Bargaining and Litigation Over Compensation Under Eminent Domain*

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1 Introduction

Eminent Domain laws empower the state to acquire private property for public purpose. These laws permit compulsory acquisition or what is popularly called condemnation of a property by the government, if the owner refuses to sale the property voluntarily. At the same time, the compulsory acquisition laws entitle the owner to compensation equal to the 'market value' of the property. The compensation is to be paid by the acquiring-agency/condemnor at the time of acquisition. Depending on the jurisdiction or the context, the owner of the condemned property may or may not be allowed to negotiate the compensation amount with the condemnor. However, under all jurisdictions the owner has right to litigate the compensation amount, if not satisfied with the compensation offered by the condemnor.

The first question is whether the owner received compensation is indeed equal to the market value of the property or not. Several empirical studies on the subject argue that the actual compensation received by the owners of condemned properties is generally different from their market value. See, e.g., Burger and Rohan (1967), Munch (1976), Bell and Parchomovsky (2007), Aycock and Black (2008), Chang (2008), and Kades (2008).

The variance between the compensation offered by the government, on one hand, and the 'market value' of the property, on the other hand, is not entirely surprising. Since, determination of the market value of a condemned property is by no means an easy exercise. In the first place, the actual market price does not exist for an acquired property. By definition, a condemnation means lack of an actual voluntary market transaction that could reveal the market price. In practice, the market price for the condemned properties is determined by taking the average of the sales prices of

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'similar' properties that have been transacted through voluntary exchanges. However, many attributes of a property affect its market valuation, and no two properties are exactly identical. Identification of similar properties and, therefore, the market price of the condemned property is a genuinely difficult task vulnerable to errors.[1] In this scenario, it is not entirely surprising that the compensation granted by the government officials is generally different from what researchers will find as the 'market value' of the property.

However, the empirical studies also argue that in many instances, the differences between the compensation received, on one hand, and the market price, on the other hand, is significantly large.[2] This especially is the case with very low and very high value properties, regardless of whether the compensation is received by accepting the official offer or granted by a court through litigation. For instance, in an empirical study of bargain-settlement over eminent domain compensation for 89 properties in New York City, Chang (2008) concludes:[3]

> "47 out of 89 condemnees (or 53 percent) were compensated with less than fair market value; 36 condemnees (40 percent) received more than fair market value; 6 condemnees (7 percent) got roughly fair market value. Furthermore, "compensation percentage" (actual compensation divided by the estimated fair market value) is not bell-shaped; 36 condemnees (40 percent) received extreme compensation payments - compensations that are higher than 150 percent or lower than 50 percent of fair market value."

Moreover, the compensation structure seems to be regressive: Compensation for high-value properties is much greater than their market value; in contrast, compensation for the low-value properties is significantly less than the market value as determined by researchers. The regressive nature of compensation persists, regardless of whether the compensation is received by accepting the official offer or through the litigation process.

In many instances, the acquisition affected owners choose to litigate the government awarded compensation before a court of law. Indeed, litigation over compensation is a universal phenomenon. However, the litigation does not make the compensation any less iniquitous. If any thing, the court awards are said to be more iniquitous in this sense. For instance, another empirical study of 798 properties in Chicago by Munch (1976) concludes:[4]

[1] Naturally, the government officials enjoy lot of discretion in the matter.

[2] The researchers have calculated market value of property on the basis of the actual transaction prices of other properties similar to the property in question in terms of location, such as distance from main road, market places etc.

[3] See Chang (2008), p.4.

[4] See Munch (1976), p. 488.

> "low-valued properties receive less than market value and high-valued properties receive more than market value," and " [a]s a rough approximation, a $7,000$ parcel receive about $5,000$, a $13,000$ property breaks even and a $40,000$ property may get two or three times its market value."

These findings naturally raise the following questions: Why the deviations from market value are large for the very low and very high value properties? Why there is rampant litigation over compensation amount? Why the compensation structure under eminent domain laws is regressive, regardless of whether the compensation is received by accepting the official offer or by litigating,?

