

**Forced to Policy Extremes:
Political Economy, Property Rights, and “Not in My Backyard (NIMBY)”**

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Abstract

This paper analyzes how a community may preclude a firm from locating there even if it is efficient for the firm to do so, i.e., the community engages in NIMBY. The basic logic is as follows. Consider a locality that has nuisance laws that are applied to potential polluter so if the pollution causes harm, the polluter is enjoined or fined to compensate those harmed. A firm (and potential polluter) wishes to locate in this area. Suppose that locating there and abiding by the nuisance laws (abating or compensating) is the efficient outcome. Also suppose that after location in the area, the firm is able to alter the local political economy equilibrium in its favor, i.e., it weakens the property rights of residents and enables more of its pollution. From the residents' point of view, this is a worse outcome and it is better to preclude the firm from locating there. Essentially, this is a sequential game where the first stage determines whether the firm locates in the community and the second stage determines how much it will pollute. The efficient outcome is for the firm to locate there and abate. But if the community believes it will lose at the second stage, it will seek to preclude the firm at the first stage. If the community wins, there is no pollution. If it loses, there is a lot of pollution. Thus, policy extremes will be the outcome rather than the firm operating with incentives to abate.

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I. Introduction

The phenomenon of NIMBY (“not in my backyard”) is widely observed. Broadly speaking, NIMBY is defined as a neighborhood or community preventing the location of a particular facility nearby. Examples include residential neighborhoods blocking the location of multi-family residences, halfway houses, cell phone towers, roadways, windmills, and commercial or industrial activity. While this may be a sensible reaction by one group to prevent external costs from being imposed on them, this paper seeks to understand conditions under which NIMBY is likely to be more common and where it may prevent value enhancing activity.

In the examples given above, location of newcomers to a community may generate uncompensated costs for the incumbent members of the community. NIMBY is a way to prevent this. Indeed, this and other measures – such as zoning – may be a sensible outcome in dealing with externality creating activities. However, an alternative way may be available. This is through strong property rights that require compensation for or prevention of harms. Here, new entrants to a community may locate where they wish, but external costs are internalized by requiring the entrant to compensate for losses suffered or by abating the potential harms.

One example of this is nuisance law. Yandle (1997) discusses this in the context of localized water and air pollution. He describes numerous legal cases where firms generating pollution were sued under nuisance laws. In many of these examples, the courts took a strong individual rights approach and required the entity causing the pollution to cease and/or pay damages. One supposes that similar legal approaches can be and are followed regarding other nuisance/externality creating activities, such as noise, roadway location, and the like. If this approach works, residents are assured that their loss is recoverable. Furthermore, penalties are in place that provide incentives to those creating externalities to limit the harm they generate.

Thus, a strong presumption of strictly enforced property rights can weaken the appeal of NIMBY. Under this regime, if a firm locates in a community and begins generating pollution, residents are confident that they will be compensated for any loss. The desirability of practicing NIMBY lessens.

However, this is unlikely the case in other political regimes. When allowable pollution is determined by political support/opposition among community members, special interest groups often hold disproportionate sway and policy moves in their favor. Once a part of the community, pollution-generating firms are one such interest group and they may be effective in influencing local government to allowing more pollution than is optimal and impose costs on the rest of the community. Thus, once an externality-generating entity is allowed into the community, it can influence policy in its favor. One way for the community to prevent this is to stop the firms from locating in the area in the first place. In other words, practice NIMBY.

There is a serious disadvantage that emanates from this scenario: efficient levels of pollution do not occur. There are situations where the benefits to the firm from generating certain levels of pollution exceed the costs, including the costs imposed on local residents. In the property rights scenario, this pollution can occur with residents being made whole via compensation. In the politically determined regime, this does not occur. If the residents are unsuccessful in preventing the firm from locating in the community, the firm gains special favors and excessive pollution results. If the residents do prevent location by firms in the community, no pollution occurs; even pollution would raise value. Thus, there is either too little or too much pollution. Politically determined “rights” generates NIMBY and forces us to policy extremes.

This is generally related to the principle of tying decision rights to incentives as discussed by Jensen and Meckling (1992). In the property rights regime, firms have the decision rights to

determine how much pollution they do. However, with required compensation for harms, they have incentives not to over pollute. In the political regime, the link between decision rights and incentives is broken. Firms are given the right to engage in more pollution, but are not required to pay for its harms. Over pollution results. Anticipating this, residents remedy the situation by practicing NIMBY. Implicitly understanding that firms will not have appropriate incentives to control pollution, NIMBY removes their decision right to determine how much to pollute by not allowing them in the community.

