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Abstract

This paper extends a new line of research on urban squatting that focuses on the role of the squatter organizer. The model replaces the benevolent organizer from previous studies with a collection of competing, rent-seeking squatter organizers, a structure that may offer a realistic picture of many cities in less-developed countries. In addition to delineating the structure of such a competitive model, the analysis generates a host of comparative-static results and other insights. Among other things, the analysis shows that competition among squatter organizers has much in common with competition in a traditional industry setting.

JEL-Code: R200, R300.

Keywords: squatting, rent-seeking, urbanization.

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by

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1. Introduction

Almost a billion people, over 30% of the world urban population, are estimated to live in slums (UN-Habitat, 2003). Although no firm data are available, several hundred million people from this total are probably squatters, who occupy their land illegally, paying no rent to the owner. In the city of Dhaka, Bangladesh, for instance, squatter settlements are estimated to provide as much as 15% of the housing stock (World Bank, 2007).

Research by economists has attempted to shed light on the squatting phenomenon from both theoretical and empirical perspectives. Extending earlier theoretical contributions by Jimenez (1985), Hoy and Jimenez (1991), and Turnbull (2008), the most recent formal work on urban squatting focuses on the role of the "squatter organizer," who manages a squatter settlement in the interests of the residents. Brueckner and Selod (2009) and Shah (2012) develop such models, emphasizing the organizer's role in preventing eviction of the squatters.

Squatter organizers are called community bosses in Ecuador, pradhans in India, shack lords in South Africa, and mastaans in Bangladesh. The World Bank study on Dhaka (World Bank, 2007) noted that mastaans "are self appointed leaders who set up committees, maintain links and have patronage from local and national political leaders, government officials and local law enforcing agencies." Lanjouw and Levy (2002) note that, because of these links, "organizers appear able to protect squatter communities from government threats." As evidence, Lanjouw and Levy present survey data showing that the perceived threat of eviction is lower in squatter communities run by an organizer, with 83% of the residents of such communities viewing eviction as "impossible," compared to the 58% who hold this view in communities lacking an organizer. The protection offered by organizers may account for the World Bank's (1993) view that "most governments, unwilling to engage in mass evictions, have gradually condoned existing squatter housing while attempting to resist further squatting."[1]

To forestall evictions, squatter organizers often require community residents to make "defensive expenditures" that are designed to raise the costs that would be incurred in evicting them. These expenditures could cover the organizer's political lobbying expenses or perhaps the cost of bribes paid to politicians. Alternatively, defensive expenditures could pay for a security force to defend the settlement, or they could represent lost labor income due to time spent by squatters in protecting their plots (as documented by Field (2007)).

The squatter organizer in the Brueckner-Selod model dictates a level of defensive expenditures, but he also attempts to limit the "squeezing" of the formal housing market, which occurs because the squatter settlement occupies land that could otherwise be used for formal housing. If carried too far, squeezing can raise the price of formal housing enough to make eviction of the squatters by landowners worthwhile, with the land then switched to the lucrative formal use. The organizer limits squeezing, reducing the incentive to evict, by restricting both the number of squatter households and their individual land consumption. Defensive expenditures, which raise the cost of eviction, also help to reduce eviction incentives. With proper adjustments on both margins, the organizer in the model can prevent eviction entirely. Shah's (2012) model also has an organizer who mandates defensive expenditures, but the model differs by assuming that squatting occurs on government land, which eliminates the squeezing phenomenon but introduces other losses.

Although these models assume that a single organizer controls all the squatting in a city, the reality is often different. Multiple organizers, each managing a relatively small share of the squatter population, may compete with one another for residents. For example, Lanjouw and Levy's survey covers 20 different squatter communities within the single city of Guayaquil, Ecuador. Moreover, the benevolent view of the squatter organizer in the Brueckner-Selod model could be inaccurate, as these authors recognize. A different view would portray the organizer as a rent-seeker, who not only collects defensive expenditures from the squatters but also extracts a rent payment that he pockets as income. Although the institutional literature is not explicit in ascribing such ignoble motives to squatter organizers, a rent-seeking view often emerges from reading "between the lines." With rent-seeking behavior thus a realistic possibility, the following questions arise: What would a squatter-organizer model that incorporates such behavior look like? What comparative-static and efficiency properties would it have? The purpose of the present paper is to answer these questions by developing and analyzing a model with competitive, rent-seeking squatter organizers. Among the comparative-static questions that arise, a particularly interesting one asks how the extent of squatting competition (captured by the number m of competing organizers) affects the equilibrium. Such competitive impacts, which are akin to market-structure effects in industry models, would be seen in the model's main outcome variables, which include the total amount of land consumed by squatters, the formal housing price, the level of required defensive expenditures, and the profit earned by each organizer. The model also contains other important parameters, whose effects can be appraised. Assuming suitable data could be found, the comparative-static predictions could be tested empirically, complementing the set of existing empirical studies on squatting.[2]