The scanty literature on these issues attribute above-mentioned outcomes to ignorance of low-valued properties (Chang, 2008), poor quality of government lawyers (Munch 1976; and Bell and Parchomovsky, 2007), and different precedent values of court awards (Posner, 2003).[5] The literature on litigation attributes the existence of, in equilibrium, litigation to the imperfect information or asymmetric information between the parties parties involved.[6]

In contrast, in this paper we show that the incentive structure induced by the eminent domain laws is the main factor accounting for the above-mentioned empirical findings. In the first place, the government officials responsible for making the initial compensation awards do not have strong enough incentives to search for market value of condemned properties. This leads to large deviations between the compensation offered by the government, on one hand, and the market value, on the other hand. We model the bargaining and litigation over compensation and show that, *ceteris paribus*, the litigation is much more profitable for the owners of the relatively high-value properties than for those owning low-value properties. Since, during litigation the government lawyers do not have strong incentives to put in the required efforts. The litigation efforts of the owner, in contrast increase in the direct proportion the market value, leading to higher expected court/jury awards. Naturally, the owners decide whether to accept the official offer or not, in the shadow of their litigation payoffs. However, the relative litigation award increase with market value. Therefore, the owners of high-value properties accept only the official offers only if it is sufficiently large; otherwise they reject the offer and go for litigation. In contrast, the owners of the low-value properties can accept the official award even when it is less than the market value.

The formal model developed in the paper is used to discuss the problems with

[5]Posner (2003) has argued a low value property is similar to many more properties than is the case with a high value property. Therefore, he argues, the judicial compensation awards have greater precedent value, and this makes courts conservative in awarding compensation. As a result, relatively low value properties receive comparatively less compensation

[6]See, e.g., Bebchuk (1984), Schweizer (1989), Spier (1992) and for a review of the literature see Shavell (2004).

the land acquisition process in India. In addition to the above discussed problems with the eminent domain laws, a unique feature of the Indian land acquisition law creates further incentives for the acquisition affected property owners to litigate the government awards. Under the Indian law, court awarded compensation cannot be less than the government awards,[7], making the litigation a costly but risk-free choice for the affected parties. This explains the unusually high frequency of litigation over land acquisition in India.

The rest of the paper is organized as follows. Section 2 provides the basic formal setup for government awards and litigation process. Section 3 shows how the court awards vary with the market value of the property. Section 4 models the bargaining over compensation. Section 5 explores the above issues in the Indian context. Section 6 concludes with final remarks on the analysis and the results derived in the paper.

2 The Model

Consider an instance of land acquisition under the *eminent domain*. Suppose, a government needs land for some 'public' project. Several properties/land-parcels may be needed for the project. The properties may possibly be owned by different individuals, and may or may not be contiguous. Moreover, the 'market value' can vary across the properties.[8]

Assume that the government announces it decision to use eminent domain at date $t = 1$. Consider a property under acquisition - it can be the only property under acquisition or one of the properties being acquired. Suppose,

r is the market value of of the property.[9]

Most legal systems entitle the owner of a condemned property to 'just' compensation, which is taken to be some multiple of the market value of the property. In principle, the owner is entitled to compensation equal to

$$r \times M,$$

where M is the multiplier provided by the law.[10] For simplicity assume that the government makes the compensation offer at $t = 1$ itself. Let,

[7]Section 25 of the Land Acquisition (Amendment) Act, 1984 expressly prohibits the courts from doing so.

[8]That is, if traded in the market, generally different properties will fetch different prices to their owners.

[9]In general, the market value of a property can be defined as the market rate per-unit (say, per-sq-meter) times the size of the property.

[10]Under the Land Acquisition Act, 1894, $M = 1.3$. However, under LARR 2013, $M = 2$ for urban areas; for rural areas it $M \in [2, 4]$ depending on the distance from district headquarter.

r^o be the value of the property as assessed by the government. So, the official compensation offered to the owner is

$$r^o \times M.$$

Upon receiving the offer, the owner has to decide whether to accept it. Suppose, the owner takes this decision at $t = 1$ itself. If the offer is rejected, litigation takes place at $t = 2$, and the court/jury announces its award.