The property rights regime is not a cure all, however. There are transactions costs of implementing property rights, such as the costs of initiating a law suit to enjoin pollution or to gain compensation, as well as costs of metering firms regarding the level of emissions generated, collecting the fees, and dispersing to affected citizens. If these costs are too high, this regime is not workable. If a system of fines and compensation is established, but the cost of doing so is prohibitive, residents can sensibly practice NIMBY. Anticipating an additional tax burden in excess of any benefit of allowing firms in the community, firm location there is prevented. Thus, there are cases where NIMBY is efficient.

The paper is organized as follows. We consider a stylized case where a firm, or group of firms, wishes to locate in a city. The existing residents may allow it or prevent it. If the firm locates there, its pollution/emissions are subject to penalties. There is a penalty level that compensates residents for their losses, but lower penalties enhance firm profit. The penalty is determined in either of two regimes: the strong property rights regime or the political regime. There are different outcomes in each case.

This is modeled as a two-stage sequential game. In stage one, residents decide whether firms may locate in the city. In stage two, the penalty for pollution is determined, as is the level

of pollution, and the resulting utility of residents and profit of firms. To solve the game, we examine stage two first, then consider the choice in stage one.

Section II of the paper presents the basic set up of the stage-two model. Section III examines the property rights regime where harms are fully compensated. Transactions cost are also discussed in this section. Section IV presents the regime where the pollution penalty is determined in a political setting. Once the firm becomes part of the community, it forms an interest group and can change the policy outcome in its favor. A model of political support is presented where this can occur. If the firm is successful, it gains profit and residents are worse off than with no firms in the community. Section V discusses stage one of the sequential model. Anticipating the stage two outcomes, residents in stage one determine whether firms may locate in the city. As described below, resident are likely to practice NIMBY in the political regime and where transactions costs of the property rights regime is prohibitive. Lastly, section VI concludes.

II. The Basic Framework

Consider the above ideas in the context of a specific example. Suppose that a firm, or group of firms, is considering whether to locate in a particular city. Each firm generates an amount of externality-creating activity such as emissions/pollution. At the first stage of the game noted above, the citizens of the community decide whether to allow firms to locate in the city. In the second stage, assuming firms may enter, the level of penalties for firms is determined. Where property rights are well entrenched, this requires compensation for harms. Alternatively, the penalty, as emissions, is determined by a political process. Once the firms are allowed into the community, they gain political rights and can use this influence to sway policy in their favor

The firm, or group of firms, that wishes to locate in the city generates an amount, s , of emissions/pollution per firm. There also is a fee the firm pays for each unit of s generated. Let this be given by θ . Each firm's profit is given by:

$$(1) \quad \Pi = X + \alpha s - \frac{1}{2}\beta s^2 - \theta s,$$

where X is firm profit from outside the model and $\alpha s - \frac{1}{2}\beta s^2$ reflects productivity gains and/or cost saving from s . The profit maximizing level of s is derived from the first-order condition:

$$(2) \quad d\Pi/ds = \alpha - \beta s - \theta = 0,$$

yielding $s = (\alpha - \theta)/\beta$. This generates a profit of $\Pi = X + \frac{1}{2}(\alpha - \theta)^2/\beta$. As is readily seen, both emissions and profit fall (rise) as θ rises (falls).

Assume that there are N_2 firms so the total amount of emissions generated is $S = s \cdot N_2$. Let there be N_1 residents of the city. Pollution is a public bad, so each is subjected to $S = s \cdot N_2$ units of the emission. However, each receives a share of the total fees collected from firms. Total fees are $\theta s \cdot N_2$, so each resident receives $\theta s \cdot N_2 / N_1$ in compensation. The utility of each resident is thus:

$$(3) \quad U = Y - \gamma s \cdot N_2 + \theta s \cdot N_2 / N_1 = Y - (\gamma - \theta / N_1) s \cdot N_2$$

where Y is the utility from other sources and γ is the per unit harm suffered from each unit of emissions. As one can see, lower values of the emissions fee reduce resident utility and higher values tend to increase it.