The plan of the paper is as follows. Section 2 extends the Brueckner-Selod model, replacing the single benevolent squatter organizer with a fixed number of competing, rent-seeking organizers. Section 3 conducts a comparative-static analysis of the squatting equilibrium, answering the questions posed above. Recognizing that the rent-seeking motive may lead to entry of additional squatter organizers, Section 4 extends the basic model by analyzing a free-entry equilibrium, where the number of organizers (and thus the number of squatter settlements) increases until the rent earned by organizers falls to zero. Following Brueckner and Selod, section 5 considers the question of squatter formalization, where residents pay rent in return for title to their land. This analysis also generates an efficiency verdict. Section 6 offers conclusions.

2. The Model

In the Brueckner-Selod model, housing capital is absent, with land consumption representing housing. So when eviction removes squatters from the land, the vacant plots are rented and occupied by formal residents. Eviction is desirable for the landowners when the formal rent per unit of land, denoted p_f, is greater than eviction cost per unit of land. Squatter actions influence this "eviction condition" in two ways.

First, the amount of land occupied by squatters determines p_f. The reason is that squatters and formal residents are assumed to compete for a fixed total land area, which means that land available for formal housing, and thus the market-clearing formal price p_f, depends on the size of the squatter area. Second, as explained above, squatters can raise the eviction cost by devoting more of their income to defensive expenditures. Eviction cost thus depends on defensive expenditures per household, which are denoted by A_i in squatter settlement i, where $i = 1, 2, ...m$. In addition, the size of the squatter population in the settlement, N_i, affects eviction costs in a positive direction. With a larger squatter population, the political outcry caused by eviction of the settlement is more substantial, making eviction more costly.

These relationships are captured by the eviction-cost function $e(A_i, N_i)$, which gives eviction cost per unit of land. The $e(\cdot)$ function is increasing in both its arguments. In order for eviction of settlement i not to be worthwhile for landowners, the post-eviction return to the land, given by the formal price p_f, cannot be larger than the eviction cost per unit of land. Formally, this "no-eviction" constraint is written

$$p_f \quad \leq \quad e(A_i, N_i). \tag{1}$$

The constraint will bind, holding as an equality, in equilibrium. Note that if the constraint were not satisfied for some settlement while holding for others, only that settlement would undergo eviction.

The squeezing process described above determines p_f in (1). To formalize it, let individual land consumption for squatter households in settlement i be denoted by q_i, which implies that the settlement's total land area is $N_i q_i$. Together, the m squatter settlements occupy a land area of $\sum_{j=1}^{m} N_j q_j$. With the overall land area of the city fixed at $\overline{L}$, the remaining formal land area equals $\overline{L} - \sum_{j=1}^{m} N_j q_j$. The formal population must fit in this area, which requires the formal price p_f to adjust so as to equate the total demand for land by formal residents to the available area. This total demand, which comes from a fixed number of formal residents, is given by the downward-sloping demand function $D(p_f)$. Therefore, the condition

$$D(p_f) \quad = \quad \overline{L} \; - \; \sum_{j=1}^{m} N_j q_j \tag{2}$$

ensures that the formal residents fit into the available land area.

The last elements of the model are the squatter utility function, $u(x_i, q_i)$, where x_i is non-housing expenditure for a resident of settlement i, and the budget constraint. Although squatters are assumed to incur no explicit rental cost for the land they occupy, they do make a payment to the squatter organizer, which includes only defensive expenditures in the Brueckner-Selod model. When the squatter organizer is a rent-seeker, however, he will require squatters to make an additional payment of "rent," denoted R_i for settlement i, which is income for the organizer. As a result, the budget contraint for a resident of settlement i is $A_i + R_i + x_i = y$, where y is squatter income. Therefore, utility can be written

$$u(y - A_i - R_i, q_i). \tag{3}$$

Note that squatters may not be able to distinguish how the organizer divides the total payment of $A + R$ between defensive expenditures and rent, so that the organizer's rent-seeking motive might be partly hidden.

While the squatter organizer in settlement i dictates this total payment, he also controls the sizes of squatter plots, dictating the individual land consumption levels q_i. In addition, he has control over the size of the settlement population, N_i, having the power to limit the number of participating households, a power that is empirically documented.[3]

The Brueckner-Selod model has a single squatter settlement, so that $m = 1$, and the rental payment is set equal to zero, reflecting benevolence of the organizer. The organizer then sets A_1, q_1 and N_1 to maximize the squatter utility, given by (3) with $i = 1$, subject to the constraints (1) and (2). The organizer is assumed to be able to offer a utility level at least as great as that available in the rural area, denoted $\overline{u}$, so that he can attract a supply of squatter residents.

