constitute an economic burden on urban areas persists to this day in some cities. Central governments and municipalities started regulating minimum housing standards that were deliberately unaffordable to the poor in order to “discourage the formation of slums” but in fact with the objective of containing migration. Many of these standards are still on the books!

Confronted with increasing slum populations in urban areas, a number of developing countries created new government institutions to deal with what was perceived as a supply problem. In India, state governments created housing boards and slum-clearance boards that were supposed to build housing for the low-income population that could not afford to buy houses in the formal market, while demolishing slums and relocating displaced households into apartments. In Thailand, the National Housing Authority had the same mission: providing housing for the urban poor.

Government housing boards and housing authorities were allowed to maintain land use and building standards that were much lower than the ones permitted to the private sector, giving them a de facto monopoly on supplying housing for the poor. Dwelling units built by government housing institutions were using a number of subsidies that were not always transparent and that often had to be increased with time. The

contribution to the growth of the housing stock by government housing institutions was always marginal because of the need for more resources for subsidies and the inability to scale their operation in an efficient manner to meet the demand from the increasingly large number of new migrants. In addition, because the price of land was the only dependent variable in the design of housing following strict norms established in advance, often by the central government, housing projects intended for the poor were usually built in remote locations not attractive to poor households without individual means of transportation.

In the 1970s, the World Bank and other multilateral donors started showing interest in financing projects that would develop land affordable to migrants rather than financing the construction of finished housing. These “sites and services” projects were supposed to be free of subsidies and therefore would constitute a model that the private sector could later emulate. In reality, the implementing agencies were usually government housing boards and housing authorities that often resisted the concept of land development only.² These projects were often located on government land to cut the implementation time and the uncertainty linked with government acquisition of private land through eminent domain. The design standards used were often well adjusted to make them affordable. However, governments never allowed the private sector to use these low but realistic standards, and consequently the private sector never took the relay of the government housing boards to scale up the production of developed land.

With the fall of the European socialist economies in the early 1990s and the market reform in China, international donors started to become interested in applying market principles to land development in countries that officially had always been market economies.

New urban land strategy papers were developed that advocated removing the various supply constraints on land and housing development and concentrating subsidies on the demand side, in particular by developing housing finance. With the exception of Chile, few government and municipalities responded positively with specific revisions to their land use regulations. Housing boards and housing authorities continued to produce an increasingly irrelevant small number of subsidized housing units often allocated to the middle class or to civil servants.

At present, governments in a large number of countries are slowly reforming the land development process. Local groups, including those made up of slums dwellers, are usually pushing for reforms, while governments are reluctantly revising the most absurd regulations. The slow state-by-state abrogation of the Urban Land Ceiling Act that took place in India during

the last 10 years is a good example of the slow but steady process toward reforming the supply side.

The best way to help grassroots-driven reform is to build reliable local land databases that are widely disseminated using the Internet. The donor community and researchers should focus, first, on establishing monitoring systems for municipal land management; second, on identifying clearly and precisely the regulatory parameters—minimum plot sizes, maximum floor area ratio, and so on—that are the most detrimental to affordable land development; and third, on establishing a new methodology for calculating costs and benefits and for evaluating positive and negative externalities in changing land use parameters. The most effective way of accelerating reform is engaging in dialogue with local interest groups—like slum dwellers, developers, local banks, and the press—while giving them specific, reliable data.

MEASURING THE WAY MARKETS DISTRIBUTE URBAN LAND BY INCOME GROUP AND BY LOCATION

The spatial concentration of economic activities creates the value of urban land. Most urban economic activities do not require land per se but only the floor space built upon it. The spatial concentration of floor space where economic activities are taking place allows the increasing returns to scale characterizing cities' economies. The demand for urban land is in reality a demand for floor space.

Because no floor space can be built without some land to build upon, land is an indispensable input in the building of floor space. However, like most inputs, it has substitutes. Where and when land prices are high, land consumption per person will adjust downward, either by consuming less floor space or by substituting capital for land by building multistory buildings or by using air rights (e.g., over railway tracks). To understand land markets, it is important to understand how capital can be substituted for land and the limits imposed on substitution by regulations and by the minimum capital threshold required from households and firms to accomplish this substitution.

Substituting Capital for Land: The Floor Area Ratio

In areas where land is expensive, developers substitute capital for land by building additional floors on the same parcel of land. Assuming that households and employees consume a constant amount of floor space per person, increasing the number of floors would increase density (both job density and population density), and therefore for a given population it would decrease the demand for land for the entire city. Alternatively, increasing the number of floors

would allow increasing floor consumption per person or per job without increasing the demand for land.

The floor area ratio (FAR) is the number of units of floor space that are built on a unit of land.³ It is therefore a measure of the rate of substitution of capital (the cost of construction) for land. As is shown in the section below that discusses government intervention, free markets forces do not establish FAR values, which are usually heavily constrained by government regulations. For the moment, we will limit ourselves in finding the endogenous limitations in substituting capital for land, in the absence of government regulations.

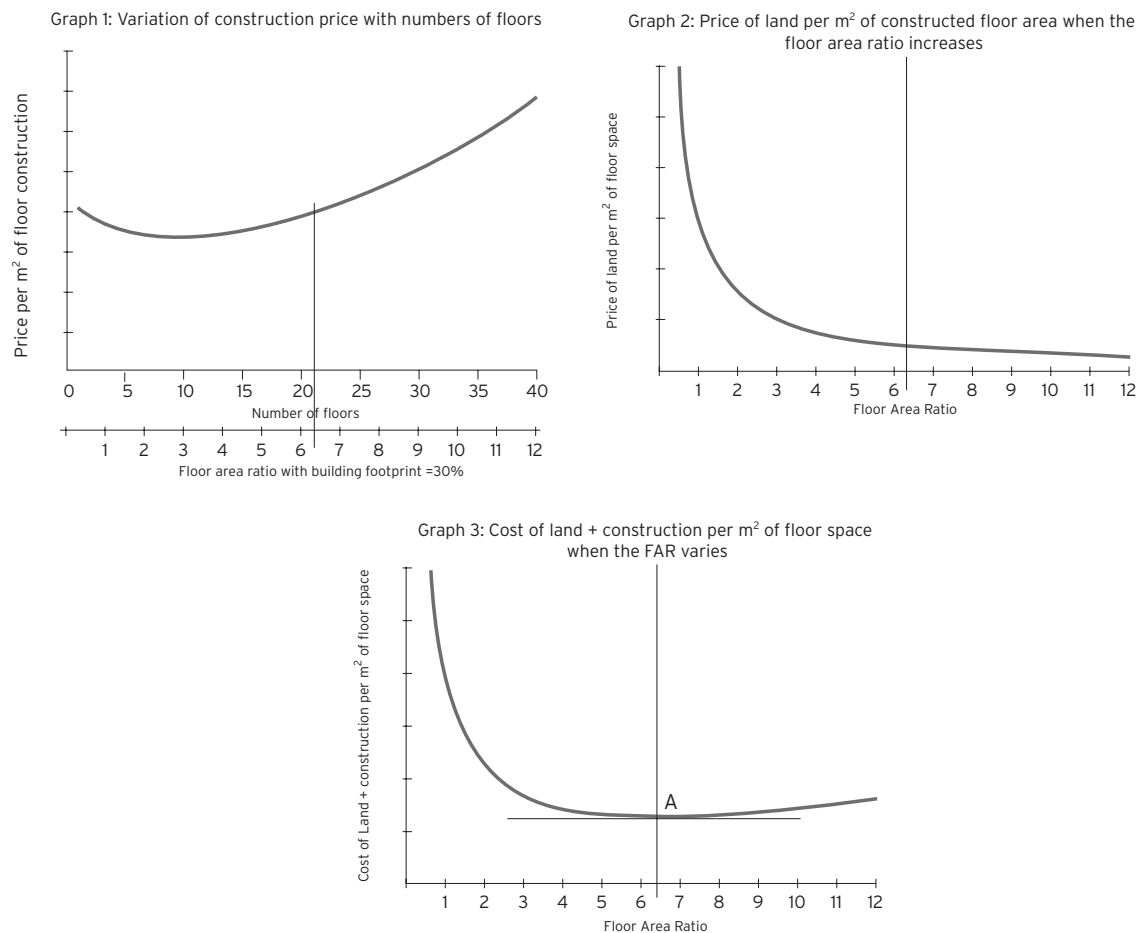
Substituting capital for land is constrained by the cost of construction per square meter of floor space, which follows a U-shaped curve as the number of floors increases. The possibility of substituting capital for land depends, therefore, on the relative cost of land and construction (see Figure 1).

Graph 1 at the top of Figure 1 shows the U-shaped curve typical of the variations of the price of construction per unit of floor space when the number of floors increase. For convenience, the number of floors shown on the horizontal axis has been converted into the FAR, assuming a lot of coverage of 30 percent.

Graph 2 in the middle part of Figure 1 shows—for a given fixed price per unit of land—the variations of land cost per unit of floor space built when the FAR increases. When the FAR is equal to 1, the cost of land per unit of floor space is equal to the price of land, then decreases asymptotically and tends toward zero when the FAR increases.

Graph 3 at the bottom of Figure 1 shows the sum of construction costs and land cost per unit of floor

Figure 1: The Floor Area Ratio and the Cost of Construction



Source: Author's calculations

space when the FAR varies. For a given price of land, when the FAR increases, the cost of construction plus the cost of land per square meter of floor space pass through a minimum, shown as A in Graph 3 of Figure 1. There is, therefore, for a given price of land, and a given cost of construction function, a unique FAR value for which the cost of providing a unit of floor space is a minimum. For the case shown in Figure 1, this minimum is reached for an FAR of 6.4—for a given cost of land per square meter and for a construction

cost function defined by the U-shaped curve shown in Graph 1 in the upper part of Figure 1. For a different land cost, the minimum would be different. For instance, when the land price decreases, the FAR value that minimizes the cost of floor space per unit area would be lower than the one shown in A.

In reality, a developer would want to maximize the difference between sale price value—represented by the sale price per square meter of floor space—and the

total cost (land + construction), and not just minimize input cost as shown on Figure 1.

The sale value of different floors might be different depending on their location. For instance, higher floors might have a higher sale value than lower floors. Or, possibly, consumers may be willing to pay a premium for apartments in small buildings of no more than four floors. Maximizing the difference between sale value and production cost might therefore give a different optimum FAR than just minimizing cost, as I have shown in Figure 1. However, the principle stays the same; depending on market conditions, there will be a best and higher use of land that will depend on the FAR used. Or in other words, given market conditions in a specific area and at a specific time, there is an optimum level of substitution of capital for land.

Market conditions—land prices and consumer demand for floor space—change continuously. However, most buildings normally have a useful life of around 50 years or more. When market conditions have changed so much that there is a large difference between the optimum rate of capital substitution for land as compared with the one that was used when a building was originally built, it makes economic sense to demolish that building and build a new one with a rate of substitution closer to the optimum.

Substituting Capital for Land Is Not Always Possible for Poor People

The rate of substitution of capital for land described above is based on “market conditions,” that is, it was assumed that the price of land was determined by consumers’ demand. In countries that are rapidly urbanizing, in particular cities in Asia with buoyant economies, there is a very large difference between the income of urban households that are fully integrated into the urban economy and those that are

emigrating from the countryside and have not yet acquired the skills and the productivity that characterize the more established urban labor force. In many cases, we will see that the lowest income groups may not be able to substitute capital for land and will be obliged to consume land with an FAR equal to 1 or even below 1. We are then confronted with the paradoxical situation of poor households having to consume 1 or more units of land per unit of floor space while high-income people will be able to consume only—say—one-fifth of a unit of land for each unit of floor space.

Low-income households do not have always the possibility of substituting capital for land. The cost of constructing a structure that can support several floors is often beyond the means of low-income urban households. For instance, in India, a single-story structure of wood, bricks, and corrugated iron can be built for as little as \$50 per square meter. However, the minimum cost of construction for a multistory structure is around \$150 per square meter (just for the floor space, without finishing). A minimum one-room dwelling of 16 square meters in a multistory structure—including staircases and corridors—would require a minimum of \$2,400 for construction only, compared with \$800 for a horizontal structure with the same floor area.

The higher the price of land compared with the cost of basic construction, the more incentive there should be to substitute capital for land. To give an order of magnitude, land in Mumbai at about 10 kilometers North of Churchgate Station would cost around \$900 per square meter (Ghokale 2007). In a faraway suburb, far from transportation (outside Thane, for instance) land would cost around \$200 per square meter. In either case, because construction is cheaper than land, it would make sense to substitute capital for land by building multistory buildings.

The high initial cost of a structure that can support several floors prevents low-income households from substituting capital for land. Their only recourse to outbid higher-income groups in acquiring urban land is to consume less land and less floor space. The financial threshold, about \$2,500 in most countries, represented by the cost of constructing 16 square meters of floor space in a multistory structure is the major obstacle to providing low-income households with the possibility of accessing well-located land by substituting capital for land. Low-income households would need an income of about \$1,000 per year to be able to afford the minimum cost threshold for a 16-square-meter dwelling in a multistory structure.

Countries that have succeeded in the large-scale private provision of formal low-cost housing are countries where the productivity of low-income urban households has allowed them to earn or borrow the initial \$2,500 necessary to be able to buy an apartment in the formal market by substituting capital for land. However, in most cities purchasing a dwelling in a well-located area in the formal market is impossible for households that have an income below \$800 per year. Not being able to substitute capital for land, low-income households need to buy about 20 square meters of land to build a minimum-sized dwelling of 16 square meters. By contrast, a middle-income household in Seoul or Singapore in a typical residential area with a FAR of 4 only needs to buy 15 square meters of land for an apartment of 60 square meters!

While the cost of construction varies from country to country, a square meter of concrete floor space has about the same price everywhere, because two of the major cost components are steel and cement, which are internationally traded commodities.⁴ Differences in labor costs in various countries are often compensated for with differences in productivity. For this

reason, the cost threshold that allows leveraging land by using higher FARs may be about the same everywhere.

The Indispensable Emergence of the Informal Sector

In the cores of dense and large Asian cities, the substitution of capital for land is an integral part of land price formation. For low-income households that cannot afford the minimum cost of a minimum-sized dwelling in a multistory structure, the land market is clearly out of reach, even if they were to reduce their consumption of land and floor space to a few square meters per household.

For households that cannot afford to substitute capital for land, a parallel market for land is bound to develop. This parallel informal market exists in every city of the world where a large number of households have an income that is too low to permit land substitution. When the rate of migration slows down and most low-income workers have reached a level of productivity that allows them to substitute capital for land, the informal parallel land market tends to disappear.

If we agree that free migration from rural areas to cities is economically desirable, then we must admit that *the constitution of an informal market independent from and parallel to the formal market is indispensable* for households whose productivity has not yet reached the point where they can afford to substitute capital for land. The issue to be addressed, therefore, is not how to prevent the development of an informal land market but on the contrary (1) how to ensure a steady supply of land for this parallel market and (2) how to ensure a minimum level of health and education for households whose dwellings are in the informal market.