III. The Strong Property Rights Regime

Consider the case where the city is in a legal environment with strong individual property rights. For example, nuisance law may be such that residents may sue firms for generating pollution and there is the presumption that harms to individuals may be enjoined and/or a requirement that there is compensation for harm. In the context at hand, this implies that each

firm pays each resident the amount γ – the harm created – per unit of externality generated. This implies that $\theta = \gamma N_1$.

If this is the case, the residents are fully compensated for harm and utility is $U = Y$. The firm's profit function becomes:

$$(4) \quad \Pi = X + \alpha s - \frac{1}{2}\beta s^2 - \gamma N_1 s$$

The firm selects $s = (\alpha - \gamma N_1)/\beta$ and gains a profit of $\Pi = X + \frac{1}{2}(\alpha - \gamma N_1)^2/\beta$.

As we will discuss below, with the presumption of strong property rights, residents are not resistant to allowing firms to locate in the city. They are assured of being compensated to remain whole.

Naturally, transaction costs can alter this outcome. There may be transactions costs of initiating a law suit to enjoin pollution or to gain compensation. Also, there can be cost of metering firms regarding the level of emissions generated, collecting the fees, and their dispersal to affected citizens. Assume that the amount of transactions costs is T . If residents bear an equal share of this cost, either from paying the cost of lawsuits or taxes to support the metering and collecting fines, their resulting utility is $U = Y - T/N_1$. Residents do not gain in this setting.

Alternative, suppose that firms are charged the transactions costs of operating this regime. With each firm paying an equal share, profits are $\Pi = X + \frac{1}{2}(\alpha - \gamma N_1)^2/\beta - T/N_2$. Firms will only seek to enter if the transactions costs are not higher than the profit gain from operating in the location. Otherwise, they do not attempt to enter.

IV. The Politically Determined Outcome

An alternative scenario is that the notion of strong property rights in the environment is not firmly entrenched, but outcomes are subject to political manipulation. We consider how this may take place in the context of setting the penalty the firm pays for emissions. The political

process is modeled as one where the local government maximizes political support. Once the firm is allowed into the community, it (or its representatives) gains political rights equivalent to the residents of the community. This can change the political outcome ex post, i.e., once firms are allowed into the community, relative to the ex ante situation where firms are outsiders.

The approach of Becker (1993) is followed where it is argued that political support and opposition to public policies ultimately flow from individuals' willingness to pay to support or oppose policies. How this translates into support or opposition is not a simple process. Support can take many forms, including voting, campaign donations, helping convince the public of the importance of particular government policies, and promoting the "jobs generated" by the policies. Political opposition takes similar forms, just on the other side of the particular issue. Elections are won and policies enacted based on the net political support they garner. While both community residents and community outsiders may engage in some of these activities, the model presumes that it is community residents who ultimately have the advantage in this regard due to voting.

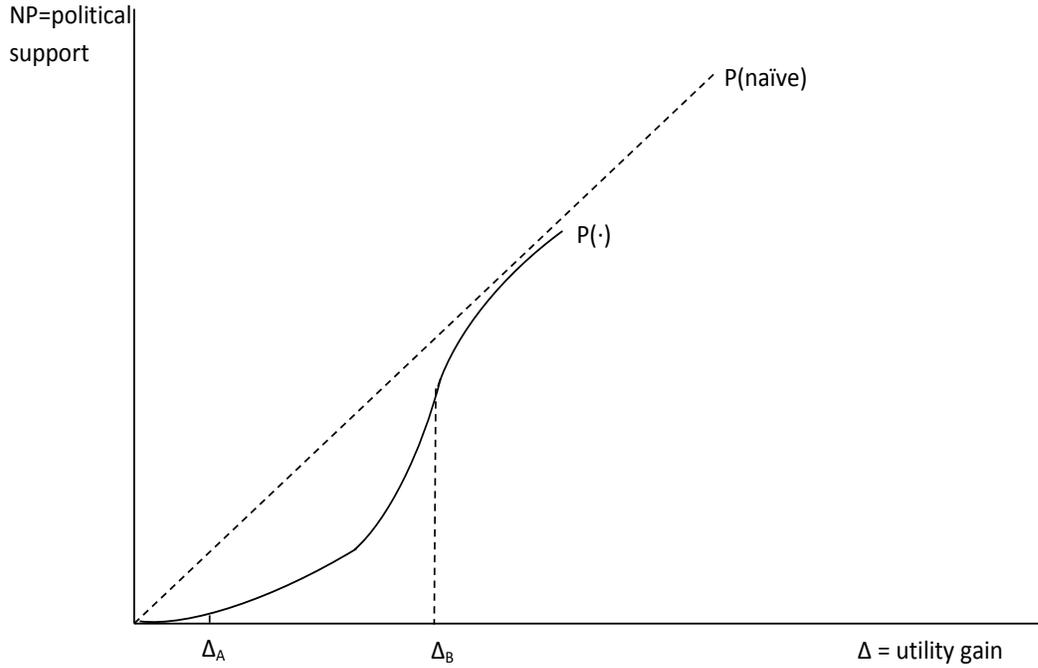
What fundamentally drives the willingness of people to undertake these political support/opposition activities is the gain or loss they attain under the particular policy. A naïve approach is to assume that net political support is simply equal to the net change in the sum of individuals' willingness to pay. However, public choice scholars have long recognized that political support/opposition is not in exact correspondence to utility gain or loss from public policy. Downs (1957) first discussed the concept of rational ignorance and how this can affect political outcomes. Essentially, for potentially small gains or losses, individuals have little incentive to become informed about their causes and do not do so. Thus, for policies that have only a small effect on each individual, these individuals will be rationally uninformed and offer