To convert the model to portray the case of competing, profit-maximizing squatter organizers, $m > 1$ is assumed, and R_i becomes a decision variable. In addition, the organizer's exploitative goal means that he will offer squatters the minimum utility needed to attract them. As a result, the condition

$$u(y - A_i - R_i, q_i) \quad = \quad \overline{u} \tag{4}$$

will hold for each squatter settlement. For most of the analysis, the number m of squatter organizers is treated as exogenous, allowing an appraisal of the effects of an exogenous change in competition. Eventually, however, m is endogenized, with the analysis then focusing on a free-entry equilibrium.

The total rent earned by the organizer of settlement i is equal to N_iR_i, its population times rent per squatter. The organizer's goal is then to maximize N_iR_i subject to the constraints (1), (2) and (4), taking the decisions of other squatter organizers as given. Since the organizers are identical, this behavior will lead to a symmetric Nash equilibrium with m identical squatter settlements having common values of N, q, A, and R. Comparative-static analysis of the equilibrium will then show how the equilibrium values of the variables are affected by changes in the parameters, including the extent of squatting competition, as represented by m.

Analysis of the equilibrium is not feasible without imposing further simplifying assumptions. One convenient set assumptions removes q_i as a decision variable for the squatter organizer, setting $q_i = 1$ for all i. In this case, the utility constraint (4) simply requires nonhousing consumption to equal a constant, or

$$y - A_i - R_i \quad = \quad k \tag{5}$$

Two additional assumptions follow Brueckner and Selod (2009). First, formal housing demand is generated from Cobb-Douglas preferences, so that $D(p_f)$ is inversely proportional to p_f, being given by $D(p_f) = \theta/p_f$, where θ is a constant equal to the product of the Cobb-Douglas land exponent, the income level of formal residents, the formal population size. The third assumption is that eviction costs are proportional to the product of A_i and N_i, with $e(A_i, N_i) = \alpha A_i N_i$, where α captures the effectiveness of eviction-prevention measures. Since eviction cost must be set equal to p_f by (1), the quantity demanded of formal housing can be written as

$\theta/p_f = \theta/\alpha A_i N_i$. Substituting in (2), that constraint reduces to

$$\frac{\theta}{\alpha A_i N_i} + \sum_{j=1}^{m} N_j - \overline{L} = 0. \quad (6)$$

Finally, rewriting (5) as $R_i = y - k - A_i$, the total rent (or profit) earned by the organizer of settlement i can be written as

$$N_i(y - k - A_i). \quad (7)$$

The organizer's goal is now simply to choose N_i and A_i to maximize (7) subject to the constraint in (6), viewing the N_k values for $k \neq i$ as parametric.

A diagrammatic depiction of the maximization problem is useful. Setting (7) equal to a fixed profit level π_i and solving for A_i yields the equation of an indifference curve for the organizer, given by

$$A_i = y - k - \pi_i/N_i. \quad (8)$$

These curves are upward sloping and concave in $[N_i, A_i]$ space, with lower curves corresponding to higher profit levels, as shown in Figure 1.

To graph the constraint in (6), let $G_i \equiv \overline{L} - \sum_{j \neq i} N_j$ and rearrange (6) to yield

$$A_i = \frac{\theta}{\alpha N_i (G_i - N_i)}. \quad (9)$$

Note that the relationship between A_i and N_i in (9) holds fixed the values of N_j, $j \neq i$, which are captured in G_i. Calculations show that this relationship is a U-shaped curve with a minimum at $N_i = G_i/2$, as shown in Figure 1. The constraint's curvature, however, turns from convex to concave past the minimum point. Assuming that the second-order condition is satisfied, a tangency between an indifference curve and this U-shaped curve gives the profit maximum. This condition will be satisfied if the tangency is located on the convex part of the constraint's upward-sloping portion, as shown in Figure 1.

Differentiating (8) and (9) to generate slope expressions, the tangency requires

$$\frac{\pi_i}{N_i^2} = \frac{\theta(2N_i - G_i)}{\alpha N_i^2 (G_i - N_i)^2}. \tag{10}$$

To derive the implications of (10), the endogenous profit level π_i is eliminated by substituting $N_i(y - k - A_i)$ in place of π_i. Then, A_i is replaced by the solution in (9). After rearrangement, the resulting condition reduces to

$$(y - k)(G_i - N_i)^2 = \theta/\alpha. \tag{11}$$

Although the N_i are chosen individually by the various squatter organizers treating other settlement sizes as fixed, symmetry implies that the solutions are identical across organizers. To find the resulting common solution, symmetry is imposed in (11), with $N_i = N$ and $G_i = \overline{L} - (m-1)N$. The condition then reduces to

$$(\overline{L} - mN)^2 = \frac{\theta}{\alpha(y-k)} \equiv \lambda, \tag{12}$$

an equation that determines N as a function of m and λ.[4] Note that λ captures three different forces: the strength of formal housing demand (θ), eviction-prevention effectiveness (α), and the squatters' willingness-to-pay (WTP) for defensive expenditures and rent, as represented by $y - k$ (see (5)).