The land supply of the informal market is by nature idiosyncratic and depends on local history and topography. Typically, these land types are likely to be traded in the informal land market:

1. Private land:

- a. Land areas that are not considered “developable” by the formal sector for topographical or accessibility reasons;
- b. Private land parcels that are deemed undevelopable because of land use regulations or a master plan but that landowners choose to develop informally; and
- c. Areas historically developed as villages or older informal settlements that have been absorbed into an urban area.

2. Government land:

- a. Land areas belonging to the government but with no current use; and
- b. Rights of way for roads and railways.

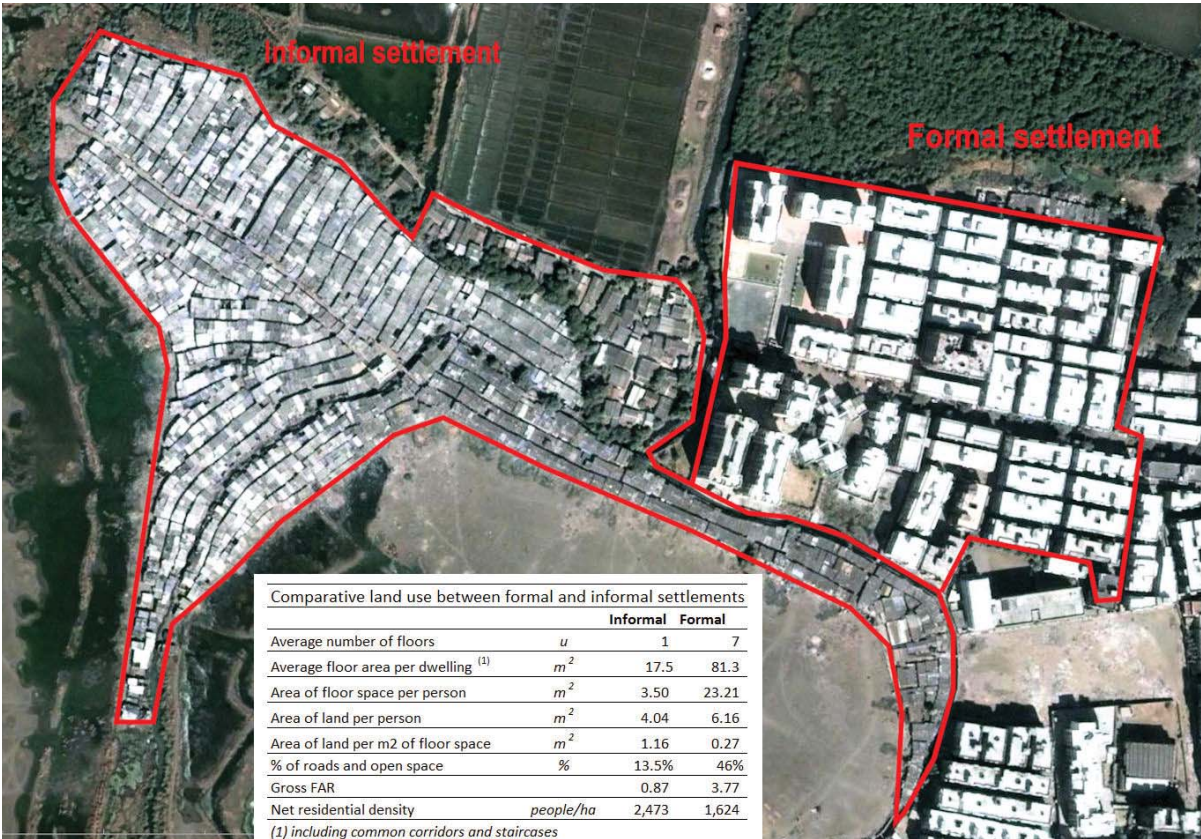
To my knowledge, no government has ever willingly created an informal market by delineating areas where building regulations would not apply, although some “sites and services” built by government and nongovernmental organizations in the 1970s and 1980s came close to it. However, much of the land used by informal markets is indirectly created by the government’s fiat through regulations. For instance, the restrictions imposed by the Mexican government on the sale of land in *ejidos* create a de facto informal land market, because this land cannot be legally developed by formal developers without an extremely lengthy legal and administrative procedure. In Cairo, about 60 percent of the population lives in areas developed informally, the agricultural land of the Nile River Delta having been declared as *non-aedificandi* by the government;

as a result, farmers are selling their land informally to private developers. The restrictions on building on agricultural land imposed by the Egyptian government have in fact created an informal parallel market where the informal sector does not have to compete with the formal sector.

The informal and formal land markets work independently of each other. Higher-income households cannot outbid lower-income households because they are operating in different, independent markets. While the proportion of informal settlements in each land category above may vary a lot from city to city, the percentage of informal settlements on private land is usually quite large. We must note that while there might be some cases of households squatting on private land, the proportion of squatters on private land is usually quite low. Usually, slums built on private land have been built with the consent of the owner and following a cash transaction. While the transaction resulting in the occupation of private land is illegal and informal, it is nevertheless a market transaction with a willing seller and a willing buyer.

The image shown on Figure 2 and the table of Figure 3 shows the juxtaposition of the formal and informal sector in a northern suburb of Mumbai. It illustrates the juxtaposition of the different land uses in the two sectors in adjacent locations. While the households in the formal sector consume six times more floor space than the households in the informal sector, they consume about the same amount of land per dwelling. Because land in this area is much more expensive than floor space, it is impossible for low-income households to outbid higher-income groups by consuming much less land, which could be done if they could afford the minimum \$2,500 necessary to substitute capital for land.

Figure 2: Land Use Differences in the Formal and Informal Sectors in Adjacent Lots



Source: Google Earth

Comparative Land Consumption Between Cities

The land consumed by cities—the land actually consumed and built upon, not the land within administrative boundaries—varies enormously from city to city (Figure 4.) Cities that consume very little land are not necessarily more economically efficient than cities that consume a lot of land. There is no correlation between households’ income or cities’ productivity and urban land consumption, as can be seen in Figure 4. This confirms the reality that efficient land use cannot

be imposed through norms but should be based on local market conditions. Land transformation quotas or land use norms imposed at the national level, as is now the case in China, are bound to create rigidities and diseconomies at the local-city level. In China, for instance, the central government considers that a norm of 100 square meters per additional person of built-up area for marginal urban growth is a “desirable” number. In addition, the central government imposes a land conversion quota on every major city to preserve agricultural land. In spite of the remarkable shift toward free markets in urban areas, China is

Figure 3: Northern Mumbai: Formal and Informal Sectors

Comparative land use between formal and informal settlements

		Informal	Formal
Average number of floors	u	1	7
Average floor area per dwelling ⁽¹⁾	m ²	17.5	81.3
Area of floor space per person	m ²	3.50	23.21
Area of land per person	m ²	4.04	6.16
Area of land per m ² of floor space	m ²	1.16	0.27
Area of land per dwelling	m ²	20.22	21.55
% of roads and open space	%	13.5%	46%
Gross FAR		0.87	3.77
Net residential density	people/ha	2,473	1,624

(1) including common corridors and staircases

Source: Author's calculations

still using a normative approach for land development based on “scientific” formulas reminiscent of Marxist central planning in the golden era.

Figure 4 shows the built-up area per person in a number of large metropolitan areas. Few cities bother to calculate their built-up area (i.e., the land actually used) and in most cases just provide the area within their administrative boundaries.

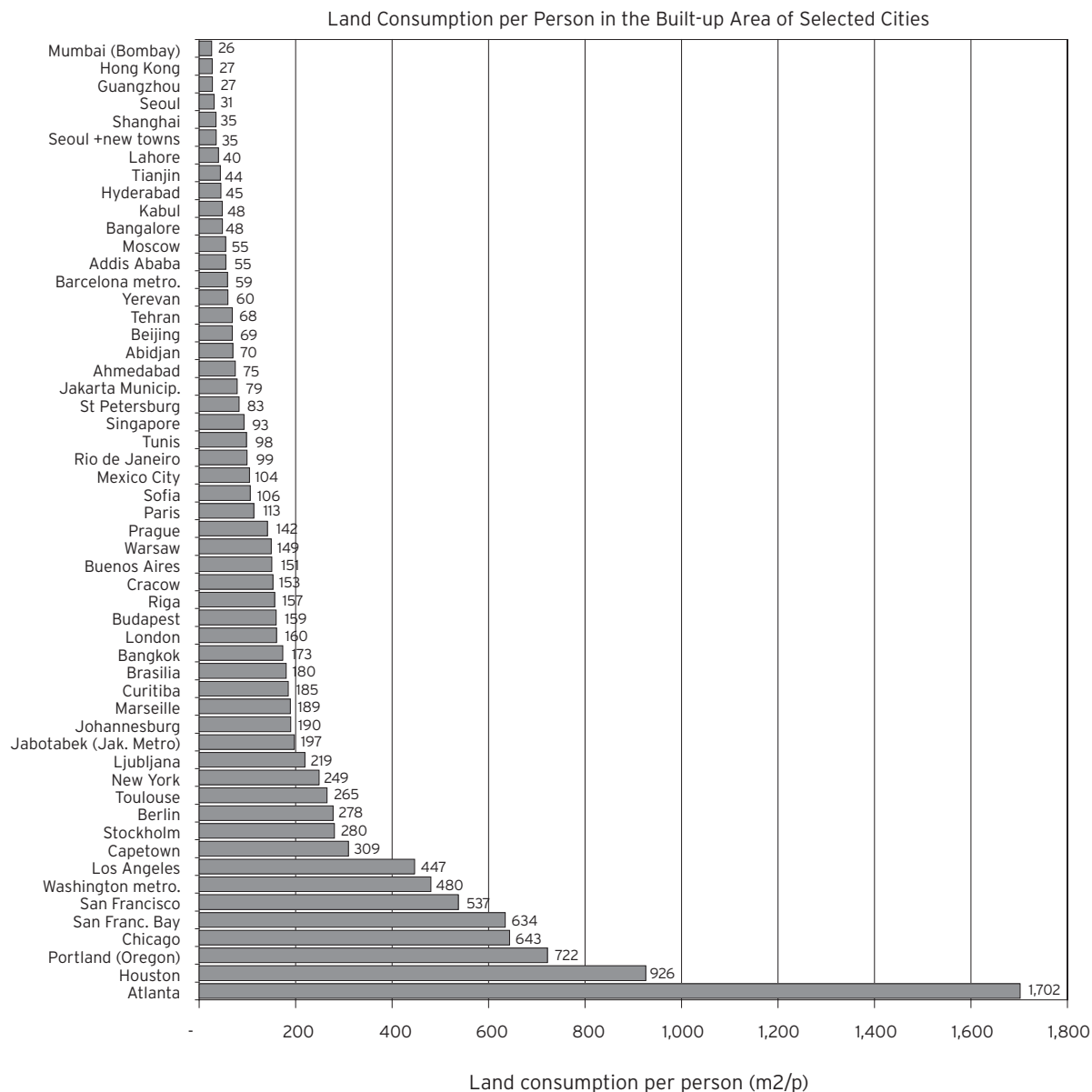
The consumption of land in the cities shown in Figure 4 is unrelated to income or productivity but is very much related to the system of transportation. The central area of all these cities is accessible within about an hour from the periphery. For the cities that consume more land, this implies a dominant individual mean of transportation, cars, taxis, or motorcycles. For the cities that consume the least, land transit must be the dominant mode of transportation. The infrastructure required for individual car transportation is land intensive and requires relatively cheap land. Or put another way, individual car transportation and its highway infrastructure open so much land to the mar-

kets that land remains relatively cheap. In these cities, except in their central business districts (CBDs), there is not much reason to substitute capital for land, and as a consequence the FAR in most residential area is below 1.

Land Consumption Within Cities

Land markets should be studied as a continuum. Too many land market statistics focus only on the new land developed each year, without taking into account the land use transformations within the existing built-up area. In reality, each year, the land used within a city's core is far more valuable than the land developed at the city's margins. The land use transformations that may or may not occur in the center city are therefore extremely important for the city's economy, much more in many ways than the land developed at the margins of urbanization. The ability to adapt existing land uses to changing economic conditions is at least as important as the ability to increase developed areas on the periphery.

Figure 4: Urban Land Consumption per Person in 50 Cities



The land consumption per person in this chart is based on the population of the 1990 census divided by the city's built-up areas as measured on land use maps and satellite imagery.

The built-up area does not include airports, nor water bodies and parks and open space larger than 4 hectares.

Source: "Order without Design," Alain Bertaud, forthcoming

For instance, in Hong Kong the land use of the traditional CBD (Central, Wan Chai, and Tsim Sha Tsui) has been constantly transformed during the last 30 years

with additions of floor space and constant upgrading of infrastructure and amenities. Probably more additional prime office space has been built over the

years in these three CBDs than in the new cities built in the new territories. Increasing the floor space area where the demand was the highest was certainly a good strategy.

While the average consumption of land presented in the previous section was an interesting characteristic of the morphology of cities, the way land is distributed between income groups and the way land consumption is distributed spatially within a city are important aspects of land markets.

Land Consumption by Income Group

To design an urban land policy, including the regulations that would support it, it is necessary to understand how markets are currently distributing land among different socioeconomic groups. Every household and business consumes exactly the amount of land it can afford under current market conditions, and every household residing in a city, by definition, can afford some area of land. Even if, in the worst case, what they can afford is limited to two square meters of sidewalk.

It is often said that land is unaffordable to lower-income households. This is a misleading formulation. What is usually correct is that the minimum lot area allowed by regulations is unaffordable to low-income households within x number of kilometers from the city center. Affordability cannot be separated from standards, which are often arbitrary. *The real issue is therefore not that land is unaffordable to lower-income groups but that the quantity of land that is affordable is socially unacceptably small and is unserved by infrastructure, transportation, and social facilities.* How much land each income group can afford, the location and legal characteristics of this land, and the quality of its infrastructure are the aspects that are important to know in order to try to improve the supply of serviced land that will benefit all urban households.