little, if any, political support or opposition. In a related vein, Olson (1965) notes that when benefits per individual of a policy is small, each person has little incentive to organize group support/opposition to a policy.

These considerations imply that the political support function has properties illustrated by the graph in Figure 1. The function labeled $P(\text{naïve})$ is the political support function based on the naïve approach. It is simply a 45° line indicating that Δ , or utility gain, is translated one-for-one to political support. The function labeled $P(\cdot)$ represents the political support function suggested by the public choice literature. The vertical distance between the $P(\text{naïve})$ function and the $P(\cdot)$ function shows how much political support falls short of willingness to pay for each value of Δ . So, for example, for very small gains to each individual – say gains less than Δ_A in the figure – political support is virtually nil. However, as the gain per person rises, political support begins to rise and – for very large gains – it eventually approaches full willingness to pay.

In order for the political support function $P(\cdot)$ to be as just described, it must have a segment where support increases at an increasing rate. This is the segment between Δ_A and Δ_B . For values of Δ much larger than Δ_B , the function approaches $P(\text{naïve})$ but never crosses it since, if it did so, would imply more support than willingness to pay. Thus, for $\Delta > \Delta_B$, the $P(\cdot)$ increases with Δ at a decreasing rate. In summary, the $P(\cdot)$ function has a positive first derivative, that is, $P'(\cdot) > 0$. Initially, its second derivative is positive; $P''(\cdot) > 0$. For large values of Δ , the second derivative turns negative; $P''(\cdot) < 0$. Note that political opposition works in the same fashion. For losers of a particular policy, Δ represents the willingness to pay to avoid the policy. Political support from policy losers is negative and equal to $-P(\Delta)$.

Figure 1



Now apply this logic to the case at hand. The local government chooses the level of penalty on firms, θ , to maximize net political support, NP, which is given by:

$$(4) \quad NP = N_1 P(U(\theta)) + N_2 P(\Pi(\theta))$$

The first-order condition for the political support maximizing θ is:

$$(5) \quad \frac{dNP}{d\theta} = N_1 P'(U) \frac{dU}{d\theta} + N_2 P'(\Pi) \cdot \frac{d\Pi}{d\theta} = 0$$

Now, note that it can be shown that $dU/d\Pi = [-d\Pi/d\theta + (\gamma N_1 - \theta)]N_2/N_1$. The first term in this expression indicates that any gain to profit from lowering θ is offset by a loss in utility. The total amount is on a per capita basis, so is weighted by N_2/N_1 . The second term is the additional change in utility that generates welfare gains or losses from the setting of θ . Thus, for example, if θ is below the amount to compensate residents, $(\gamma N_1 - \theta) > 0$ and continuing to lower θ reduces utility.

Substituting this term into equation (5) gives:

$$(6) \quad \frac{dNP}{d\theta} = N_2 \left[P'(U) \frac{(\gamma N_1 - \theta)}{\beta} + (P'(\Pi) - P'(U)) \cdot \frac{d\Pi}{d\theta} \right] = 0$$

Note that without rational ignorance, $P' = 1$ and we obtain $\theta = \gamma N_1$, that is, the full compensatory penalty. However, in the case at hand, $P' \neq 1$ and the political support function is as depicted in figure 1.