3. Comparative-Static Analysis

3.1. Results

Using (12) and the other equations of the model, comparative-static analysis of the equilibrium can be carried out. Since (12) implies that mN is constant holding λ fixed, the first results are

$$\frac{\partial N}{\partial m} < 0, \quad \frac{\partial mN}{\partial m} = 0. \tag{13}$$

Therefore, as squatting competition increases, the size of individual squatter settlements falls, a natural result. However, the decrease in N exactly offsets the increase in m, so that the total squatter land area is unchanged. Squeezing of the formal housing market is therefore unaffected by greater competition. The constraint (2), which is rewritten

$$\frac{\theta}{p_f} \;=\; \overline{L} \;-\; mN, \tag{14}$$

then implies

$$\frac{\partial p_f}{\partial m} \;=\; 0, \tag{15}$$

so that the formal price is unaffected by the extent of squatting competition.

The effects of λ on N and mN can also be seen from inspection of (12), which yields

$$\frac{\partial N}{\partial \lambda} \;<\; 0, \quad \frac{\partial mN}{\partial \lambda} \;<\; 0. \tag{16}$$

Therefore, an increase in λ reduces the size of individual squatter settlements and the total squatter land area, regardless of whether the source of λ's change is an increase in formal housing demand (θ), a decrease in eviction-prevention effectiveness (α), or a decrease in squatter WTP ($y-k$).

With the total squatter land area mN falling as λ increases, squeezing is reduced. When the higher λ value comes from a decrease in α or $y-k$, this reduced squeezing leads to a decrease in p_f, given (14). But when the source is a higher value of the demand parameter θ, the increase in the formal land supply on the RHS of (14) is accompanied by an increase in the LHS due to stronger demand, and the change in p_f that clears the market is unclear. However, squaring both sides of (14) and using (12) to eliminate $(\overline{L}-mN)^2$, the condition reduces to $p_f^2 = \alpha\theta(y-k)$, so that p_f is increasing in θ as well as in α and $y-k$. Therefore, even though an increase in λ caused by a higher θ reduces squeezing and gives more land to formal residents, the increase in formal housing demand more than offsets this effect, leading to an increase in p_f. Summarizing,

$$\frac{\partial p_f}{\partial \theta} \;>\; 0, \quad \frac{\partial p_f}{\partial \alpha} \;>\; 0, \quad \frac{\partial p_f}{\partial (y-k)} \;>\; 0. \tag{17}$$

Thus, the formal price rises when formal housing demand increases, eviction-prevention effectiveness rises, or squatter WTP grows.

Comparative-static effects on A can be derived by imposing symmetry in (9), which gives

$$A \quad = \quad \frac{\theta}{\alpha N(\overline{L} - mN)}. \tag{18}$$

Using (13), inspection of (18) yields

$$\frac{\partial A}{\partial m} \quad > \quad 0, \tag{19}$$

so that defensive expenditures rise with an increase in squatting competition. Since A in (18) depends directly on θ and α as well as on all the components of λ through N, the component effects must be considered separately. To find the effect of θ and α, (18) and (12) can be combined to yield $A = (y-k)(\overline{L} - mN)/N$. N's decline in (16) from a higher θ or a lower α has a positive effect on this expression, implying

$$\frac{\partial A}{\partial \theta} \quad > \quad 0, \quad \frac{\partial A}{\partial \alpha} \quad < \quad 0. \tag{20}$$

Therefore, defensive expenditures rise with an increase in formal housing demand or a decline in eviction-prevention effectiveness, natural conclusions. From (18), the effect of $y-k$ on A operates through N, and differentiation of (18) shows that N's effect on A in the symmetric equilibrium is positive (see the appendix). With A then increasing in N and with N increasing in $y-k$ from (16),

$$\frac{\partial A}{\partial (t-k)} \quad > \quad 0 \tag{21}$$

follows, indicating that a higher squatter WTP raises defensive expenditures, another natural conclusion.

Since (5) implies that A and rent per squatter R move in opposite directions holding $y-k$ fixed, (19) and (20) yield

$$\frac{\partial R}{\partial m} \quad < \quad 0, \quad \frac{\partial R}{\partial \theta} \quad < \quad 0, \quad \frac{\partial R}{\partial \alpha} \quad > \quad 0. \tag{22}$$

Thus, rent per squatter falls as competition increases, as formal demand rises, or as eviction-prevention effectiveness falls, all natural results. Eq. (5) along with additional calculations shown in the appendix establish

$$\frac{\partial R}{\partial(y-k)} \quad = \quad 1 - \frac{\partial A}{\partial(y-k)} \quad > \quad 0, \tag{23}$$

so that R increases along with A as WTP rises.