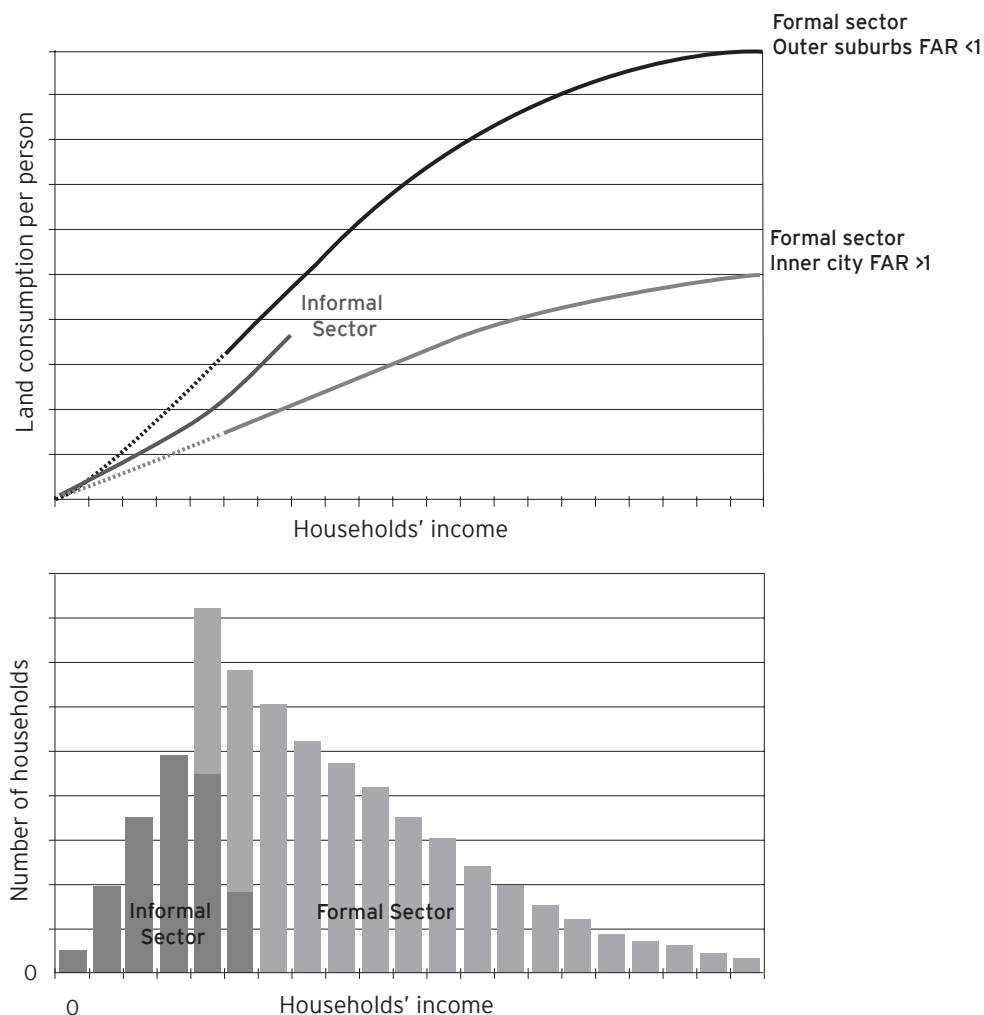
Figure 5 shows a way of relating consumption and households' income. In the graph at the top part of the figure, the curves representing consumption by the formal and informal sectors correspond to consumption under current market conditions. Urban land use policy should aim to alter the consumption curve of the various groups: *decreasing the land consumption of the formal sector* by allowing more market-driven FARs and *increasing the floor space consumption of the lowest-income groups* by either facilitating their access to capital substitution for land and therefore gaining access to the formal sector, or by improving the infrastructure and social facilities standards in informal areas. Land subsidies to increase land and housing consumption by lower-income groups are usually not effective. Direct housing demand subsidies could be provided to the lowest-income groups to increase their floor space consumption while probably lowering their land consumption.

Figure 5 has the advantage of showing simultaneously the level of consumption per income group and the number of households at this consumption level. The magnitude of any subsidy can therefore easily be derived, depending on the minimum level of services that becomes the objective of the policy.

The Spatial Distribution of Land Consumption

The spatial distributions of land consumption, expressed by density profiles drawn from the city center to the outer suburbs, help understand how land markets work and how regulations could alter their functioning. The classical monocentric model of Alonso (1964), Mills (1970), and Muth (1985)—predicting that built-up densities would follow a negatively sloped exponential function dependent on household income, the cost of transportation, and land/capital substitution—has proved to be very robust, even for cities that are not anymore dominantly monocentric,

Figure 5: Consumption of Land per Income Group



Source: Author's calculations

like Atlanta. The density profile of 12 major cities on three continents shown in Figure 6 demonstrates the resilience of the model. Within a given city, the consumption of land per person from the city center to the periphery often varies by several orders of magnitude. The overall demand for urban land is therefore very much dependent on the density profile. The high densities—low land consumption per person—in city centers are possible because of the possibility

of substituting capital for land. As we have seen, the regulation of maximum FAR reduces the possibility of making this substitution, even when it is an economic necessity. We will see in the next section how regulations affect the demand for land by altering the density profile of cities. No study of land market, supply, and demand could be complete without drawing a density profile as a starting point.

Figure 6: Density Profile in 12 Metropolitan Areas

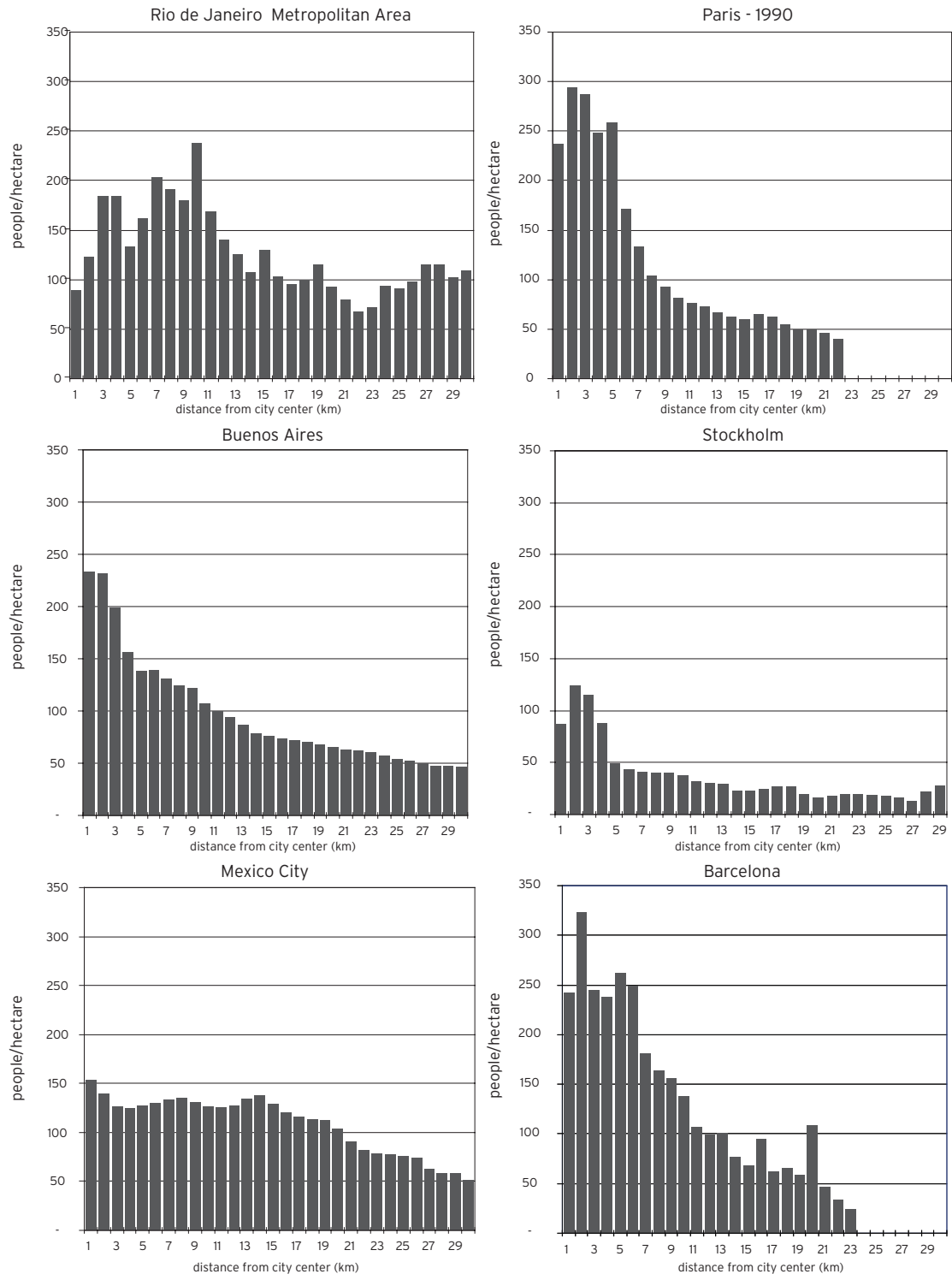
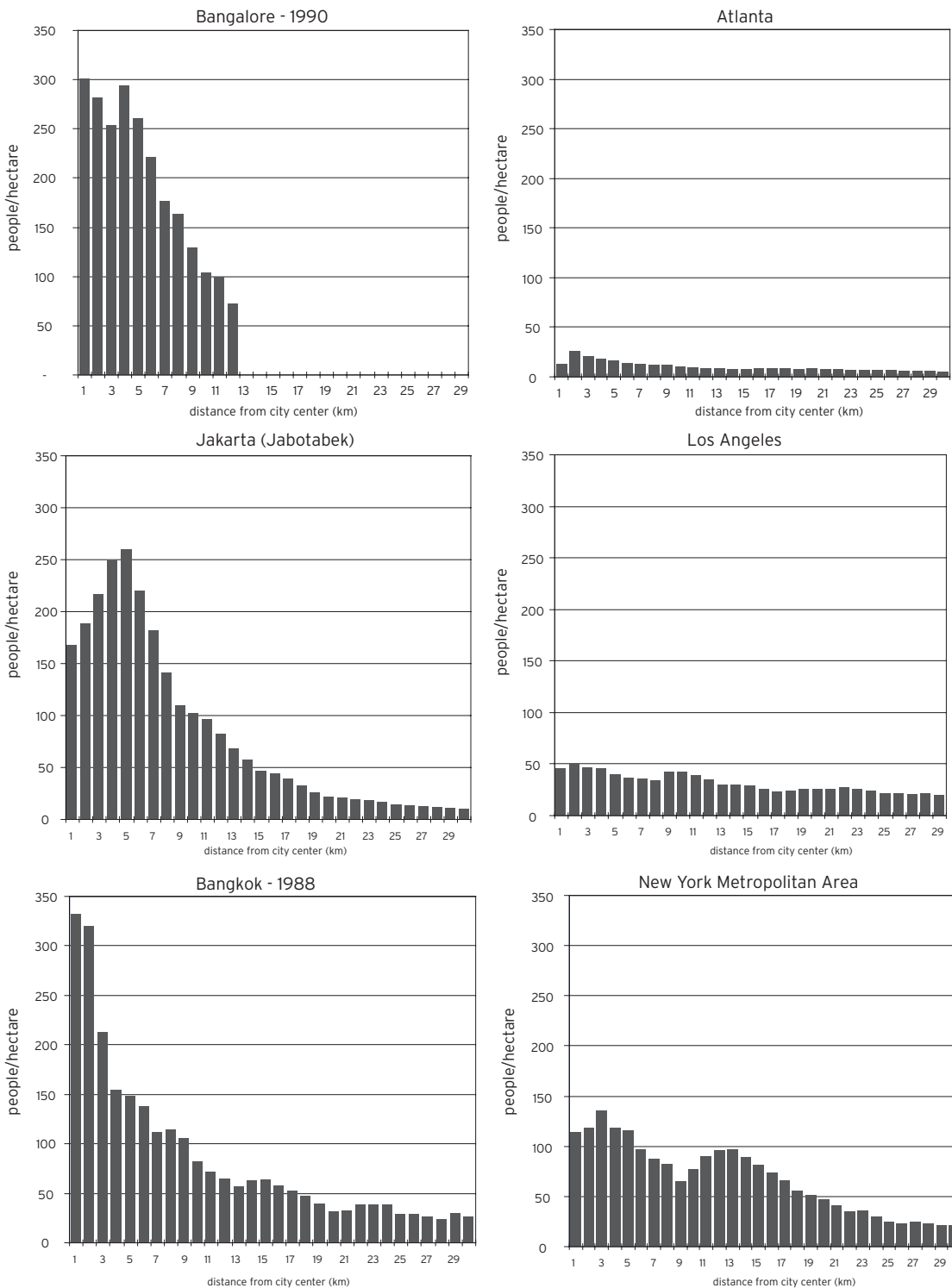


Figure 6: Density Profile in 12 Metropolitan Areas (cont.)



Source: "Order Without Design," Alain Bertaud, 2003

HOW GOVERNMENT ACTION AFFECTS BOTH LAND SUPPLY AND CONSUMPTION

Many government actions affect both land supply and land consumption. Regulatory constraints cannot be reduced to a dummy variable; different parameters at different times have very different effects. The consumption of land per unit of floor space varies enormously from city to city and within cities. This variation is due in part to consumer demand and in part to government regulations and government landholdings. Here, I try to identify the part of the land consumption that is due to consumer demand and the one that is due to government regulations and activities.

Because urban land price varies with time and location, one would expect its consumption to also adjust continuously to changing prices. However, in reality a large part of urban land consumption is not determined by the market but by government regulations and norms set by the government. In addition, a large part of urban areas are under government ownership—such as streets, public facilities, and open space like parks—and thus are not traded on the open market. The areas not traded may also include government-owned land, land used by utilities, and land used by parastatal enterprises and by the military. The market price of government-owned land, both used or unused, is seldom calculated,⁵ and its consumption therefore does not adjust when prices change.

The total land consumed in a city can be disaggregated into four components, as shown by this equation:

$$L = \frac{A}{Far} + R + S + G$$

Where

- *L* is land consumption
- *A* is the total floor area for housing and any commercial and other private enterprises
- *Far* is the average floor area ratio
- *R* is the area reserved for roads
- *S* is the area reserved for public open spaces
- *G* is the land area used for government-owned facilities and entities (which may range from primary schools and the post office to army barracks)
- Typically *R* + *S* + *G* represent more than 50 percent of all urban land in most cities.

Among the five independent variables in this equation, the value of *A* is the only one that is mostly market driven. All the others have an upper limit (for *Far*) and a lower limit (for *R* and *S*) that are controlled by government norms, regulations, or practices and are not normally subject to adjustments when land prices vary.

The quantity $\frac{A}{Far}$ corresponds to the total area of privately owned land in a city.

In most countries, the FAR is subject to a regulatory upper limit. In places where this upper limit is binding, this particular regulation increases the land consumption per unit of floor space compared with what it would have been if the FAR had been fixed by the market. In Bangalore, Bertaud and Brueckner (2004) calculated that the low FAR regulatory values in the core city cost households on average around 3.5 percent of their yearly income in additional transportation costs.

In Mumbai, the FAR is particularly constrained to a low value of 1.33 in the city core. If we compare this FAR value to the average FAR in Seoul, which is about

equal to 4, it means that the FAR regulation obliges households and firms to consume about three times more land per unit of floor space than they will do in Seoul (a city with a population density similar to that of Mumbai).

A relatively small change in the average gross FAR could over a relatively short period of time have a large impact on the area of urban land required for urban development. Figure 7 shows three alternative land requirements over 20 years for a hypothetical city of 1 million people growing at 2.5 percent a year, with a current gross residential FAR of 0.8 (about the same gross FAR as current Tianjin residential areas). In all three hypotheses shown in Figure 7, the floor space consumption per person would increase from 20 square meters in the base year to 30 square meters at the end of a period of 20 years. An increase in FAR from 0.8 to 1.1 would reduce the land requirement by more than half that would be required if the average gross FAR was to decrease from 0.8 to 0.5. This increase in gross FAR could be obtained only if there was an economic justification for substituting capital for land. However, in many cities, particularly in India, FAR regulations are binding on large areas; that is, an increase in the regulatory limit on FAR would result in an actual increase on the ground.