The assessment of the market value of the property by a court depends on the evidence led by the litigants - the lawyer(s) of the owner, on one hand, and that of the government department, on the other. The registered sale-deeds of similar properties is the most widely accepted evidence by the courts. Generally, the litigants provide a list properties that were transacted voluntarily (, i.e, through market) along with the transaction rate of each property. However, the courts/juries have to identify the properties that are 'similar' to the property at hand. Thereafter, the courts assess the market value of the property at hand using the transaction rates of the so identified properties. However, as discussed earlier, no two properties are exactly similar. This means that the courts enjoy lot of discretion when it comes to choosing the reference property and therefore the compensation. In such a scenario, it is difficult to predict the litigation outcome beforehand. Specifically, assume that at $t = 1$ when the owner has to decided whether to accept the government offer, there is uncertainty about the court assessed market value; it can turn out to be greater than or less than the government offer.

The owner will accept the compensation offered by the government only if it is a least as much as the net expected compensation from litigation. That is, only if the offered compensation is at least equal to the value of the expected court provided compensation minus the litigation costs. Therefore, to find out the set of mutually acceptable offers, we need to determine the payoffs of the parties from litigation.

In reality, the litigation efforts put in by the litigants affect not only the litigation costs but also the expected court awards. This means that the nature of uncertainty faced by the parties is also a function of the litigation efforts. Formally, the uncertainty over court award is modeled as follows. Let,

r^c denote the compensation rate awarded by the court/jury.

The final compensation received by the owner is $r^c \times S$. At $t = 0$, r^c is a random variable distributed, say over $[\underline{r}^c(r), \bar{r}^c(r)]$, where $0 \leq \underline{r}^c(r) < \bar{r}^c(r)$. Let,

$F(.)$ be the conditional distribution function for r^c.
$f(.)$ be the associated conditional density function.

The functions $F(.)$ and $f(.)$ are conditional on the litigation efforts by the plaintiff owner and the defendant government, i.e., x and y. Moreover, these functions as well as their support in general will depend on the market value of the property in question.[11] Formally, $F(.) = F(r^c \mid r, x, y)$ and $f(.) = f(r^c \mid r, x, y)$. Let,

$$E(r^c \mid r, x, y) = \int_{\underline{r}^c}^{\bar{r}^c} r f(r^c \mid r, x, y) dr.$$

That is, $E(r^c \mid r, x, y)$ the expected value of the property as assessed by the court. So, the expected value of the total compensation provided by court is given by

$$E(r^c \mid r, x, y) \times M.$$

We assume that the expected rate awarded by the court is an increasing and concave [resp. decreasing and convex] function of the effort put in by the lawyer of the owner [resp. by the government lawyer]. That is, $\frac{\partial E(r^c|r,x,y)}{\partial x} > 0$, $\frac{\partial^2 E(r^c|r,x,y)}{\partial x^2} < 0$ $\frac{\partial E(r^c|r,x,y)}{\partial y} < 0$, and $\frac{\partial^2 E(r^c|r,x,y)}{\partial y^2} > 0$. Further, to ensure an interior solutions of the optimization problems assume $\frac{\partial E(r|r,0,y)}{\partial x} = \infty$ and $\frac{\partial E(r^c|r,\infty,y)}{\partial x} = 0$, $\frac{\partial E(r|r,x,0)}{\partial y} = -\infty$ and $\frac{\partial E(r^c|r,x,\infty)}{\partial y} = 0$.

Let the cost (dis-utility) of litigation efforts by the lawyers of owner and government be given by $\psi(x)$ and $\psi(x)$, respectively. These costs are directly incurred by the lawyer who provides efforts. For analytical convenience, at times we will use the following functional forms: $\psi(x) = \frac{x^2}{2}$ and $\psi(y) = \frac{y^2}{2}$ Besides, the cost of litigation efforts, the litigation may entail some some fixed costs too; such as, court fees for filing the case, etc. Let x_0 and y_0 denote the fixed cost of litigation for the plaintiff and the defendant, respectively.

3 The Asymmetric Incentive Structure

During litigation both the property owner and the government will be represented by their respective counsels. Depending on how the gains from the litigation are shared between the property owner and his lawyer, the latter may not have incentive to maximize the net gains from litigation.[12] The same argument applies to the government and its lawyer. However, assume that when choosing litigation efforts, the two lawyers play Nash equilibrium. That is, for any given y opted by the defendant government, the lawyer of the owner will choose x to solve:

[11] In general, the relatively high value properties are transacted more frequently, and vice-versa. Since, market transactions are used as evidence during litigation, the market-value is likely to effect the returns from litigation effort.