Since the effects on N of m, θ, α, and $y-k$ are in the same direction as the effects on R given (13), (16), (21) and (22), profit $\pi = NR$ moves in step:

$$\frac{\partial \pi}{\partial m} \; < \; 0, \quad \frac{\partial \pi}{\partial \theta} \; < \; 0, \quad \frac{\partial \pi}{\partial \alpha} \; > \; 0, \quad \frac{\partial \pi}{\partial(y-k)} \; > \; 0 \tag{24}$$

Therefore, greater competition reduces each squatter organizer's profit, and higher formal housing demand, lower eviction-prevention effectiveness, or lower WTP have the same effect.

Table 1 summarizes the comparative-static results.

3.2. Discussion

The foregoing results show that competition among squatter organizers is much like competition among firms in a traditional market. An increase in the number of competing organizers reduces individual settlement sizes just as an increase in the number of firms in an industry cuts output per firm. However, the total squatter land area stays constant, in contrast to the higher industry output that would usually accompany an increase in the number of firms. In addition, the profit earned by each organizer falls as competition increases, just like in a traditional industry setting.

Since eviction must be deterred for the organizer to earn his profit, defensive expenditures must adjust in step with these market-structure effects. With settlement size falling as competition increases, this source of eviction prevention weakens. Because the formal price remains constant (a consequence of unchanged squeezing), eviction costs must also stay constant to forestall eviction, requiring an increase in defensive expenditures. This need for higher defensive expenditures is the source of lower organizer rent, which must fall as defensive expenditures rise to keep squatter utility constant. With smaller settlements reducing the number of rent payers per organizer, profit then falls.

When eviction-prevention effectiveness falls or formal housing demand increases (putting upward pressure on p_f), it becomes harder for the squatter organizer to satisfy the no-eviction constraint. The result is a reduction in settlement sizes (to reduce squeezing) and an increase in the required level of defensive expenditures, which reduces profit. Finally, an increase in willingness-to-pay allows the organizer to extract more defensive expenditures and rent from each squatter. With better eviction deterrence allowing settlement sizes (and squeezing) to increase, each organizer earns more profit.

4. The Free-Entry Equilibrium

So far, the number of squatter organizers has been treated as exogenous. However, just as in a traditional industry setting, a free-entry equilibrium can be characterized and analyzed. As long as squatter organizers are earning a positive profit, an incentive for entry exists. This incentive disappears, however, once rent per squatter R reaches zero. From (5), a zero value for R implies

$$A \;=\; y \;-\; k, \tag{25}$$

so that A equals squatter WTP.

Substituting this A value into (6), imposing symmetry, and rearranging, that condition reduces to

$$(\overline{L} - mN)N \;=\; \frac{\theta}{\alpha(t-k)} \;=\; \lambda \tag{26}$$

With A fixed, the zero-profit indifference curve in Figure 1 is flat, so that the tangency must occur at a point on the constraint where the slope is zero.[5] Setting the numerator of the RHS of (10) equal to zero yields $2N_i - G_i = 0$, and imposing symmetry, this requirement reduces to $\overline{L} - mN = N$. Substituting in (26), the resulting solution for N satisfies

$$N^2 \;=\; \lambda. \tag{27}$$

Since $mN = \overline{L} - N$ holds from the previous equality, the total squatter land area is then given by

$$mN \;=\; \overline{L} \;-\; \sqrt{\lambda}. \tag{28}$$

Finally, since $m = \overline{L}/N - 1$, the solution for m is

$$m \;=\; \frac{\overline{L}}{\sqrt{\lambda}} \;-\; 1. \tag{29}$$

A comparison of (27) and (16) shows that the effect of λ on N is exactly the opposite of the effect in the exogenous-m case, positive rather than negative. This outcome can be understood by noting that the free-entry impact on N from a change in λ can be decomposed into the direct effect, given by (16), and an indirect effect from the induced change in m. This change can be seen in (29), which shows that an increase in λ reduces m, indicating that entry is deterred by stronger formal housing demand, weaker eviction-prevention effectiveness or lower WTP. From (13), the lower m then raises N, offsetting λ's negative direct effect on N. This offset is sufficiently strong to reverse the sign of the direct effect, making the overall impact of λ on N positive.

Despite this sign reversal, (28) shows that the total squatter land area continues to be a decreasing function of λ, with the negative effect on m more than offsetting the increase in N. Therefore, in a free-entry equilibrium, stronger formal housing demand, weaker eviction-prevention effectiveness, or a lower squatter WTP reduce the extent of squeezing of the formal housing market, matching the effects in the exogenous-m case. As before, the impacts of a lower α or $y - k$ translate directly into a lower p_f, while an increase in θ yields opposing effects on the supply and demand for formal land. But since the solution for p_f in the fixed-m model was independent of m, it follows that this solution, $p_f^2 = \alpha\theta(y-k)$, is also relevant at the free-entry equilibrium.[6] Therefore, as before, p_f increases with θ as the demand effect dominates, and (17) continues to hold in the free entry equilibrium.