The regulation of FAR is not the only type of regulation that has an impact on land markets. Here is a succinct list of other types of regulations that also affect the supply of and demand for land:

1. Regulations that increase land consumption

Beside the regulations of FAR, subdivision regulations set standards for roads, block length and width, and land reserve for open space. As a result, the amount of land that can be built upon depends on these regu-

lations. In some countries, the area of land that can be used and traded is below 40 percent of the total land developed. I am not arguing here for an absence of regulation for road widths or open space but for an audit of these regulations so that the total land that can be privately used be at least above 50 percent of the total land developed.

2. Regulations that decrease supply

Greenbelts, zoning plans that restrict development on slopes or on various types of land to be set aside for conservation, restrict supply. Urban growth boundaries, as practiced in Portland, Oregon, decrease land supply and contribute to high land and housing prices.

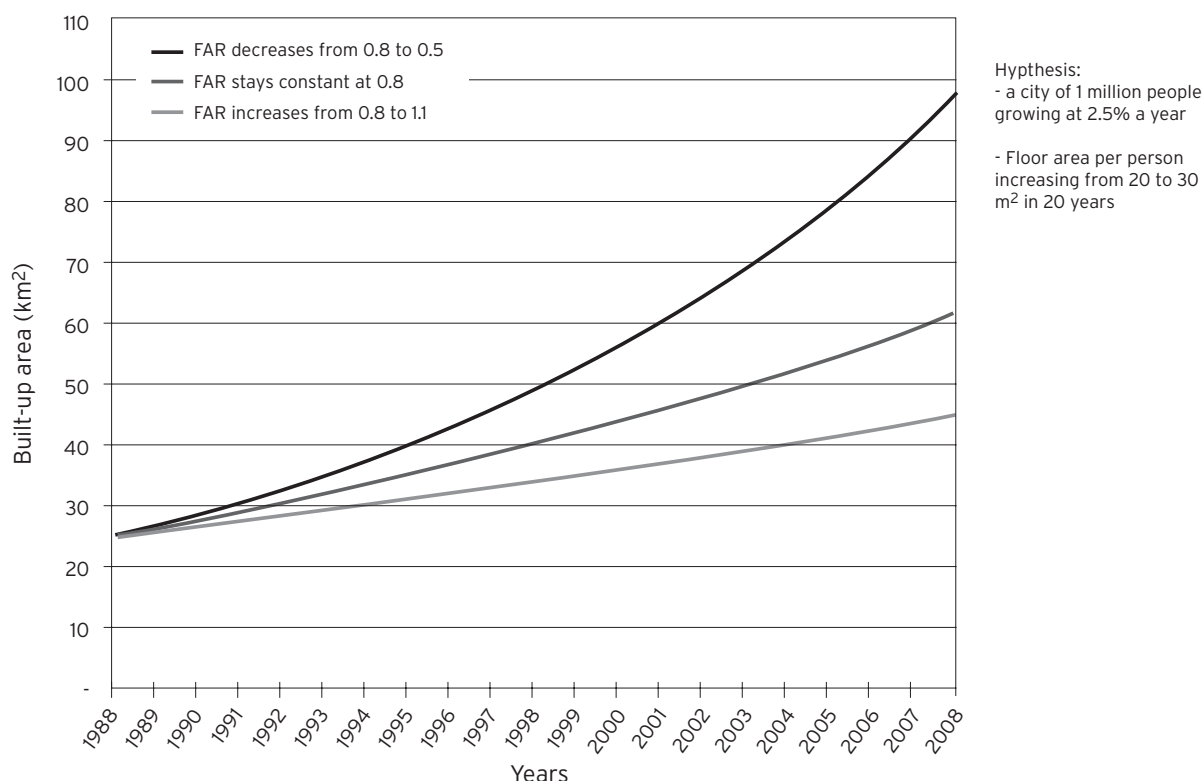
Finally, government ownership of land usually restricts supply. Land owned by the government is usually underused because there is no rationale to substitute capital for land when the land is not priced, which is the case for most government-owned land.

3. Practices that make supply inelastic

Zoning plans, in general, allocate land for specific uses. If the quantity of land allocated for a specific use is insufficient, it creates a temporary shortage until the zoning plan is amended. The overallocation of land for a specific use has the same effect, because the land stays vacant until the zoning plan is amended, which may take several years.

Complex building permit procedures, sometime taking several years for large projects, contribute to making land supply inelastic. The building permit process often significantly increases the transaction costs of building formally and as a consequence increases the size of the informal sector.

Figure 7: Land Requirements Under Alternative Average FAR Scenarios



Source: Author's calculations

4. Investments that increase land supply

The extension of primary infrastructure investments in road and transit in new areas increases land supply by shortening the time required to travel from one place in the city to another. However, some transportation infrastructure, like ring roads and highways, have restricted access whose purpose is to decrease use and thus to improve traffic flow. In this case the impact of these investments is limited in terms of increasing land supply. The debate over the dispersion system of the planned Trans-Harbor Bridge in Mumbai still under design illustrates this point. The design of the dispersion roads that will give access to the bridge periodically oscillate between opening the maximum amount of land on the other side of the bay to urban-

ization and restricting access to a maximum amount to ensure better intercity traffic flow between downtown Mumbai and Pune.

The preceding should not be understood as necessarily advocating fewer regulations or even no regulations. What is suggested is that the cumulative effect of many regulations and practice on the supply of land is important and worth measuring. The decision to impose a particular regulation is usually made with a limited objective in mind, by people who have also a limited view of global land supply at the city level. It is necessary to periodically aggregate the cumulative effects of regulations and to amend them in order to increase the elasticity of land supply.

URBAN LAND DEVELOPMENT CASE STUDIES: INDIA, SOUTH KOREA, CHINA, AND THAILAND

The way countries formulate policy and regulate urban land is never completely coherent. The following case studies show that there is no silver bullet to reduce supply constraints on urban land and that neither complete laissez faire nor an government monopoly on land development can by itself solve the problem.

The major problem of suburban land development is the long and risky negative cash flow borne by the developer, whether this developer is the government, an implementation agency as in Gujarat land adjustment projects, or a private developer. At a certain point, it is necessary to disburse capital to build an infrastructure that will provide revenues in the future in the form of increased land values. How far away is this future? Will the proceeds of land sales be sufficient to cover the cost of infrastructure, including the financial cost of carrying a negative cash flow for an unknown number of years? There is a strong risk factor in any land development project. The larger the project, the higher the risks. Who should bear this risk? Government, private developers or landowners? The four case studies that follow—which include cities in India, South Korea, China and Thailand—show alternative arrangements for initiating and bearing the risk for expanding land supply. None of them is fully satisfactory, although in general they show better outcomes than in many other countries.

India: The Town Planning Schemes in Gujarat

In India, land policy, land regulations, and urban infrastructure investments have been at time guided by national policies but are for the most part controlled

by states' chief ministers and states' legislatures. In some cities, urban development authorities accountable to the state's chief minister have a quasi-monopoly on new land development; in other cities, land development is practically entirely private and the development authority's role is mostly restricted to planning and to a few discrete land development projects. Municipal corporations have very little power on land use and infrastructure investments. The power of elected mayors is purely symbolic. This peculiar institutional arrangement may explain some of the idiosyncrasies of Indian urban development and its laws and practices. It may also explain why urban infrastructure and the housing sector have not thus far seemed to benefit from the fast economic development of the last few years.

Over the years, the Indian government and the states' legislatures have been using a number of draconian laws to regulate the development of urban land. These laws have pursued a dual objective: attempting an egalitarian distribution of land (e.g., ULCRA and rent control act) and preventing urban congestion and densification (e.g., the progressive reduction of FAR). But the Indian urban laws have achieved neither their egalitarian nor their low-density objectives; Indian cities have the largest slums in the world and are among the densest. In addition, these laws have been partially responsible for very high land prices and an extremely low consumption of floor space and land. The overly restrictive regulatory system has resulted in what has been describe as a "criminalization" of urban development.

While the ULCRA has been progressively repealed in most states, the constraint it imposed on land supply is still having an impact on the spatial structure of Indian cities. The proper use of FAR regulations and what FAR values should be is debated nearly daily

in the Indian press, often with a lot of insights. Few cities, Hyderabad, for instance, have removed most floor space index constraints. Many more cities, unfortunately, still maintain a strict control over FAR, or even, like Mumbai, have progressively decreased the permitted FAR over the years in spite of increasing population and land prices.

For a given urban population and a given floor consumption, low FARs values increase demand for land. To respond to this demand, new urban infrastructure is required to increase land supply. However, in India, there are very few formal mechanisms for financing urban infrastructure, short of special allocations by states' legislatures or grants from the central government. As a result, the supply of new urban land falls short of the natural demand created by increases in urban income, population, and economic activities.

With few exceptions, it seems that the various states in India are mostly using two models for financing urban land development. The first model consists of creating a monopolistic Urban Development Authority (the Delhi model), which is financially powerful but unresponsive to demand, as would be expected from a land monopolist. The second model consists of introducing draconian restrictions on FAR values (the Mumbai model), creating an enormous scarcity of land and floor space, and then negotiating with private builders to relax some of the FAR restrictions in exchange for segments of infrastructure or for social projects like slum redevelopment. The relative success of the sale of Tradable Development Rights in Mumbai is based on a two-pronged approach: first, creating an artificial shortage of floor space and land by keeping FAR unreasonably low; and second, relaxing the FAR rules piecemeal against contributions in kind from developers in the form of slum redevelopment or the fragmented construction of infrastructure.

The two approaches—the monopolist state development agency, and the piecemeal relaxation of draconian regulations—produce an outcome that is less than satisfactory. While most states in India have used a variant or a combination of these systems, the State of Gujarat has developed and perfected over the years an original system to ensure the timely and nearly self-financed development of land on the peripheries of cities. This system, based on land readjustment models commonly used in some East Asian countries, could certainly be adapted successfully in other parts of India.

The Town Planning Schemes of Gujarat as an Urban Land Supply Mechanism

To develop urban land on the fringes of cities, the State of Gujarat is using town planning schemes (TPSs), a form of land readjustment system roughly similar in principle to the ones that had been used in South Korea, Taiwan, and Germany. A detailed description of the TPS mechanism and process is provided by Ballaney and Patel (2009). The legal framework for the TPS of Gujarat is originally based on the Gujarat Town Planning and Urban Development Act of 1976. The legislation has been revised a number of times to improve its operational aspects and its financial viability.

Land readjustment projects have been tried by many countries without much success. There are many types of issues to overcome to successfully develop land through land readjustment projects: (1) the slowness of the legal process; (2) the lack of confidence in government to deliver the infrastructure once the land for roads and services has been taken from landowners; (3) the temptation by the implementing agency to take too much land away for roads, facilities, and its own use to finance infrastructure; (4) the overdesign of infrastructure, resulting in a land devel-

opment price that does not clear the market; and (5) the failure by the implementation agency to recover the cost of infrastructure.

Initially, the TPSs in Gujarat were affected by all five of these types of issues. As recently as 1986, a World Bank urban study found that in Gujarat, on average, it took 10 years to implement a TPS; that most of the infrastructure was never or poorly implemented; and that in most cases, the state government was obliged to subsidize the land developed through TPSs. The TPS rules were amended several times. The amendments to the rules were often done to respond to a specific crisis affecting the State of Gujarat. For instance, Mehta (2001) argues that the plague epidemic in Surat in 1994 was instrumental in Gujarat to focus attention on urban problems and on the poor state of urban infrastructure. The earthquake of 2001 in Bhuj, Gujarat, gave a new urgency to redevelop land quickly in the dense areas where property lines had been erased by the disaster. Every time, new methods were used and some rules were changed to respond to the urgency of the problems facing the state.

Eventually, as of 2009, it appears that the TPSs became fully operational. The implementation process, from initiation to final approval of a TPS, requires on average less than one year. Since 1999, the Ahmedabad Urban Development Authority (AUDA) has managed to develop on average about 700 hectares a year using a TPS (Figure 8). The average area developed each year is roughly equivalent to about 3.2 percent of the current built-up area of the Municipality of Ahmedabad. This is an impressive achievement.

While the area of land under development and the infrastructure built so far seem to show that TPSs are a feasible mechanism for land development in the Indian legal context, the issues of affordability and the

influence of TPS on city structure are not yet completely clear.

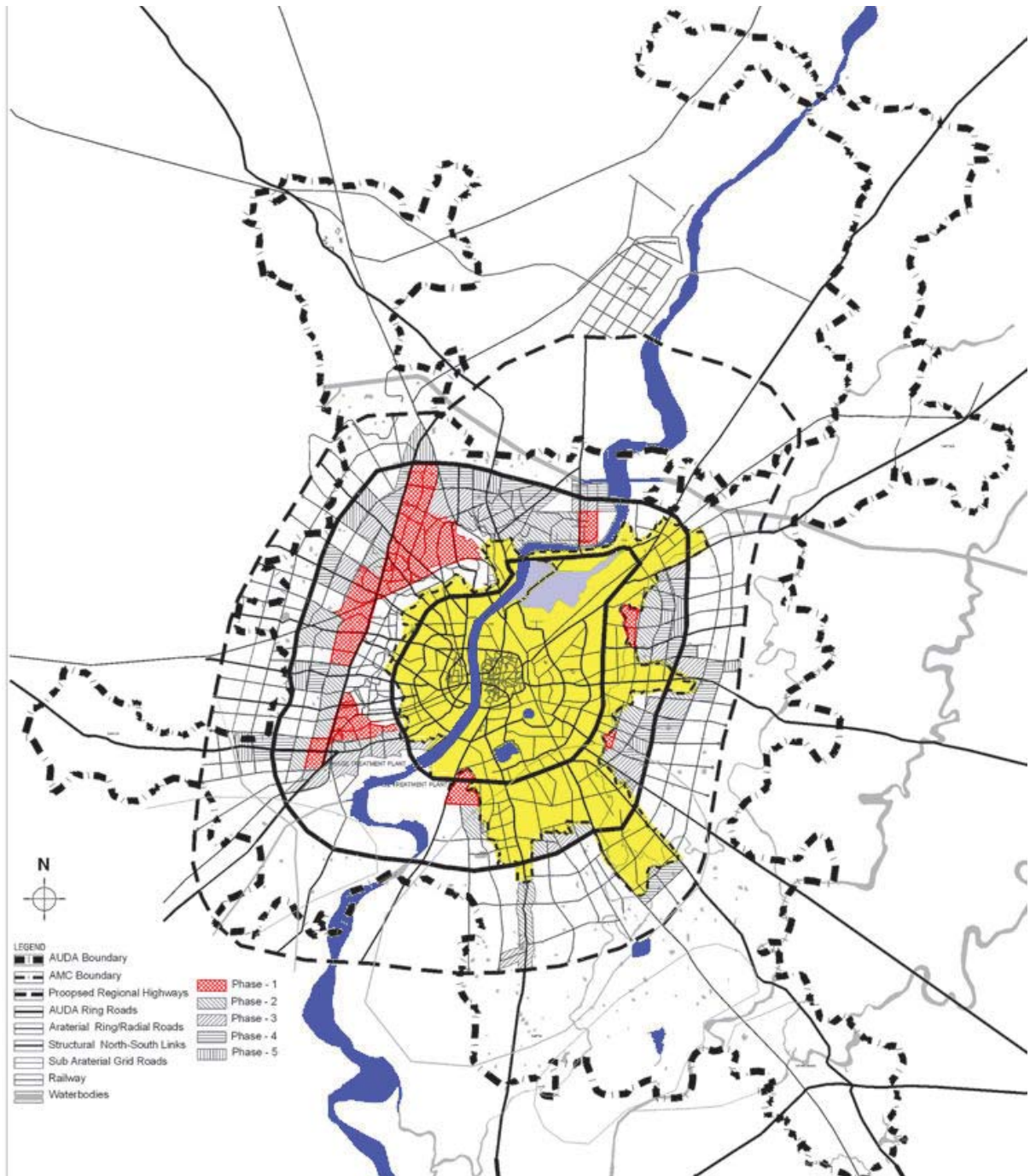
Housing Affordability and TPSs

What is the sale price of land in a TPS? Obviously, in Ahmedabad, the developed land clears the market. The example shown in Figure 9 shows that infrastructure is getting built simultaneously as the TPS land is being sold to developers by the original landowners. This phasing should improve the cash flow and reduce financial cost. In Figure 9, we can see existing informal areas that probably preceded the TPS being kept in situ and allowed to become slightly denser. It would be interesting to know the price cutoff point for the housing units being built on a TPS. We do not know what minimum infrastructure and land use standards are applied within the lots allocated to developers. The quota of 2 percent of the land allocated by AUDA to build subsidized Economically Weaker Section flats does not seem to constitute a valid supply response to housing demand coming from poor households.⁶ The demand for housing from poor households may vary a lot from one area of the city to another, and a quota is not the right answer.