[12] For instance, if the owner sells his case to the lawyer, the latter will choose litigation efforts to maximize the net gains from litigation. On the other hand, if the payment received by the lawyer do not depend on the court award, he is unlikely to choose net gains maximizing efforts.

$$\max_{x} \ \{\lambda_O \left[ME(r^c \mid r, x, y) - x_0\right] - \psi(x)\}, \tag{1}$$

where λ_O is the incentive power of the contract between the owner and his lawyer. Put differently, λ_O captures the important assigned by the lawyer to the court awards and fee.

While the court award represents a gain from litigation for the owner, it is a cost for the government, over and above the other costs of litigation. Therefore, for given x opted by the lawyer of the owner, the optimization for government's lawyer is:

$$\min_{y} \ \{\lambda_G \left[ME(r^c \mid r, x, y) - y_0\right] + \psi(y)\}, \tag{2}$$

where λ_G is the incentive power of the contract between the government and its lawyer(s).

As noted above, the lawyer of the property owner may not have incentive to maximize the net gains from litigation. The same argument applies to the government and its lawyer. However, in general, the incentive problem will acuter for the government. The fee structure for the government lawyers is subject to official rules and regulations. In contrast, the agreement between owner and his lawyer is subject to no such restrictions. For instance, while the owner can reward his lawyer for higher court awards, the government lawyer's compensation may not vary with the court awards. Therefore, it seems plausible to argue that the owner has greater degrees of freedom in choosing the terms of engagement with his lawyer; such as, the initial fee, share in the court provided compensation, etc. The difference in the compensation structures will have implications for the choice of efforts by the the lawyers. Moreover, the cost of court award is borne neither by the government officials-in-charge nor by the government lawyer - ultimately, it is borne by the taxpayer. Therefore, the government officials may also not care if the lawyer does not do a good job during litigation. In sum, compared to the lawyer of the property, the government lawyer has weaker incentive to put in desired effort. Formally, speaking $\lambda_G \leq \lambda_O$. Let,

$$\lambda = \frac{\lambda_G}{\lambda_O}$$

λ denotes the relative incentive strengths for the government lawyer. For simplicity, assume that $\lambda_O = 1$. Therefore, $\lambda \leq 1$. That is, for any given y, the the optimization problem of the owner can be written as:

$$\max_{x} \ \{ME(r^c \mid r, x, y) - \psi(x) - x_0\} \tag{3}$$

Given our assumptions, for any given y, the optimization problem (3) is strictly concave in x, and the unique solution, say x^*, is identified by the following first order condition:

$$M\frac{\partial E(r^c \mid r,x,y)}{\partial x} - \psi'(x) = 0. \tag{4}$$

From (4) note that x^* is clearly a function of M, r and y; formally, $x^* = x^*(M,r,y)$.

Due to the above mentioned constraints on the payment structure, we assume that government lawyer assigns less than full weight to the cost of court awards. That is, for given x opted by the plaintiff, the government lawyer solves:

$$\min_y \ \{\lambda\left[ME(r^c \mid r,x,y) + y_0\right] + \psi(y)\}, \tag{5}$$

where λ is the weight put by the officials on the costs of litigation to the exchequer.

$\lambda < 1$ means that the government lawyer care less for the cost of litigation to the exchequer. The litigation efforts are privately costly to the official lawyer. Note that the dis-utility of effort is incurred by the lawyer, therefore, in (5) he assigns full weight to the cost of efforts $\psi(y)$. For any given x and $\lambda \in [0,1]$, the minimization problem in (5) is strictly convex in y. Therefore, for any given x opted by the plaintiff's lawyer, the optimum response for the government, $y^*(x)$, is a uniquely solve the following first order condition:

$$\lambda M\frac{\partial E(r^c \mid r,x,y)}{\partial y} + y = 0, \text{ if } y^*(x) > \underline{y}; \tag{6}$$

otherwise $y^*(x) = \underline{y}$, where $\underline{y} \geq 0$ denoted the minimum litigation effort the government lawyer has to put to fulfill the formal requirements. Clearly, $y^* = y^*(M,\lambda,r,x)$. For any given M, from (6) note that as $\lambda \to 0$, $y^*(M,\lambda,r,y) \to \underline{y}$. That is, for small values of λ the official lawyer will put no more than the mandatory effort. In fact, for any given x, we have: $(\forall\lambda[0,\underline{\lambda}])[y^*(M,\lambda,x) = \underline{y}]$, where $\underline{\lambda}$ satisfies

$$\lambda M\frac{\partial E(r^c \mid r,\underline{y},x)}{\partial y} + \underline{y} = 0. \tag{7}$$