In a sense, these p_f effects are the ultimate implications of the model, showing how squatting's impact on formal residents varies with key parameters. The effects, which emerge regardless of whether or not the free-entry equilibrium has been reached, show that squatting is worse for formal residents (leading to a higher p_f) when eviction-prevention is effective and when squatters have high willingness-to-pay for rent and defensive expenditures, both natural conclusions. However, since an increase in formal housing demand prompts a retreat by the squatter settlements, the unfavorable price impact of formal demand growth is softened. Thus, less squeezing by squatters ends up cushioning formal residents from the adverse effects of a surge in their own demand.

Although Brueckner and Selod's comparative-static results, being based on flexible squatter land consumption, are not strictly comparable, the conclusions are quite different. In their squatting equilibrium, exactly half the city's land area is occupied by squatters, regardless of parameter values. As a result, squatter income and eviction-prevention effectiveness do not affect the extent of squeezing and the formal price, with p_f only responding to the strength of formal demand. Since squeezing is unaffected, formal residents thus face the full price impact of a growth in their own demand.

5. Squatter Formalization

Formalization, where squatters gain legal status in return for payment of rent, is a goal of many governments in the developing world. Brueckner and Selod (2009) showed that Pareto-improving formalization was possible in their model, with all stakeholders better off than in the squatting equilibrium. This finding established the inefficiency of that equilibrium.

To carry out a parallel inquiry for the model with rent-seeking rather than benevolent organizers, the first step (following Brueckner and Selod) is to investigate the "sustainability" of the squatting equilibrium. Sustainability means that no squatter resident should have an incentive to move into the formal part of the city, paying formal rent. The equilibrium is sustainable when the rent payment a relocating squatter would make, equal to p_f given fixed unitary land consumption, exceeds his outlay in the squatter community, equal to $A+R$. Since the equilibrium value of p_f equals $\sqrt{\alpha\theta(y-k)}$ from above while $A+R$ equals the squatter WTP value $y-k$ with or without free entry, the sustainability condition reduces to

$$\frac{\alpha\theta}{y-k} \quad > \quad 1. \tag{30}$$

Now consider formalization of the squatters, under which the fixed squatter population of mN gains legal status in return for payment of rent. Since the group's total land consumption is fixed at mN and thus independent of p_f, the previous formal price continues to clear the market once the former squatters enter it. As a result, formal residents are unaffected by formalization. But the sustainability condition implies that each squatter loses from formalization, with the total loss equal to

$$L \equiv [p_f - (A+R)]mN = [\sqrt{\alpha\theta(y-k)} - (y-k)]mN > 0, \tag{31}$$

where the inequality follows from (30).

Assuming that the government collects and distributes the rent payment, it has mNp_f to distribute to offset losses from formalization. A portion L of this amount could then be given back to the squatters to offset the increase in their outlay, leaving $mN(A+R)$ for further distribution. Squatter organizers lose their total profit of mNR with formalization, but a transfer of this amount (assuming $R > 0$) will offset the loss, leaving an amount mNA for further distribution. Landowners, who earned nothing from the squatter land before, need no transfer to keep them equally well off. However, previous recipients of defensive expenditures may require compensation. For example, if the mNA payment flowed to politicians as bribes to buy support for the squatter settlements, these the same politicians may require a continuation of the bribes to support formalization. Alternatively, if the defensive expenditures paid for a security force whose alternative was unemployment, then the (now unemployed) members of this force would require a transfer of the same amount to be equally well off. Finally, if defensive expenditures are a result of forgone labor income, then although income rises when they disappear, this gain is accompanied by a disutility from work, which was absent when the squatter spent time at home defending the plot. If work leaves no surplus for the worker, with the gained income A exactly offset by a disutility of the same magnitude, then each former squatter needs to be compensated in this amount, requiring a total transfer of mNA to the former squatters in addition to L.

With these various distributions, all the city's stakeholders are exactly as well off as in the squatting equilibrium, implying no social gain from formalization. This conclusion contrasts with Brueckner and Selod's finding of a strict Pareto improvement, and the source of this difference is the assumption of fixed land consumption by squatters. With land consumption variable in their model and squatter incomes lower than those of formal residents, formalization led to a decline in the formal housing price. This decline generated gains that could be redistributed to make all stakeholders better off. Its absence in the current model removes such gains, eliminating Brueckner and Selod's inefficiency verdict on the squatting equilibrium.