Integrating existing villages and informal settlements into a TPS rather than relocating them might be a better way of ensuring a demand-driven supply of land and floor space for low-income households. The original owners of these plots should be allowed to build without too many restrictions, so that they can develop housing for rental adapted to the demand from low-income migrants.

It is also possible that the new housing created in suburbs by a TPS attracts mostly middle-class households that have individual means of transportation, cars or two-wheelers, and that the most attractive housing for low-income households is being provided

Figure 8: Ahmedabad's Development Plan and TPS



Source: Ballaney, Shirley and Bimal Patel, 2009, "Using the 'Development Plan-Town Planning Scheme' Mechanism to Appropriate Land and Build Urban Infrastructure" India Infrastructure Report 2009

Figure 9: Image of a TPS under Implementation in Northwest Ahmedabad, 2002-8



Source: Google Earth

in the older housing stock located in the area within the boundaries of the municipal corporation. In this sense, by attracting middle-class households away from the older housing stock, a TPS might be contributing to improved housing conditions for low-income households. This issue deserves additional research to provide a consumption profile by income group similar to the one mentioned in the first section.

Finally, on the affordability side, it appears that most phase 1 TPSs are located on the West Side of the city (Figure 8). Land and housing prices are much higher on the West Side than on the East Side. One way to provide more affordable land and housing would be to develop land using TPSs in areas where land is cheaper and to adapt standards to demand from lower-income groups.

The Impact of TPSs on Cities' Structures

As is usual in India, the maximum FAR allowed in the TPS areas in the suburbs of Ahmedabad controlled by AUDA is higher (FAR = 2) than the one allowed within the corporation boundaries of Ahmedabad (FAR = 1 to 1.5). For instance, the new housing units appearing in the middle of the bottom picture in Figure 9 are constituted by a five-story apartment building, which would not be allowed in the center of Ahmedabad where most of the regulatory FAR is between 1 and 1.5. The restriction of FAR distorts the structure of Indian cities by increasing densities in the suburbs and condemning cities' centers to decay.

The Development Plan drawn up by AUDA to define the infrastructure of TPSs does not cover the area of the municipal corporation. It should be possible to coordinate a FAR zoning plan for the entire city that would be consistent with land prices and consumer demand, that is, a zoning plan that would have a much higher commercial and residential FAR in the city cen-

ter and a lower FAR in the suburbs, although not lower than the FAR of 2 currently allowed by AUDA.

Conclusion: An Evaluation of TPS Affordability and a Revision of FAR Should Be the Next Step

The TPSs of Gujarat have demonstrated that they are an efficient way of developing suburban infrastructure in India. It is now necessary to demonstrate that the TPS can also deliver land for low-income housing without arbitrary government-imposed quotas. A priority research effort should consist of an evaluation of the affordability lower limit currently reached by private developers building in TPSs. A complete land market study and FAR used by developers would also show to what extent and where developers are substituting capital for land, and whether the current regulatory FAR prevents this substitution. As mentioned by Ballaney and Patel (2009), nothing prevents TPSs from being used for the development of downtown areas. However, to do so, agreement should be reached on a complete revision of FAR policy in Indian cities. The spatial profile of regulatory FAR should follow the land price gradient and not contradict it. Unless this revision is done, it would be difficult to use TPSs in the central areas of large Indian cities.

South Korea: Land Readjustments and the KLDC

The urban development policy carried out by the government of South Korea contrasts with the one followed by the government of India. South Korean urban development policy is based on direct and massive government intervention and infrastructure investments in urban land development. The private sector's role in urban development and housing has been mostly limited to implementing the plans drawn up by the government. The main development objective of the South Korean government since the end

of the Korean War (1950-53) has been to raise the productivity of industry, and the building industry has been considered an important industrial sector.

Due to the destructions during the war and to the partition of the country, in the late 1950s the largest cities of South Korea contained large refugee camps and high-density shantytowns where many houses were built out of wood, cardboard, and plastic sheets. The informal settlements in Seoul in 1966 represented 38 percent of the city's housing stock (Woo-Jin Kim 1997). At the time, most urban formal dwellings were individual houses or townhouses. The first apartment blocks in Seoul were built in the early 1960s.

At the time, formal urban development was done through land pooling, which was a traditional way in South Korea of converting agricultural land to urban uses. During the 1960s, due to high demand for housing and to rigidity in land supply, urban land prices increased by as much as 49 percent in some years (Jung 1993).

From 1968 to about 1980, the government became actively involved in land pooling as a way to build the arterial roads that were an important part of its urban master plans and were deemed essential to boost urban productivity. The land pooling process was well established and well administered but slow when dealing with very large projects. In the early 1970s, the government applied land pooling to build large-scale projects of more than 20,000 units at a time in a single project (Yoon 1994). Typically, it would take more than 10 years to implement half the land development projects built during this period. In Seoul, entire self-contained neighborhoods were completed using land pooling—for instance, the Yeong Dong Project south of the Han River (Doebele et al. 1982).

The establishment of a greenbelt around Seoul and a government policy trying to encourage the growth of small towns contributed to a shortage of developed land, in spite of the government's direct support for large land pooling projects. Because of fast economic growth, growing household income increased the demand for housing, contributing to higher land prices and rents. It was clear at this point that while the economic policy of the government was successful in increasing incomes, the traditional land development process through land pooling was creating a supply bottleneck because it was too slow to provide enough land for the current demand for housing.

At the end of the 1970s the government saw the need to accelerate the land development process. Published in 1980, *The Korean Master Plan for Public Housing Construction and National Urban Land (1981-91)* established a new policy aiming at providing a large increase in the supply of urban land by having the government directly acquire 70 percent of the urban land required for urban residential development through the City Planning Project Law, while 30 percent would be provided through land pooling. (Doebele et al. 1982) But within these 30 percent land pooling projects, 25 percent of the land would be developed by the Korea Land Development Corporation (KLDC). The plan, therefore, aimed for 77.5 percent of urban land to be developed directly by the government, either through direct acquisition or through a "tax" in kind on land pooling.

The goal of the government was efficiency and speed in providing the urban infrastructure that it saw as a prerequisite for increasing the productivity of the entire South Korean economy. Thus, controlling urban land development had two objectives: (1) It was allowing the government to provide a timely supply of large tracts of urban land ready for development to the

private building industry; and (2) it immediately provided the rights of way that were necessary to build a modern primary infrastructure able to support high densities. In doing so, the South Korean government of the time pursued the same policy it had followed for other industrial sectors: concentration to achieve economies of scale.

The government subsidized the developed land it provided to builders, but in counterparty mode, it imposed price controls on the sale of apartments (Yoon 1994). At the same time, land use regulations fixed the FAR and the distribution of the size of apartments—in most residential areas of Seoul developed by the KLDC, the FAR is between 2 and 6. For the builders, because land uses and apartment sale prices were fixed, the only way to increase profits was to increase productivity, which was precisely the objective of the government. Landowners, in particular *chaebol*, were obliged to dispose of their “idle land” holdings at prices fixed or “negotiated” by the government. The subsidies on land were passed on to the housing purchaser, as the sale price fixed by the government would not have been achievable without the land subsidies. As a result, the market prices for these apartments after resale by the original beneficiary were much higher than the original purchase price. For this reason, the government allocated the new apartments through a lottery.

In terms of affordability for lower-income groups, the government adopted a tough love attitude and never envisaged upgrading the older dense urban settlements, which were mostly one or two stories. It appears that one of the main assumptions underlining the strategy of the government at the time was confidence in the ability of the Korean people living in substandard housing to be able, in the medium term, to increase their income sufficiently to be able to af-

ford the 60-square-meter apartments being built on a massive scale in large apartments blocks by an efficient building industry. This was of course a gamble, but history shows that it was successful.

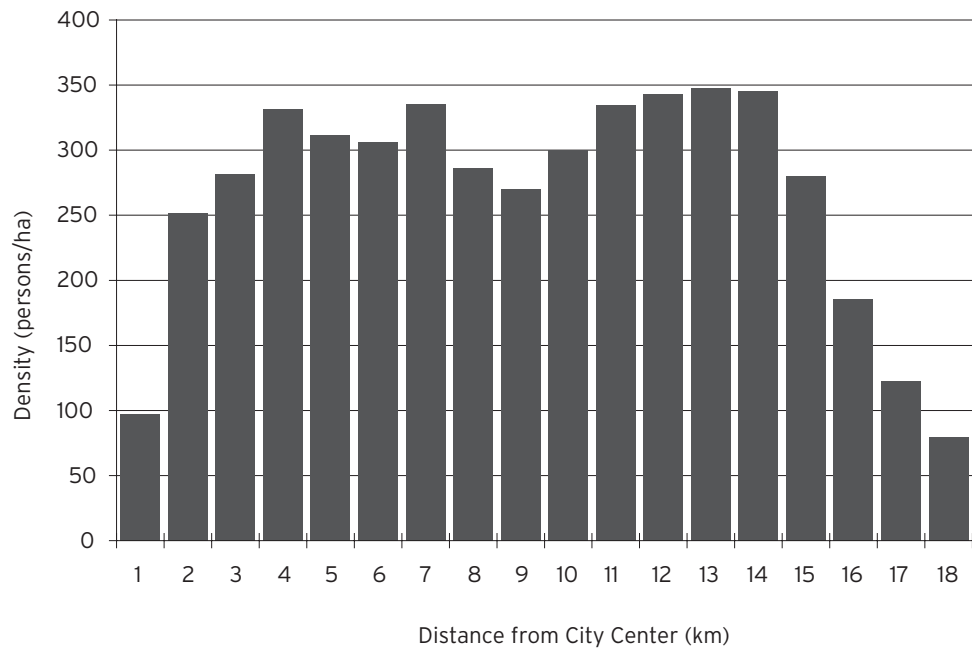
For households that somehow did not see their income increase sufficiently to purchase a new apartment, the government built a number of low-income rental housing units whose rents were heavily subsidized. However, the criteria to benefit from these apartments included age, family status, and health, in addition to having a very low income. The number of beneficiaries was strictly limited by these criteria to a small number, about a million households for the entire country. The rental of public housing was therefore reserved to what the Victorians would have called the “deserving poor.” The other poor had to wait in subdivided apartments to win the housing lottery, or to sufficiently increase their income to afford a new apartment in the free market.

An Assessment of the “Korean Model” for Urban Land Development

The massive investment in urban infrastructure resulted in a high-quality infrastructure that could support high density. The substitution of capital for land was done through regulatory norms imposed by the government rather than by market forces. As a result of the absence of market forces in establishing the FAR, the density gradient of Seoul is flat (Figure 10).

While the government succeeded in providing in time a modern urban infrastructure that greatly contributed to urban productivity, housing consumption is remaining low for a country with such a high gross domestic product (Figure 11)—but that low consumption is also common to other affluent countries of East Asia such as Japan and Hong Kong. There has been a recent decline in owner-occupied housing units, and

Figure 10: Seoul Built-Up Density Profile



Source: Author's calculations

Seoul's price/income ratio of 6.7 in 1999 remains very high (Son 2003).

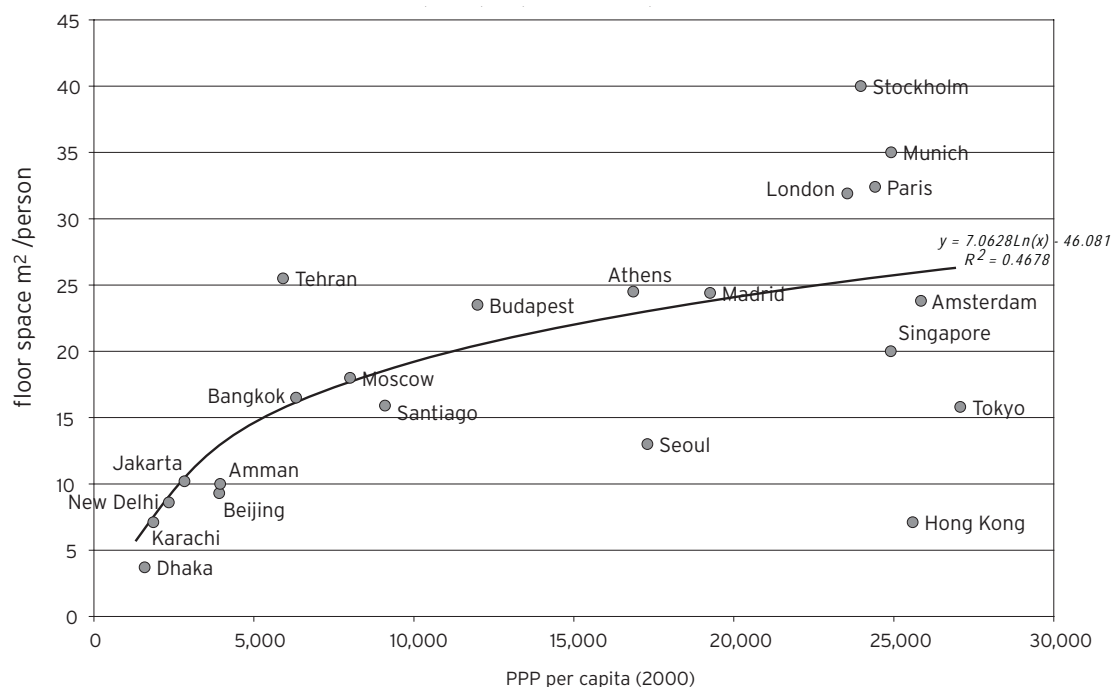
In conclusion, in South Korea the successful emphasis on the subsidized direct government development of urban land and on high residential FARs has succeeded in moving most poor households into well-served but small and expensive apartments. Woo-Jin Kim (1997) nicely summarizes the originality of the housing policy approach in South Korea: "The assumption of the government was that increased household income would be transferred into effective demand for new decent housing, which builders would supply . . . as a means of raising labor productivity. . . . The Korean government adopted mass investment in education rather than subsidizing housing."