Suppose x^* and y^* simultaneously solve (4) and (6), respectively. In that case, the pair (x^*,y^*) is a Nash equilibrium. Moreover, the mutually best-responses, x^* and $y^*(\lambda)$, satisfy the following conditions:

$$M\frac{\partial E(r^c \mid r,x^*,y^*)}{\partial x} - x^* = 0, \tag{8}$$

and

$$\lambda M\frac{\partial E(r^c \mid r,x^*,y^*)}{\partial y} + y^* = 0, \text{if } y^*(x) > \underline{y}; \tag{9}$$

otherwise $y^*(\lambda) = \underline{y}$.

4 Market Value Vs Litigation Payoff

In this section, we analyze the relation between the market value of a property, on one hand, and the expected court awards if the owner decides to reject the official offer and go for litigation, on the other hand. The total compensation received by the property owner depends on the its market value, and the *multiplier* provided by the eminent domain law. For the ease of illustration, assume $\lambda = 0$, $\psi(x) = \frac{x^2}{2}$ and $\psi(y) = \frac{y^2}{2}$.

4.1 Multiplier Vs Litigation Payoff

In this subsection, we study the *ceteris-paribus* effect of the changes in the multiplier on the litigation outcome, specifically on the litigation payoff of the plaintiff-owner. From (8)-(9) it is easy to see that when $\lambda = 0$,

$$x^*(M, r, y^*) = M \frac{\partial E(r^c \mid r, \underline{y}, x^*)}{\partial x}, \tag{10}$$

and

$$y^*(M, 0, r, y^*) = \underline{y}, \tag{11}$$

respectively. Therefore, we get:

$$\frac{dx^*(M, y^*)}{dM} = \frac{\frac{\partial E(r|r,x^*,\underline{y},)}{\partial x}}{1 - M\frac{\partial^2 E(r|r,x^*,\underline{y},)}{\partial x^2}}; \tag{12}$$

$$\frac{dy^*(M, 0, x^*)}{dM} = 0. \tag{13}$$

Therefore, we can make the following claim.

Lemma 1 *(i)* $\frac{dx^*(M,y^*)}{dM} > 0$, *and (ii)* $\frac{dy^*(M,0,x^*)}{dM} = 0$.

The first inequality holds since $\frac{\partial E(r|x^*,y^*)}{\partial x} > 0$, by assumption, and $1 - M\frac{\partial^2 E(r|x^*,y^*)}{\partial x^2} > 0$ follows from the second order condition for the plaintiff's optimization problem.

In other words, as the multiplier M increases so does the effort of the plaintiff. However, changes in the multiplier does not affect the effort of the defendant. In fact, as the following proposition shows, the expected award-rate as well as the expected litigation payoff plaintiff increases with the increase in M. Let,

$$V(.) = \{ME(r^c \mid r, x, y) - \psi(x) - x_0\}$$

That is, V is the expected value of the total compensation received of the owner, net of the litigation costs. Note that for given y and other parameters the plaintiff optimization problem can be re-written as

$$\max_x V(x, y, r, M). \tag{14}$$

So, corresponding to V, the maximand or the optimum value function is

$$V^* = ME(r^c \mid r, y^*(M, 0, x^*), x^*(M, y^*)) - \frac{x^{*2}(M, y^*)}{2} - x_0. \tag{15}$$

Proposition 1 *(i)* $\frac{dE(r^c|r,x^*,y^*)}{dM} > 0$, *and (ii)* $\frac{dV^*}{dM} > 0$.

Proof: *(i)* Note that

$$\frac{dE(r^c \mid r, x^*, y^*)}{dM} = E_x(r^c \mid r, x^*, y^*)\frac{dx^*}{dM} + E_y(r^c \mid r, x^*, y^*)\frac{dy^*}{dM}.$$

Now, the claim follows immediately, in view of (12) and (13).