Different assumptions regarding defensive expenditures, however, lead to a more-favorable welfare verdict on formalization. If the bribes to politicians exactly offset a distaste for supporting squatters, which disappears with formalization, then no compensation for this group is needed, leaving mNA in the hands of the government for welfare-improving distributions to other stakeholders. The same outcome obtains if the squatter security force finds other work upon formalization, thus requiring no compensation when defensive expenditures stop. In addition, if a return to employment by squatters entails a work disutility smaller than A, then only a portion of the mNA amount would need to paid in compensation in addition to L, leaving some funds in the hands of the government for further redistribution. In all these cases, formalization is welfare-improving, indicating that the squatting equilibrium was inefficient.

6. Conclusion

This paper has extended a new line of research on urban squatting that focuses on the role of the squatter organizer. The model replaces the benevolent organizer from previous studies with a collection of competing, rent-seeking squatter organizers, a structure that may offer a realistic picture of many cities in less-developed countries. In addition to showing how to construct such a model, the paper generates a host of comparative-static results and other insights. These results demonstrate that competition among squatter organizers has much in common with competition in a traditional industry setting, while showing the effects of other parameter changes on the squatting equilibrium. The paper's comparative-static results could serve as the basis for empirical work, assuming that suitable data could be found. Additional work on the model itself could be devoted to relaxing the assumptions used to facilitate the analysis (the fixed q for squatters and Cobb-Douglas formal preferences). However, the resulting increase complexity might require the use of numerical methods to generate results. In any case, given the importance of squatting in less-developed countries and the modest volume of research studying it, further work of all types deserves high priority.

Appendix

Differentiating (18) yields

$$\frac{\partial A}{\partial N} \quad = \quad \frac{\theta(2mN-\overline{L})}{\alpha N^2(\overline{L}-mN)^2} \quad > \quad 0, \qquad (a1)$$

where the sign follows because $2mN-\overline{L}<0$ must hold. To establish this latter inequality, note that the numerator of the RHS of (10) must be positive in the symmetric equilibrium, and that after substitution for G_i, this requirement reduces to $(m+1)N>\overline{L}$. Since $2m>m+1$ holds when $m>1$, it then follows that $2mN-\overline{L}$ is positive, yielding the sign in $(a1)$. With the effect of $t-k$ on N positive from (16) and with a higher N raising A from $(a1)$, A is then increasing in $t-k$, as stated in (21).

To derive the effect of $y-k$ on R, the full solution for A's derivative is needed. Using (12) to compute $\partial N/\partial(t-k)$ yields

$$\begin{aligned}\frac{\partial A}{\partial(t-k)} \quad &= \quad \frac{\partial A}{\partial N}\,\frac{\partial N}{\partial(t-k)} \\ &= \quad \frac{\theta(2mN-\overline{L})}{\alpha N^2(\overline{L}-mN)^2}\,\frac{\theta}{\alpha(y-k)^2m(\overline{L}-mN)} \\ &= \quad -\,\frac{(\overline{L}-2mN)(\overline{L}-mN)}{2nN^2}, \qquad (a2)\end{aligned}$$

where the last equality comes from substitution using (12). Using $(a2)$, $1-\partial A/\partial(y-k)$ has the sign of

$$2mN^2 \;+\; (\overline{L}-2mN)(\overline{L}-mN) \quad = \quad mN[(m+2)N-\overline{L}] \;+\; (\overline{L}-mN)^2 \quad > \quad 0, \qquad (a2)$$

establishing $\partial R/\partial(y-k)>0$.