China: A Government-Run Land Development Monopoly Selling Land to the Private Free Market

Urban land development in China is a particularly interesting case, as most critics, including China's central government, fear that "too much land and too much infrastructure" has been developed. This concern is so unique among emerging economies that the Chinese model merits a detailed study.

In China, the local government has a monopoly on land development and is able to derive a large amount of revenue from converting land from agriculture to urban uses. Predictably, a lot of land is being developed, but not necessarily in a way that responds to consumer demand or that promotes transportation

Figure 11: Relationship Between Housing Consumption and Purchasing Power Parity in Several Countries



efficiency. This inefficient land development has become a main concern of the central government, to the point that it has recently felt obliged to impose land development quotas on local governments.

From the time of the creation of People's Republic of China in 1949 to the beginning of the 1990s, housing was mostly provided by enterprises as part of "in-kind" employee compensation and by municipalities as part of welfare service. At the time when housing reforms were initiated in 1991, the private provision of housing was insignificant and consumers' choices in making trade-offs between distance, floor area, design quality, and price were inexistent.

Housing reforms in China started in the early 1990s and were implemented on a large scale around 1996.

After a period of less than 20 years of pragmatic and persistent policy reforms, the bulk of urban housing is now provided by the private sector, and salaries paid by enterprises have been adjusted to reflect workers' productivity. The impact of housing reform has gone far beyond increasing floor space consumption per capita and spectacularly improving the design and comfort of housing units. It has also allowed enterprises to focus on the production of their core products rather than having a large part of their staffs distracted by housing construction and real estate management issues.

These reforms have been carried out while the country has been urbanizing rapidly. Cities have had to create a new real estate industry from scratch in order to build housing according to consumers' preferences

and to develop new land on the peripheries of cities. The demand for land has increased because of (1) the need to accommodate a flow of new migrants from the countryside and (2) the new housing expectations created by rapidly increasing urban incomes.

Does the Current System Develop Too Much Land?

The rapid expansion of Chinese cities has required the conversion of large land areas from agricultural to urban use. While the land development at the fringe of cities has been entirely conducted by local governments with the financial support of government-owned banks, the central government considers the size and speed of the loss of scarce agricultural land one of the major urban development issues that need to be urgently resolved.

Many government policy papers argue that the “uncontrolled” expansion of cities into productive agricultural land may create food scarcity in the future. An explicit target of 95 percent grain self-sufficiency has even been set up by the State Council (Chan 2007). The concern for the loss of agricultural land has been translated at the operational level by the institution of strictly enforced agricultural land conversion quotas, which are limiting urban expansions.

While one may legitimately doubt whether current Chinese urbanization will threaten future food security, it is undeniable that the way land is being priced at the fringe of Chinese cities raises the possibility of land misallocation between agricultural and urban uses. In market economies, it is assumed that in spite of some price distortions due to subsidies and regulations, the market mechanism allocates land reasonably efficiently between agricultural and urban uses.

In China, however, the price mechanism that in a market economy self-regulates the expansion of cit-

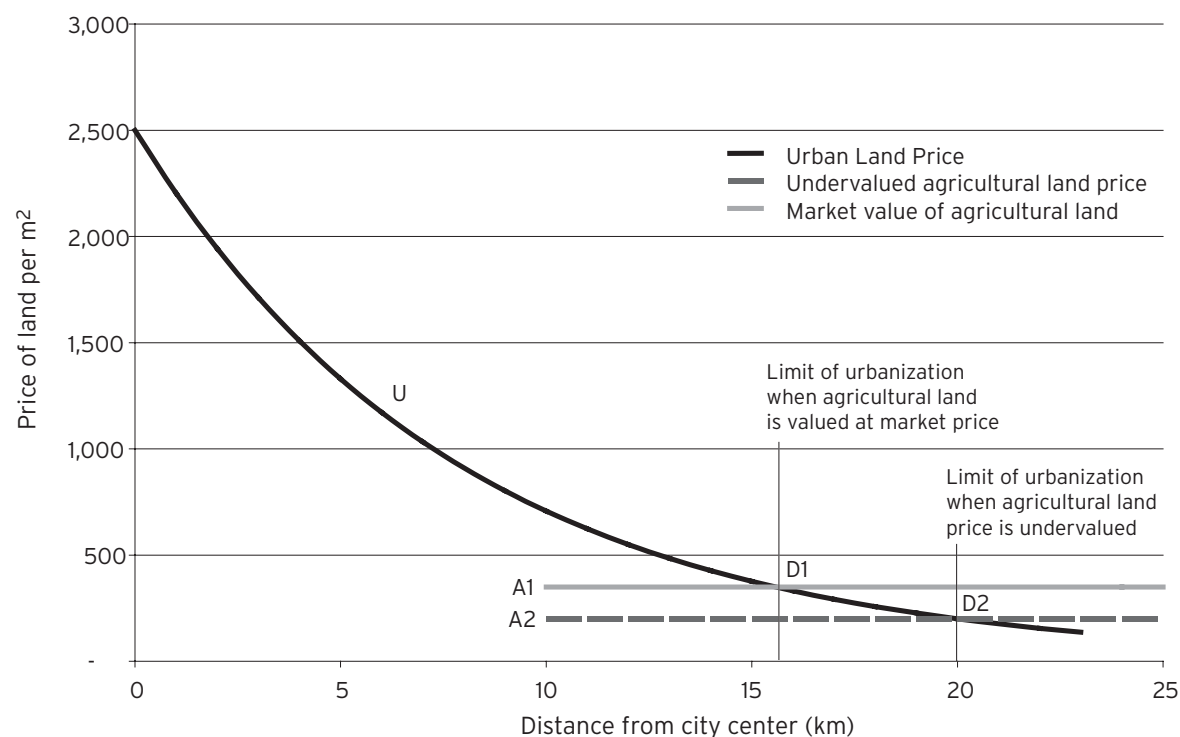
ies into rural areas does not exist. Local governments have a monopoly on land development. The price paid for farmland on the fringe of cities is not based on market prices but is calculated using complex compensation formulas for crops, buildings, and pensions for displaced farmers. These compensations are often idiosyncratic and are not always transparent. In particular, the price paid for land does not take into account the location of the agricultural land acquired (Bertaud 2006).

While the acquisition cost of farmland to be developed is established through an administrative process, land once developed is increasingly sold through auctions to private builders. These builders in turn sell the apartments, offices, and commercial space they build at prices established through a free market.

Under these conditions, it is quite legitimate to ask whether in China the quantity and location of the urban land developed each year correspond to an acceptably efficient allocation of a resource. Under the classical monocentric model, as shown in Figure 12, the edge of urbanization, D1, is reached at equilibrium at the distance where the urban land rent, U , equals the agricultural rent, $A1$. If agricultural land prices are lower as a result of a distortion, then the agricultural rent function would be represented by $A2$ and the city would expand unnecessarily from D1 to D2. One obvious recommendation to answer this misallocation concern would be to “get the price of land right” by allowing farmers to sell their land directly and competitively to private developers, but that would possibly require an amendment to the Chinese Constitution.

Let us compare the land consumption data in Tianjin between 1988 and 2000, the most recent year for which comparative data are available. The population within the third ring road has increased by 22 percent, compared with an increase in the built-up area by 63

Figure 12: Urban Land Consumption When Agricultural Land Prices Are Distorted



Source: Author's calculations

percent. The built-up area per person has increased by 34 percent (see Figure 13). An increase in the built-up area per person over the last decade seems to be the norm in most cities of China; Tianjin seems to be a representative example in this respect. The difference between the rate of increase in population and the rate of increase of land area is a major concern for the government of China and is considered to constitute the major evidence that Chinese cities are consuming too much land.

In the 1980s and 1990s, one of the Chinese government's main urban policy objectives was to increase the living floor area per person. At the beginning of the 1980s, the living floor area per person in Chinese

cities was extremely low, varying for most large cities between around 4 and 6 square meters per person. In Tianjin in 1988, the average living floor space per person in the city proper had reached around 6.5 square meters per person. In 2000 the living floor space was 19.1 square meters per person, and it has further increased to 25 square meters per person in 2005.⁷

There is a mathematical relationship between the total residential area, the floor area per person, the FAR, and the total population in a given year. The increase in residential land area as a function of population, floor space per person, and the FAR can be expressed in this equation:

Figure 13: Tianjin: The Change in Population and Built-Up Area between 1988 and 2000

Year	Populations	Built-up Area km2	Density (people/ha)	Area of built-up land per person (m2)	Increase in population	Increase in built-up area	Increase in land consumption per person
1988	3,499,718	153.72	228	44			
2000	4,264,577	250.74	170	59	22%	63%	34%

Source: Author's calculations and and Tianjin Statistical Yearbook 1989 -2001

$$\frac{A_{(t2)}}{A_{(t1)}} = \frac{P_{(t2)} \cdot f_{(t2)} \cdot Far_{(t1)}}{P_{(t1)} \cdot f_{(t1)} \cdot Far_{(t1)}}$$

Where

- $A_{(t1)}$ = Area at year $t1$
- $A_{(t2)}$ = Area at year $t2$
- $P_{(t1)}$ = Population at year $t1$
- $P_{(t2)}$ = Population at year $t2$
- $f_{(t1)}$ = Floor space per person at year $t1$
- $f_{(t2)}$ = Floor space per person at year $t2$
- $Far_{(t1)}$ = FAR in year $t1$
- $Far_{(t2)}$ = FAR in year $t2$

We can see from this equation that an increase in the percentage of residential areas would be equal to an increase in the percentage of population only in the case where the floor space per person and the FAR increase in the same proportion between the dates $t1$ and $t2$. For instance, in the case of Tianjin, the living floor space per person increased by 31 percent between 2000 and 2005, so the average FAR would have also had to increase by 31 percent during the same period to allow the rate of growth of residential land to be equal to the rate of growth of population.

In reality the FAR has probably only increased slightly, because in most residential areas, the zoning plan put a ceiling of 1.8 on the allowed FAR value.

For the period shown in Figure 13, the living floor area per person has increased from 6.6 square meters per person in 1988 to 19.1 square meters per person in 2000, or by 194 percent! The increase in land area developed would have been proportional to the population increase only if during the same period the FAR had increased also by 194 percent. If that had been the case, as in 1987 the gross FAR was about 0.8, the average FAR in 2000 would have had to be equal to 2.4,⁸ corresponding to apartment buildings eight floors high. This would have been difficult to achieve because a significant part of the older housing stock in Tianjin in 2000 still consisted of buildings of one and two floors and in general in Tianjin the FAR is restricted to around 1.8 in most residential areas.

In reality, the average residential FAR in Tianjin is estimated to have been around 1.6 in 2000, a significant increase of 88 percent over 1988, but not sufficient to compensate for the exceptional increase in floor space per person. As the floor area per person increased by 194 percent during the same period (1988-2000), the faster increase in the area of residential land compared with the increase in population is neither sur-

prising nor a sign of waste in the use of land. In fact Tianjin city has been using land more intensively (i.e., with a higher FAR) during this period.

The argument developed here has focused on residential land only, not on the entire built-up areas of cities. However, the same argument could be developed for commercial areas and administrative services; the floor space per employees and per customers increased over the years because of the spectacular development of the economy and its diversification into new service sectors. In addition, many new commercial and service activities, which did not exist in the early 1980s, have been requiring additional floor space—for instance, real estate brokers, commercial banks, and large department stores. While the FAR of nonresidential areas increased spectacularly, especially for office and commercial buildings, it did not increase sufficiently to maintain parity between population increase and urban land consumption increase. A higher increase in urban land consumption than in population is therefore not in itself a cause for alarm, as long as the average FAR keeps increasing or at least maintains its value.

We can conclude that in China the total amount of land developed for urbanization is not excessive, compared not only with other countries but also with the urban areas already developed in the 1980s. The increase in urban land consumption per person over the last 20 years in China has been caused by a spectacular increase in the economy, which required the growth of fixed capital assets, in particular the construction of additional areas of floor space for housing, office buildings, and services. Because the average urban FAR has increased over the years, it could even be said that Chinese cities are using land more sparingly than was the case at the beginning of the 1980s.

The impact of FAR values on land consumption will require planners to pay more attention to the land use regulations, restricting FARs in the future, as discussed in the section below devoted to this topic.

Adjusting the current pricing of agricultural land being converted into urban land to more closely reflect market prices, combined with an increase in the regulatory FAR, would certainly increase the economic efficiency of urban land. This would be preferable to the current land conversion quotas, which are causing spatial distortions in the development of Chinese cities and reducing the stock of affordable housing for low-income migrants, as will be shown below.

Affordability of the Land Developed Under the Current System in China

The central government is concerned that most of the housing developed by the private sector on land developed by local governments is mainly targeted at higher-income households and that lower-income groups cannot afford the recently built housing units. In May 2006, to force developers to build middle- and low-income housing on the newly developed land, the central government decreed that all new commercial housing projects were required to include at least 70 percent of housing units smaller than 90 square meters (Wang 2009).

Imposing quotas on supply is not the best approach to increasing the supply of low-cost housing. Housing supply is not a zero-sum game. If developers feel that there is not enough demand for apartments smaller than 90 square meters in the area where they have purchased land, they will just build less or even nothing at all. If developers build mostly apartments with an area larger than 90 square meters, it is probably because there is a demand for this type of apartment. If this demand is not met, households that could af-

ford those large apartments will buy two smaller ones and join them (a high transaction cost) or they will outbid lower-income households when buying the older housing stock. In the end, the quota would probably reduce the overall supply stream and benefit no one, and would probably be detrimental for lower-income groups.

Given the very high standards used by the government to develop land (very wide streets, concrete sidewalks, buried networks, etc.), it is possible that the bottom price of the developed land does not allow developers to use the new land developed for other purpose than for high-income housing. However, since 2006, the land developed by local authorities has been auctioned to private developers. If the standards were systematically too high for the demand, as perceived by developers, the land auction would reflect it and the reserve price would not be reached. It is possible that there is very little demand from low-income households in the newly developed areas because of their distance from city centers. Another possibility is that the FAR imposed is too low and thus does not allow developers to make an adequate capital substitution for land for building housing that lower-income groups could afford.

Very low-income migrants who cannot afford any newly built apartment and that are able only to rent one room at a time usually find affordable housing in “urban villages,” which in China are former villages that have been absorbed into the built-up areas of growing cities but have kept their collective ownership status in terms of land tenure. The former farmers, who are the members of the village collective, retain the right to use the land of their village and are allowed to build on it practically whatever they please without having to follow any city regulations. It is not unusual to find former villages enclaved in an urban area with an FAR of 4. However, villagers are not al-

lowed to sell their land; but they can rent it. These urban villages therefore constitute the equivalent of the informal sector in other countries. However, they have the advantage that their construction is legal. These urban villages constitute the main source of low-income rental housing for recently arrived migrant workers.