(ii) Using envelop theorem, from (14) we get[13]

$$\frac{dV^*}{dM} = E(r^c \mid r, y^*(M, 0, x^*), x^*(M, y^*)) > 0. \tag{16}$$

□

In fact, the court awards increase with M not only in absolute terms but in relative terms as well. Formally, speaking we have the following result.

Proposition 2 *For any given* r, $\frac{d\left(\frac{E(r^c|r,x^*,y^*)}{r}\right)}{dM} > 0$.

Proof is left as an exercise.

Given M, let r^a solve: $r^a \times M = V^*$, i.e.,

$$r^a = \frac{V^*}{M}.$$

That is, r^a is that offer which makes the owner indifferent between accepting the offer, on one hand, and going for litigation, on the other hand. Note that r^a depends on M, i.e., $r^a = r^a(M)$. Specifically, $r^a(M)$ satisfies

$$r^a(M) \times M = ME(r^c \mid r, y^*(M, 0, x^*), x^*(M, y^*)) - \frac{x^{*2}(M, y^*)}{2} - x_0. \tag{17}$$

Clearly, for given M, the owner will accept the initial offer, r^o, only if $r^o \geq r^a$; if $r^o < r^a$, the owner will go for litigation.[14] Therefore, for given M, $r^a(M)$ is the minimum asking rate for the owner. Moreover, given that the litigation costs are

[13]Note that the litigation is feasible only if $E(r^c \mid r, x^*, y^*) - r^o > 0$ and therefore $E(r \mid x^*, y^*) > 0$ hold.

[14]Assume that when $r^o = r^a$, the owner accepts the award.

positive, the owner will opt for litigation only if the expected court awarded rate is higher than the official offer rate, i.e., only if

$$E(r^c \mid r, y^*(M, 0, x^*), x^*(M, y^*)) - r^o > 0. \tag{18}$$

Note that (18) must hold for all $r^o \leq r^a$ and specifically for $r^o = r^a$. Next, we show that among owners who choose to reject the official offer, litigation becomes increasingly more profitable as M increases. Let,

$$\pi(.) = V^*(M, r) - r^o M$$

That is, $\pi(.)$ denotes the *additional* expected gains for the owner, from opting for litigation instead of accepting the official offer.

Proposition 3 *For litigating owners,* $\frac{d\pi(.)}{dM} > 0$.

Proof: In view of (16) we get

$$\frac{d\pi^*}{dM} = \frac{dV^*}{dM} - r^o = E(r^c \mid r, y^*(M, 0, x^*), x^*(M, y^*)) - r^o.$$

However, for each litigating owner $E(r^c \mid r, y^*(M, 0, x^*), x^*(M, y^*)) - r^o > 0$ holds. Therefore, $\frac{d\pi^*}{dM} > 0$.

□

For a specific application of Proposition 2, consider two possible values of M, say M_1 and M_2. WLOG assume $M_1 < M_2$. The Proposition implies this: (i) Suppose under M_1 an owner is indifferent between accepting the award, on one hand, and going for litigation on the other hand, then the owner will sure go for litigation when M increases to M_2; (ii) Suppose under M_1 an owner prefers litigation, then the owner will sure go for litigation if M further increases to M_2.

5 Market Rate Vs Litigation Payoff

Now, we analyze the *ceteris-paribus* affect of the per-square meter market rate, r, on the litigation payoff for the owner-plaintiff. The effect obviously will depend on the nature of the relationship between the market rate, on one hand, and the expected rate awarded by the court, on the other hand.

Consider a scenario in which two properties of the same size but different market rates, say r and $r^{m'}$ respectively, get acquired. Assume that $r < r^{m'}$. The Proposition implies that if owner of 1st property is indifferent between accepting the award, on one hand, and going for litigation on the other hand, the 2nd owner will surely opt for litigation. If both owners find the litigation to be attractive, the second owner will put in higher efforts in litigation and, as a result, the court-awarded rate as well as litigation payoff will be higher for the second property. The above Proposition implies that the expected gains from litigation, over and above the official award, will be higher for the second owner.

5.1 $\lambda = 0$

For illustration, let $E(r^c \mid r, x, y) = \phi(r)E(r \mid x, y)$, where $\phi'(r) > 0$.