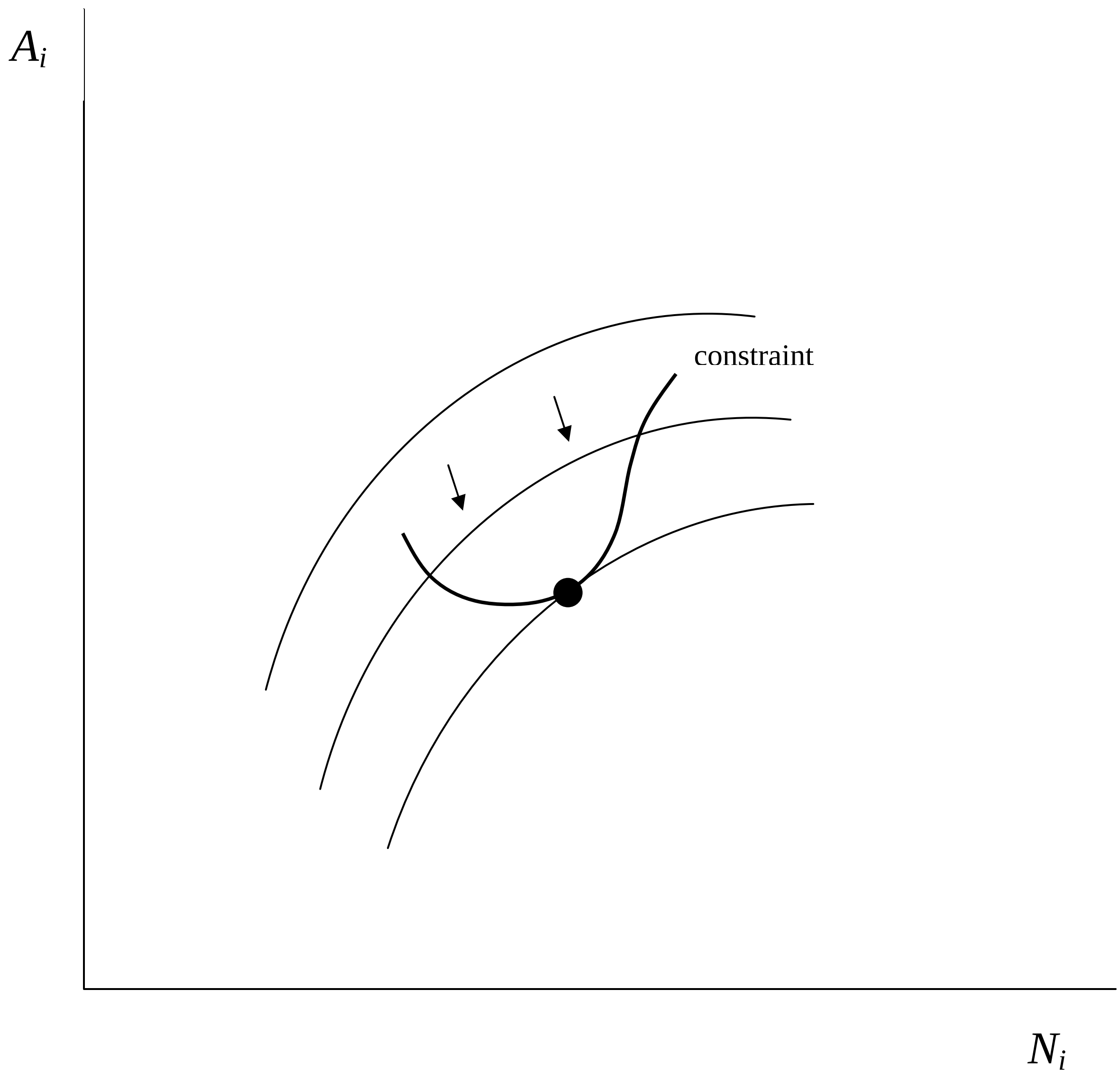

Figure 1: Profit-maximizing choice of *A* and *N*

Table 1.
Main Comparative-Static Results

	VARIABLE					
	Settlement size (N)	*Squatter area* (mN)	*Formal price* (p_f)	*Defensive expenditures* (A)	*Rent per squatter* (R)	*Organizer profit* (NR)
PARAMETER						
Number of organizers (m)	−	0	0	+	−	−
Formal housing demand (θ)	−	−	+	+	−	−
Eviction-prevention effectiveness (α)	+	+	+	−	+	+
Squatter willingness-to-pay ($y - k$)	+	+	+	+	+	+

Table 2.
Comparative-Static Results for the Free-Entry Equilibrium

	VARIABLE			
	Number of organizers (m)	*Settlement size* (N)	*Squatter area* (mN)	*Formal price* (p_f)
PARAMETER				
Formal housing demand (θ)	−	+	−	+
Eviction-prevention effectiveness (α)	+	−	+	+
Squatter willingness-to-pay ($y - k$)	+	−	+	+

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Footnotes

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[1] According to Flood (2006, p. 42), cities where the eviction of squatters is frequent include Guangzhou (China), Harare (Zimbabwe), Mumbai (India) and Valledupar (Columbia). However, cities where evictions are rare include Guadalajara (Mexico), Ho Chi Minh City (Vietnam), Istanbul (Turkey), Sao Paulo (Brazil), and Tehran (Iran) (where no evictions at all were reported). See Jha, Rao and Woolcock (2007) for further discussion of the role of community organizers in slums.

[2] In addition to Lanjouw and Levy (2002) and Field (2007), this set of studies includes Jimenez (1984), Friedman, Jimenez and Mayo (1988), Field (2005), Di Tella, Galiani and Schargodsky (2007), Kapoor and le Blanc (2008), Lall, Lundberg and Shalizi (2008), Takeuchi, Cropper and Bento (2008), and Hidalgo, Naidu, Nichter and Richardson (2010).

[3] Mangin (1967) noticed some forty years ago that organizers in the squatter settlements of Peru "do seem to be able to control, to a certain extent, who will be members of the [land] invasion group."

[4] The solution also depends on $\overline{L}$, but the effect of this parameter is of secondary interest.

[5] Note that the position of the constraint is endogenous, depending on the value of m.

[6] To see this conclusion directly, note that since the LHS of (14) equals N, which in turn equals $\sqrt{\lambda}$, solving for the formal price yields $p_f^2 = \alpha\theta(y-k)$.