Unfortunately, the land conversion quotas enforced since 2005 have worsened the progressive destruction of the urban villages. Local governments often have to use the entirety of their land quotas to build new infrastructure, in particular radial and ring roads and utilities like sewer plants. These quotas create both an artificial scarcity of land and a strong incentive to demolish urban villages to recover their land, as village land is not controlled by conversion quotas. Farmers get compensated for the destroyed structures, but not the tenants. The land conversion quotas, originally conceived to reduce the footprint of cities, instead exacerbate the progressive destruction of the only type of privately built low-income rental housing that has constantly adjusted to demand.

What Is to Be Learned from the Chinese Way of Developing Land?

A government monopoly on land development is often able to increase the supply of land rapidly, as has been done in South Korea—especially when the rights of landowners are limited, as has been the case in South Korea and China and when due process is abridged by a “muscular” government. However, the land developed might not be in the right location, and/or the standards and costs might be too high to be affordable for a large spectrum of the population. Quotas are not a way to solve the problem.

It must be recognized that, in the case of China, the spectacular fivefold increase in floor consumption per person over the last 20 years in urban areas

demonstrates that when local governments have (1) a powerful financial incentive to develop land, (2) the technical capacity to do it quickly and efficiently, and (3) quasi-unlimited access to financial resources to cover the long negative cash flow inherent to large land development projects, they can deliver serviced land in adequate quantity to prevent real estate inflation. The solution to the problem of very-low-income housing, however, is not solved by formal land development on the peripheries of cities, no matter how efficient it is, but by the conversion of older housing in the inner city, either by subdivision or by vertical extension.

Thailand: Benign Land Use Regulations Combined With Deficient Infrastructure

In Bangkok, slums that represented 23 percent of the city's housing stock in 1974 decreased to 13 percent in 1988. The increase in the formal housing stock was triggered mostly by the emergence of large-scale developers that started building high-rise condominiums for higher- and middle-income groups initially, and then went progressively downmarket (Dowall 1992). The contribution of large-scale developers, which was marginal in 1974, took off in 1984 to become the second-largest contribution to the housing stock in 1988, and have continued since that time in providing housing for a large part of the urban population (Figure 14).

What happened? I suggest the hypothesis that this spectacular result was not the effect of a deliberate policy but a combination of four factors: (i) benign land use regulations, (1) increasing urban household income, (3) higher land prices due to a defective transportation infrastructure, and (4) the Thai Housing Bank trying to go downmarket in providing loans to

households and to developers. Let us look at the factors, one by one.

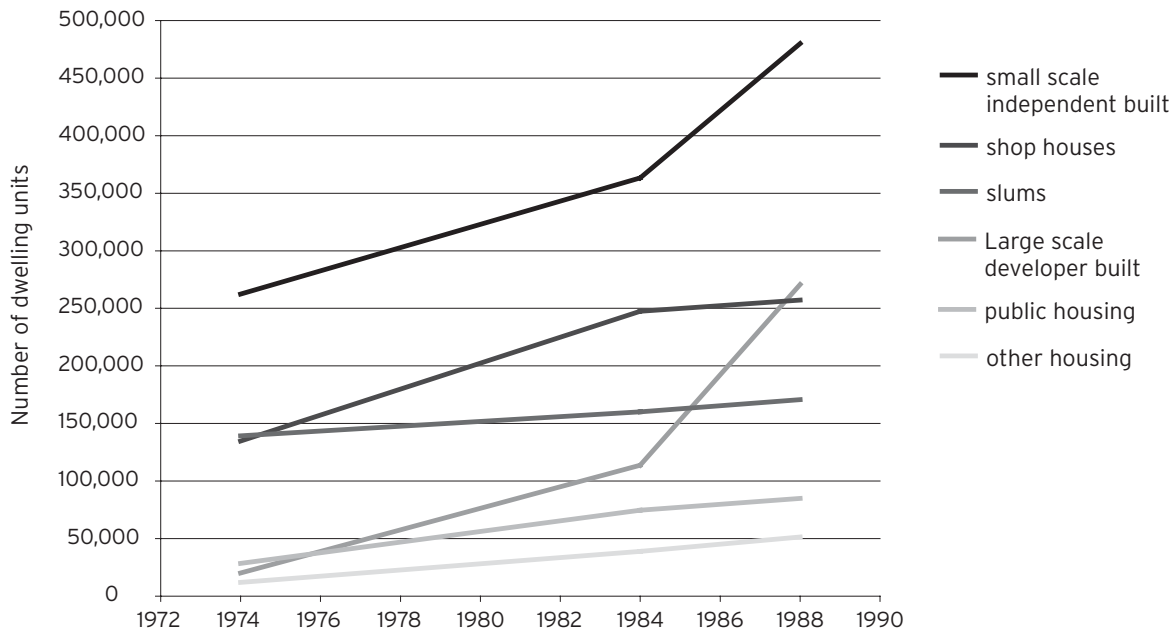
Benign Land Use Regulations

Until 2004, when a more complex zoning regulation was established in Bangkok, the FAR was quasi-uniform all over the metropolitan area and equal to 10 in commercial as well as residential areas (compared with 8 in Seoul CBD, 15 in Midtown and Downtown Manhattan, and 1.33 in Mumbai's Island City area). This means that with the exception of few blocks in downtown Bangkok and in the lower Sukhumvit area, the zoning was not binding. In other words, the free market established the rate of substitution of capital for land, and developers could decide on the number of floors to be built and could maximize the difference between cost and value, as shown in Figure 1.

As the price of land increased as the city became larger, developers could adjust to higher land prices by substituting more capital for land and therefore keeping housing prices affordable by keeping land price a roughly fixed proportion of the total housing price. Because regulations were allowing the construction of small, one-room apartments, developers were free to respond to demand from the low end of the market.

The profile of densities in Bangkok provides good evidence that market-driven capital substitution for land has been taking place in Bangkok for a long time (Figure 15). The profile of density in Bangkok in 1990 closely follows ($R^2 = 0.86$) the textbook density curve proposed by the classical monocentric city model of Alonso (1964), Mills (1970), and Muth (1985). This market-driven density profile should be compared with the profile of densities in Seoul, which is largely based on government norms and where land prices are subsidized by the government (Figure 10).

Figure 14: Bangkok: The Evolution of the Housing Stock Between 1974 and 1988



Source: David Dowall "A Second Look at the Bangkok Land and Housing Market," *Urban Studies*, 1992

These benign regulations has been in place since the 1970s, but in the 1970s nearly a third of the population of Bangkok was living in slums, so why did the positive effect of nonbending regulations result in a larger share of formal housing? The other factors—higher household income, high land prices, and improved housing finance availability—had to combine with the absence of binding regulations to increase the formal sector's share of development. There is a quasi-fixed minimum housing cost threshold of about \$2,500 as we have seen above, to be able to start benefiting from the land capital substitution.

Increasing Household Income

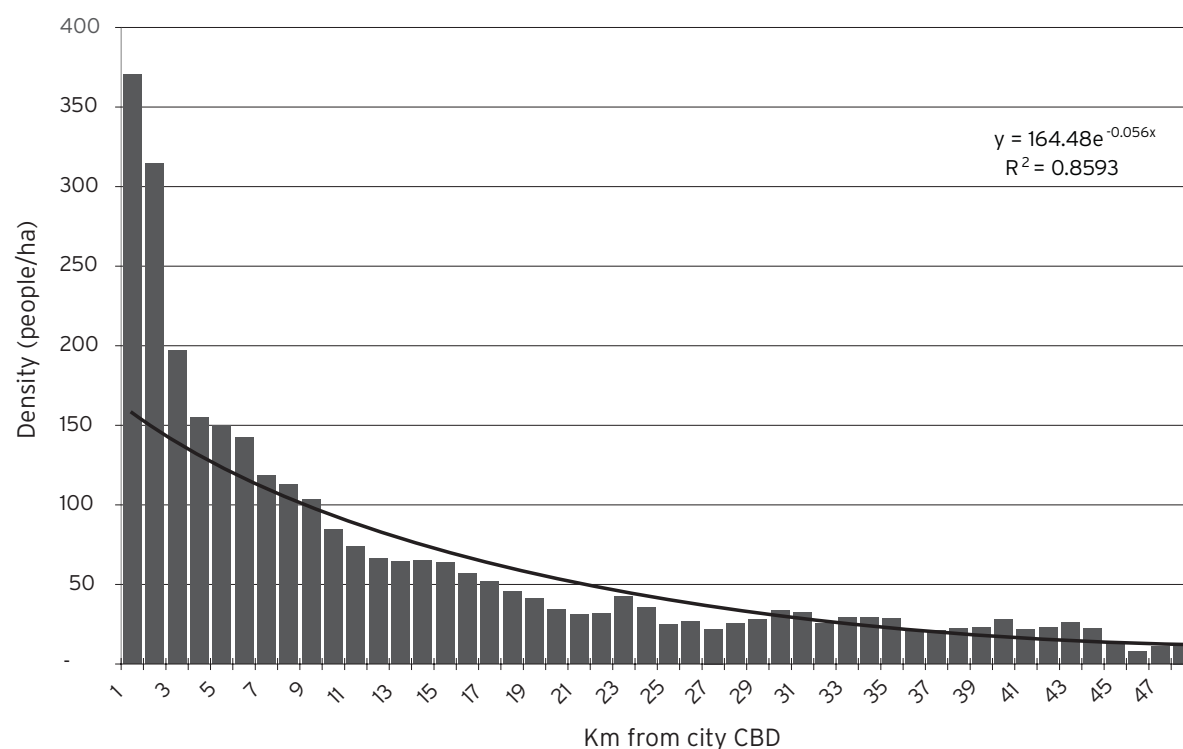
Time series on households income distribution in Bangkok are not available to the author at this point to prove that 1984 was the turning point, when an increasing large share of the urban population could

afford the cost of 16 square meters of floor space in a multistory building. The average household's income in Bangkok in 2007 was about \$7,200 per year. In 2008 U.S. dollars, the minimum threshold income to afford 16 square meters of formal floor space was around \$1,000 per year. It is not unthinkable that this threshold, in constant dollars, might have been reached by an increasing larger number of households in 1984.

High Land Prices and Defective Transportation Infrastructure

Bangkok is notorious for its congested traffic caused by a chronic underinvestment in primary roads. As the city has increased in size and its economy has developed, land prices in the central areas have tended to increase faster than on the periphery. In the case of Bangkok, this effect is compounded by congestion

Figure 15: Bangkok: Profile of Densities in the Built-Up Areas, 1990



Source: Author's calculations

that makes areas closer to the CBD more desirable as congestion worsens. In many cities, regulatory constraints on FAR prevent developers from redeveloping properties that were initially built when land prices were lower. In Bangkok, no such constraint existed, as the high regulatory FAR of 10 should not have been binding in most of the urban area. As a result, developers had the opportunity to redevelop a lot of land in the already built-up urban area instead of being obliged to build mostly on the periphery, as is the case in many cities. This benign regulatory environment allowed builders to redevelop large areas of the city, creating many more housing units in the process. The steeper the price increase had been, the more financial incentives were created to redevelop at a higher

FAR. Ironically, if urban transportation had been more efficient in Bangkok, land prices would not have increased so much in the central city and there would have been fewer incentives to redevelop areas that were originally built with a lower FAR.

Improvements in Housing Finance

Finally, no take-off in housing construction, as shown in Figure 14, can take place without the support of an efficient financial system. In the case of Thailand, the Government Housing Bank in the early 1980s greatly improved its depth and expanded mortgage loans to cheap condominium units that had previously been ignored by the formal banking system. Further discussion of financial institutions in Bangkok is beyond the scope of this paper, but is a reminder that no signifi-

cant improvement in access to land can be achieved without a sound financial system.

Can Bangkok's Experience Be Replicated?

The increasing access to the formal market in Bangkok by lower-income groups depended on at least four factors, which were favorable at the same time. An important factor was the benign regulatory environment, but in itself it would not have been enough to generate the surge in affordable housing that was seen in the 1980s if the other three factors had not been as favorable.

A new zoning plan for Bangkok was published in 2004 (Nexus Property Consultants 2006). The new zoning is less benign, and FAR restrictions are now applied to many areas. However, compared with many other countries, the restriction on the FAR is not too drastic.

More alarming, a minimum lot size of 400 square meters has been introduced. This will push into informality a number of lots that could be developed formally before the new zoning laws were implemented.

Obviously, the new more restrictive zoning was adopted in 2004 because it was thought that the previous "benign" nonbinding zoning was creating too many negative externalities. The pre-2004 zoning also created positive externalities. For instance, by allowing the substituting of capital for land as much as market conditions allowed, it significantly reduced the demand for land and therefore reduced the extension of the footprint of the Bangkok urban area into the countryside. It also significantly reduced travel distance compared with more restrictive zoning. It also allowed low-income households to have access to small apartments in relatively well-located areas. It is far from certain that the balance between positive

and negative externalities had been negative under the benign regulatory regime. The new zoning restrictions of 2004 might not bring a new positive balance of externalities.

AGENDA FOR ACTION

Academic Literature vs. Research with Direct Operational Content

In examining the available findings about land uses, it is necessary to distinguish between the academic literature, whose audience is overwhelmingly academic, and research, whose audience is composed of mayors, urban planners, and the general urban public. The academic literature, whether theoretical or empirical, does a good job explaining things in general terms through simplified models. However, the academic literature is not much help in reviewing a zoning plan or a book of housing standards inherited from a previous municipal administration. What is needed is an intermediate type of research that is grounded in the learning from the academic literature but deals with specific regulatory tools and their alternatives. The grounding of research in the academic literature is essential, but the object of this research should be the specific regulatory and financial tools being used by cities.

Land markets are seldom studied with an operational objective. For instance, a typical research project would conclude that in city X, land use regulations are responsible for an increase of z percent in housing costs. But academic research on the impact of land use regulations usually uses a dummy variable for the regulatory environment and rarely identifies the specific regulatory parameter to be changed, by how much should it be changed, and what would be the costs and benefits of doing so. To be operational—that is, to result in reform—land market studies

should be more focused on specific regulations and their quantitative impact on prices and consumption. Here, I propose an operational approach to land market research. Research on urban land and housing affordability should focus on two aspects: (1) removing supply regulatory constraints, and (2) subsidizing demand for the poor for safe water, health, and education.

Most comparative studies trying to find whether regulations have an impact on land prices tend to measure the “severity” of the regulatory environment through a dummy variable. New research should go beyond this stage. The problem is not so much whether cities are overregulated or underregulated but rather what is the regulated value of specific parameters and how distorting these values are in the economic context of a specific city. For instance, a maximum FAR value of 0.5 in a New Jersey suburb is not binding (most houses use a FAR of around 3.5) and therefore has no impact on prices and land consumption; by contrast, a maximum regulatory FAR value of 1.33 in the CBD of Mumbai is an economic disaster.

To ensure the operational aspect of the research agenda, studies should be focused on a specific city. Comparative city studies are important but often lose the specificity that could alone trigger reform.

Focus on the Affordability and Standards of Existing Housing Stock vs. the Flow of New Stock

Most studies on housing affordability in developing countries focus on the price and composition of the flow of new housing built by the formal sector. These studies usually draw two conclusions:

1. The new housing units being built are unaffordable to the poor.

2. The private sector is “not interested” in building for the poor; therefore
 - a. the government should substitute for the private sector and should build affordable housing for the poor, or
 - b. the government could force the private sector to build affordable housing for the poor by imposing quotas of “affordable housing” on private developers (e.g., China, but also Montgomery County in Maryland).