Now, from (8)-(9) it is easy to see that when $\lambda = 0$,

$$\begin{aligned} x^* &= M\phi(r)\frac{\partial E(r \mid \underline{y}, x^*)}{\partial x} \\ y^* &= \underline{y}. \end{aligned}$$

Therefore,

$$\begin{aligned} \frac{dx^*}{dr} &= \frac{M\phi'(r)E_x}{1 - M\phi(r)E_{xx}} \\ \frac{dy^*}{dr} &= 0. \end{aligned}$$

That is, the following will hold:

Lemma 2 (i) $\frac{dy^*(M,0,x^*)}{dr} = 0$, (ii) $\frac{dx^*(M,y^*)}{dr} > 0$ *and* (iii) $\frac{dE(r|x^*,y^*)}{dr} > 0$.

Note that

$$\begin{aligned} \frac{dE(r^c \mid r, x^*(r), y^*(r))}{dr} &= \frac{\partial E(r^c \mid r, x^*, y^*)}{\partial r} + \frac{\partial E(r^c \mid r, x^*, y^*)}{\partial x^*}\frac{dx^*(r)}{dr} \\ &> \frac{\partial E(r^c \mid r, x^*, y^*)}{\partial r}. \end{aligned}$$

Moreover, now the optimum value function becomes

$$V^* = M\phi(r)E(r \mid y^*(r, 0, x^*), x^*(r, y^*)) - \frac{x^{*2}(r, y^*)}{2} - x_0. \tag{19}$$

So, $\frac{dV^*}{dr} = \phi'(r)E(r \mid y^*(r, 0, x^*), x^*(r, y^*)) > 0$. That is,

Proposition 4 $\frac{dV^*}{dr} > 0$.

Note that when $\phi(r) = \delta r$, for $E(r^c \mid r, x, y) = \delta r E(r \mid x, y)$, we have:

$$\frac{d\frac{E(r^c|r,x^*(r),y^*(r))}{r}}{dr} = \frac{\partial E(x^*(r), y^*(r))}{\partial r} = \frac{\partial E(r^c \mid r, x^*, y^*)}{\partial x^*}\frac{dx^*(r)}{dr}.$$

Therefore $\frac{d\frac{E(r^c|r,x^*(r),y^*(r))}{r}}{dr} > 0$.

For given M, suppose $r^a(r)$ satisfies

$$r^a(r) \times M = ME(r^c \mid r, y^*(r, 0, x^*), x^*(r, y^*)) - \frac{x^{*2}(r, y^*)}{2} - x_0. \tag{20}$$

That is, the owner is indifferent between accepting the offer of r^a, on one hand, and going for litigation, on the other hand. Note that here r^a depends on r, i.e., $r^a = r^a(r)$.

5.2 $\lambda > 0$

In the interest of simplicity, consider a special case of $E(r^c \mid r, x, y) = \phi(r)(ax^{\frac{1}{k}} - by^{\frac{1}{j}})$, such that

- $\phi(r) = \delta r$, $\delta > 0$
- $a = b$ and $j = k$

That is,

$$E(r^c \mid r, x, y) = \phi(r)(ax^{\frac{1}{k}} - by^{\frac{1}{j}}) = \delta r(ax^{\frac{1}{k}} - ay^{\frac{1}{k}}).$$

In view of the previous sub-section, given y and r, the owner O will solve:

$$\max_x \left\{ M[\delta r(ax^{\frac{1}{k}} - ay^{\frac{1}{k}})] - \psi(x) - x_0 \right\}, i.e., \tag{21}$$

For given x, the government G solves:

$$\min_y \left\{ \lambda \left[M[\delta r(ax^{\frac{1}{k}} - ay^{\frac{1}{k}})] + y_0 \right] + \psi(y) \right\}, i.e., \tag{22}$$

So, x^* and y^* solve the following FOCs:

$$M(\frac{a\delta r}{k})x^{\frac{1-k}{k}} = x$$

$$-M\lambda(\frac{-a\delta r}{k})y^{\frac{1-k}{k}} = y$$

We get

$$x^* = \left(\frac{aM\delta r}{k}\right)^{\frac{k}{2k-1}} \tag{23}$$

$$y^* = \left(\frac{a\lambda\delta r M}{k}\right)^{\frac{k}{2k-1}} \tag{24}$$

Note that:

$$\frac{ME(r^c \mid r, x, y)}{Mr} = \delta(ax^{\frac{1}{k}} - ay^{\frac{1}{k}}). \tag{25}$$