However, these studies are looking at the wrong data and consequently are drawing the wrong conclusions. The housing supply system forms a continuum between the formal and informal sectors. The private sector includes both formal and the informal developers. The boundary between the formal and informal systems is entirely set by regulations and the level of transactions costs required to pass from the informal to the formal system.

Research on the existing housing stock, both formal and informal, is at least as important as research on the flow of new housing. In any city, there are more transactions in the existing stock than in the new stock flow (in the United States, there four times more transactions in used housing than in new housing).

Agenda for Research

Within the framework defined above, I suggest that these topics should be on a priority research agenda:

1. Land use audits,
2. Regulatory audits,
3. Monitoring land and floor space price, supply, and consumption linked to households' income,
4. Identification of the income and price limits that establish the boundary between the formal and informal sectors, and

5. Study of the cost and benefits of limiting FAR.

Some of these topics may seem unglamorous. They seem perhaps more akin to bookkeeping than to research. But if the data produced by this bookkeeping are so useful for the managements of cities and for understanding land supply and affordability, why has it not been done before? One reason is technology. Only a few years ago, just knowing how much land a city occupied (as opposed to the area within its municipal boundary) was a major endeavor that would have consumed much time and resources. The new technology made available in the last few years—Google Earth images at high resolutions updated often every year, geographical information systems (GIS) usable on laptops, global positioning systems, and so on—considerably reduce the transaction costs of maintaining these basic databases. Because of the digital nature of spatial data, it is also possible to analyze and model data and test alternative scenarios without the “black box” effect that added to the suspicion that local government officials had of previous modeling techniques.

The audience for the research should not be the academic community (although its participation in the research and its vetting of the results might be indispensable) but mayors, urban administrators, and the general urban public. The findings of the research should be published in the local press.

Land Use Audits

Land is a city’s most valuable asset. However, few cities maintain an inventory of the land they use. As we have seen in the second section, only a small part of the land used in a city is traded on the market. There is therefore a strong suspicion that a lot of the untraded land is misallocated. Accounting in a systematic way for the land being used in a city is a basic task that would have a large benefit not only for land manage-

ment but also for cities’ finances, because a large part of a city’s fiscal resources is often land based.

A land use audit would consist of disaggregating the land uses within the municipal boundary between tenure categories and land utilization categories. Spatial data could easily be extracted using GIS technology to assign market value to land in different locations. Adding overlays with census data and the transportation system could easily point out the areas that are underused. The land use audit would of course disaggregate between formally developed and informally developed areas.

Land use audits would replace the costly and largely useless master plan exercises being conducted usually every 5 or 10 years by most cities in the world. Cities’ managers could have at their disposal an assessment updated every year of how effectively land owned by government or by the private sector is being used and by whom.

Regulatory Audits

Layers of regulations often accumulate in the rule-book used by cities to deliver building permits. Many regulations are just enforced without knowing precisely what their objectives are. The following quotation summarizes the situation prevalent in many cities:

Typically [planning standards] are handed down as ‘rule of thumb’ from one situation to another, adapted by cumulated experience. Such norms are characteristically expressed as a simple inflexible per a given population, sometimes also including locational specifications. From the norms as usually expressed it is impossible to know the substantive justification - whether

functional, economic, behavioral, social, psychological or environmental. Therefore, there is no easy way of modifying them to meet particular situations in a reasoned manner. (Hill and Alterman 1979)

This quotation expresses perfectly the regulatory confusion that has accumulated over centuries of ad hoc tinkering with urban parameters without any evaluation of their accumulated effects and spatial side effects. To address these problems, municipalities should regularly conduct a regulatory audit to weed out the regulations that have lost their objectives or have too many negative side effects or more simply whose cost are higher than their benefits.

A regulatory audit consists of calculating the minimum developed land and housing costs implied in regulations per units, using minimum allowed standards. Every regulations should be tested against (1) its original objective; (2) its social benefits; (3) its cost to the consumer—including the transaction cost; (4) its impact on land and real estate markets, and affordability; and (5) its impact on the urban spatial structure.

Most zoning maps, including regulations to be used by developers, are fragmented into large-scale maps that do not provide a complete picture of the spatial strategy—if any—that should drive regulations. A regulatory audit would provide citywide maps of important regulations like FAR and minimum plot sizes. This would allow regulators to test the spatial impact of regulation, which often is still unknown.

Regulations that no longer meet their objectives, or that have a cost higher than their benefits, or have an impact on the urban spatial structure that is opposite to municipal objectives, should be either modified or

discarded. In the same way that developers are constantly adapting their output to the changing costs of land, construction, and finance and are matching them with consumer demand, municipal regulators should adapt regulatory parameters to changing economic and social objectives.

Monitoring Land and Floor Supply and Consumption

Many cities increasingly maintain digital records of land uses and price and rent changes. For instance, for the formal sector, building permits are recorded that include land area, floor area, location, and so on. These types of data exist for control purpose only but are seldom aggregated and used to monitor land markets in real time and with its spatial component.

Census and traffic survey data are also widely under-used (in India, the spatially disaggregated data of the decennial census is usually not available for seven or eight years after the census has been completed). The census data, aggregated at the neighborhood level, should be made available online for every city in the world. Densities—that is, land consumption per person per neighborhood—including informal ones, should be monitored every year.

Rents, land prices, and property prices, both existing and new, should be constantly monitored by the municipal planning office. Increases or decreases in prices send signals that need interpretation but are important for monitoring the performance of the land market.

Finally, regulatory parameters are usually described in regulations books or in detailed maps but are seldom shown in their entirety at the metropolitan level. It is therefore nearly impossible for regulators to have a

complete view of the spatial implications of the regulatory rules.

Identifying the Affordability Threshold Set by Regulations and the Limits Between the Formal and Informal Land Markets

As we have seen in the first section of this paper, by definition, every urban household consumes land. Land consumption is closely correlated with household income and location in the city. Quantifying the consumption of land per household as a function of household income and distance from city center under current market conditions is essential for understanding land markets and relating housing affordability to land prices. A few regulations parameters (e.g., minimum lot size and/or maximum FAR) establish the income thresholds below which households will find affordable land only in the informal sector.

Every municipality's planning office should have a complete knowledge of how much land is consumed per household by each income group in both the formal and informal sectors, in the same way as municipal statistical offices usually maintain a distribution of income by income groups.

A study of land markets should include these tasks:

1. establish the current consumption curve per income group, relating households' income to land and floor area consumption;
2. calculate the affordability threshold between the formal and informal markets;
3. identify the regulatory or/and productivity barriers that prevent low-income households from gaining access to the formal market; and

4. Project the number of beneficiaries and their income if regulatory or productivity barriers were removed.

Study of the Costs and Benefits of Limiting FAR

We have described in the second section above a number of sensitive regulatory parameters that affect land supply. Each of these regulations should be the object of a cost/benefit analysis. However, one of the more important parameters remains the limits put on FAR. The upper limit on FAR imposed by most zoning regulations artificially inflates the demand for land. It also distorts markets by implicitly increasing demand for land and by imposing a dispersion of floor space that may make the operation of mass transit uneconomical.

Indeed, by increasing FAR values, developers are able to substitute capital for land, using price signals to increase the efficiency of input allocation. We have seen in the case of Bangkok, for instance, how the virtual absence of a limit on FAR has been one of the reason for the surge in the supply of formal housing for the poor, and the decrease in the proportion of households living in slums. However, the absence of investments in infrastructure as Bangkok has developed has created a backlash against FAR liberalization, which has been made responsible for increasing road congestion. Calculating the costs and benefits of changing FAR values in specific cities and neighborhood would therefore be of high value for improving land use efficiency in urban areas. The positive and negative externalities created by changing FAR values would have to be identified and quantified.

In Mumbai, a city where the FAR is the most constrained by regulations, there is strong resistance against an increase because of a fear of externalities,

in particular congestion. New research on the costs and benefits of FAR limitations should be spatially oriented. Any research on the impact of FAR regulatory constraints should therefore take into account the negative and positive externalities it could generate.

A study of FAR should go beyond the regulatory FAR, which is applied only to private lots. Gross FAR, that is, the ratio between floor space and urban land—all uses included—has never been studied, to my knowledge. This would be an important parameter to measure

to be able to understand land markets. If we agree that floor space is where the most important urban economic activities are taking place, and that land is its most important input, then the ratio between floor space and land should be a key parameter for explaining urban development. This new parameter, called gross FAR, would apply at a neighborhood level, or better at the level of an entire city. It could also be a proxy for measuring a number of other inefficiencies, such as underused land.

REFERENCES

- Alonso, William. 1964. *Location and Land Use*. Cambridge, Mass.: Harvard University Press.
- Ballaney, Shirley and Bimal Patel, 2009, *Using the "Development Plan-Town Planning Scheme" Mechanism to Appropriate Land and Build Urban Infrastructure*. Ahmedabad: India Infrastructure Report.
- Bertaud, Alain. 2006. "China: Urbanization in 2 Towns in Sichuan Province: Land Use and Land Pricing Issues." July 19 http://alain-bertaud.com/AB_Files/AB_Urbanization_in_Sichuan_Province_July_06.pdf.
- Bertaud, Alain and Bertrand Renaud. 1997. "Socialist Cities without Land Markets." *Journal of urban Economics* 41: 137-51.
- Bertaud, Alain and Jan K. Brueckner. 2004. "Analyzing Building-Height Restrictions: Predicted Impacts and Welfare Costs." *Regional Science and Urban Economics*.
- Bertaud, Alain, Marie-Agnes Bertaud, and James Wright Jr. 1988. *Efficiency in Land Use and Infrastructure Design: An Application of the Bertaud Model*. World Bank Discussion Paper INU 17. Washington: World Bank.
- Brueckner, Jan K. 2001. *Urban Sprawl: Lessons from Urban Economics*. Papers on Urban Affairs. Washington and Philadelphia: Brookings Institution and Wharton School, University of Pennsylvania.
- Brueckner, Jan K., Jacques Thisse, and Yves Zenou. 1999. "Why Is Central Paris Rich and Downtown Detroit Poor? An Amenity-Based Theory." *European Economic Review* 43:91-107.
- Chan, Roger C. K. 2007. *Efficient Policies That Balance Economic Development and the Protection of Arable Land in China*. Hong Kong: Centre of Urban Planning and Environmental Management, University of Hong Kong.
- Ding, C. 2004. "Urban Spatial Development in the Land Policy Reform Era: Evidence from Beijing." *Urban Studies* 41, no. 10 (September): 1889-1907.
- Ding, C., and Erik Lichtenberg. 2007. "Land and Urban Economic Growth in China," #CCD112205 and #CCD050406, Lincoln Institute of Land Policy, Cambridge, Mass., March 16.
- Doebele, William, et al. 1982. *Land Readjustment: A Different Approach to Financing Urbanization*. Lexington, Mass.: Lexington Books.
- Dowall, David E. 1992. "A Second Look at the Bangkok Land and Housing Market." *Urban Studies*.
- Ghokale, Subas. 2007. *Mumbai Trans-Harbor Link Property Value Capture Feasibility Report*. Mumbai: Mumbai Metropolitan Region Development Authority.
- Hill and Alterman. 1979. *New Trends in Urban Planning*. Oxford: Pergamon.
- Jung, Hee-Nam. 1993. "Land, State and Capital: The Political Economy of Land Policies in South Korea." PhD thesis, University of Michigan, Ann Arbor.
- Kim, Woo-Jin. 1997. *Economic Growth, Low Income and Housing in South Korea*. New York: St. Martin's Press.
- Mills, Edwin S. 1970. "Urban Density Functions." *Urban Studies* 7: 5-20.

- Ming, Su, and Quanhui Zhao. 2006. *The Fiscal Framework and Urban Infrastructure Finance in China*. World Bank Policy Research Working Paper 4051. Washington: World Bank.
- Muth, Richard F. 1969. *Cities and Housing*. Chicago: University of Chicago Press.
- . 1985. "Models of Land Use, Housing, and Rent: An Evaluation." *Journal of Regional Science* 25: 593-606.
- Nexus Property Consultants. 2006. "New Bangkok Zoning Regulations and Market Analysis." June.
- Son, Jae-Young, Yun-Hi Won, and Choon-Geol Moon. 2003. "Changing Conditions and the Quality of Housing in Korea." *Social Indicators Research* 62-63: 211-37.
- Staley, Sam and Adrian Moore. 2008. *Mobility First: A New Vision for Transportation in a Globally Competitive Twenty-first Century*. Lanham, MD.: Rowman & Littlefield.
- Turner, John F. C., and R. Fichter. 1972. *Freedom to Build: Dweller Control of the Housing Process*. New York: Macmillan.
- Wang, Ya Ping. 2009. "Social and Spatial Implications of Recent Housing Reform in Chinese Cities." Paper presented at Housing Policy and Housing Markets in China conference sponsored by Lincoln Institute of Land Policy, Cambridge, Mass., May 18.
- World Bank. 2009. *World Development Report 2009: Reshaping Economic Geography*. Washington: World Bank.
- Yoon, Il-Seong. 1994. *Housing in a Newly Industrialized Economy: The Case of South Korea*. Aldershot, U.K.: Avebury.

ENDNOTES

1. The UN Center for Housing, Building, and Planning had even a special division dedicated to spreading the use of asbestos roofs in low-cost housing.
2. The only exception was the sites and services projects financed by the World Bank in El Salvador, which were implemented by a private foundations, e.g., FUNDASAL.
3. The FAR is the ratio between the total floor space area built on a lot and the area of the lot. FAR values vary, typically from 0.2 in suburban areas to 15.0 in downtown areas. Land use regulations usually fix the upper limit of permitted FAR. In India the FAR is called the floor space index, or FSI. For clarity, this paper uses "FAR" to designate the floor area ratio when writing about India and other countries. The FAR is not equivalent to the number of floors or to the height of buildings. A building footprint rarely covers the entire lot because of the necessity of reserving space for light and ventilation between adjacent lots. For instance, for a building footprint covering 50 percent of a lot, an FAR of 2 would correspond to a four-story building. If the building covers only 25 percent of the lot, the same FAR would allow the construction of an eight-story building. The FAR is equivalent to the number of floors only if the building footprint covers 100 percent of the lot.
4. We are talking here about just the cost of the structure, the cost of finished buildings, including plumbing, electricity, doors and windows etc. Costs are much higher and range from \$300 in China to about \$2,000 per square meter in the U.S., depending on the quality of construction.
5. The Republic of South Africa is the only country known to the author where the value of government land is regularly assessed and apparently taxed.
6. Economically Weaker Section is the terminology in India to designate households below the 35th percentile of the income distribution. Because the income threshold for the Economically Weaker Section is revised on an ad hoc basis over time, it is often difficult to know which income group is really part of it.
7. Tianjin Municipal Statistical Bureau, "Tianjin 2006 Basic Facts."
8. This is assuming a constant building footprint using 30 percent of the lot. In practice, higher FAR values usually require lower building footprints to allow more light and services access on the ground. With a 25 percent footprint, the number of floors corresponding to an FAR of 2.4 would be 9.6 stories average for the entire city.



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