Therefore, from (25), (23) and (24), the equilibrium ratio is

$$\frac{E^*(r^c \mid r, x, y)}{r} = \frac{E(r^c \mid r, x^*, y^*)}{r} = \delta a(x^{*\frac{1}{k}} - y^{*\frac{1}{k}}). \tag{26}$$

Proposition 5

$$\lambda < 1 \Rightarrow \frac{d}{dr}\left(\frac{E^*(r^c \mid r, x, y)}{r}\right) > 0.$$

Show that:

Proposition 6

$$\lambda < 1 \Rightarrow \frac{d}{dM}\left(\frac{E^*(r^c \mid r, x, y)}{r}\right) > 0.$$

6 Bargaining Over Compensation

Recall, the owner will accept the offer only if

$$r^o \geq r^a,$$

where r^a solves (20) and is function of M. From (20) it can be seen that

$$\begin{aligned} M\frac{dr^a(M)}{dM} &= \frac{dV^*}{dM} - r^a(M) \\ &= E(r^c \mid r, y^*(M,0,x^*), x^*(M,y^*)) - r^a(M). \end{aligned} \tag{27}$$

But $E(r^c \mid r, y^*(M,0,x^*), x^*(M,y^*)) - r^a(M) > 0$. Therefore,

$$\frac{dr^a(M)}{dM} > 0. \tag{28}$$

To the implications of (28), consider a scenario involving two identical but different size properties with market rate r and sizes M_1 and M_2, respectively. WLOG assume $M_1 < M_2$. So, $V_1 < V_2$, i.e., the second property has higher market value. Let $r_1^a = r^a(M_1)$ and $r_2^a = r^a(M_2)$. From (28) it follows that $r_1^a < r_2^a$. So, (28) implies that: (i) If owner of 2nd property accepts the award, the 1st owner will surely accept it; (ii) however, the opposite is not true. Specifically if $r_1^a \leq r^o < r_2^a$, the owner of the lower-value (1st) property will accept the award but the owner of the higher-value (2nd) property will reject the offer and resort to litigation to get higher rate.

7 The Indian Context

The higher judiciary in India has made it clear that the owners are entitled to compensation determined on the basis of the higher of among the circle-rate and registered sale-deeds of similar land. The circle-rates, popularly known as registry rates, are perpetually outdated and well below the market value. Due to several reasons, sale-deeds are also under-valued. Between two, however, rates mentioned in the sale-deeds are generally greater than those of the circle-rates. Nonetheless, the land acquisition collectors (LACs) - the officer responsible for awarding the compensation - have been awarding compensation on the basis of circle-rates. While the LACs use the circle-rates, courts tend to use relatively high-value sale-deeds as the basis. Consequently, court awarded compensation is consistently higher, inducing the affected parties to go for litigation. In some cases, the difference between the LAC award, on one hand, and the judiciary awarded compensation is startling. [15]

[15] An empirical study undertaken by the author corroborates these claims. For example, in 96 percent of the judgments delivered by the Punjab and Haryana High Court during 2009-10, the court awarded compensation is higher than the LAC award. Moreover, the average judicial awards are 342 percent higher than the LAC awards! See Singh 2011.

The problem is exacerbated by a seemingly benevolent provision of the Indian land acquisition laws. The Section 25 of the existing Land Acquisition (Amendment) Act 1984 mandates that the court awarded compensation cannot be less than the LAC awarded compensation. This condition makes the choice of litigation by the affected parties as a costly but risk-free venture, in that the compensation cannot be reduced. Formally, let

r_{LAC} denote the compensation rate offered by the LAC.

Now, is the expected value of the compensation rate, per-square meter, awarded by the court can be written as

$$E(r \mid x, y) = \int_{r_{LAC}}^{\bar{r}^c} r f(r^c \mid r, x, y) dr.$$

It is immediate to see that $E(r^c \mid r, x, y) > r_{LAC}$. Therefore, litigation is always profitable for the owners, as long as the cost of legal efforts is relatively small. In fact, it can be easily be seen that all of the above claims hold even more strongly in the Indian context.