If the number of firms is small relative to the number of residents, the profit per firm from emissions is relatively large and loss per resident is small. That is, the benefits of allowing emissions via a low θ are concentrated and the loss dispersed. Thus, net gain to firms of lowering θ is represented by Δ_B in figure 1 and the loss to residents by Δ_A . This implies that $P'(\Pi) > P'(U)$ and the second part of expression (6) is negative, representing a political loss from raising θ . The political support maximizing value of θ falls short of full compensation for resident loss. How far short depends on the degree of benefit concentration.

The upshot is that, with ex post political determination of the emissions fee, residents are likely to be less than fully compensated for the losses they suffer.

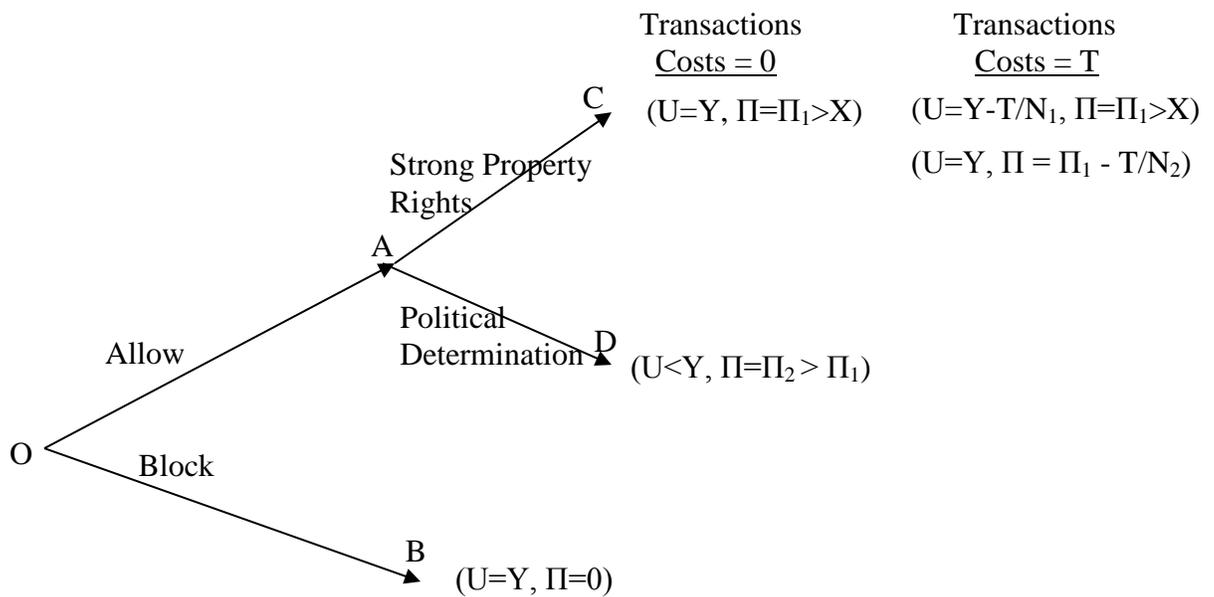
V. The Sequential Game

Given the above ex post scenarios, city residents then make a decision whether to allow firms into the community. At this stage, only residents can vote, so the influence of firms is diminished. The framework here assumes that the latter's influence is zero in the first stage. This sets up a decision tree for residents as shown in figure 2. At node O, residents decide whether to allow firms to locate in the city. It is assumed that residents look ahead to the ultimate outcome of their choice in stage one. Since residents are assumed to be homogeneous,

their collective preference in this regard is identical, so examining a representative resident is appropriate.¹

At stage one, if location is blocked, the game is over and payoffs are given at node B. The residents maintain their utility at Y and firms earn no profits from this location. If the residents allow the location of firms in the city, we move to node A. Consider first the case where transactions costs are zero. If strong property rights are in place and well enforced, then this institutional framework runs its course. Firms decide how much to pollute and compensation is paid. Residents maintain utility at Y and firms attain profits $\Pi_1 > X$. This outcome is shown at point C.

Figure 2



However, if a strong property rights regime is not in place, then the penalty for emissions is set by a political process where firms are members of the community. With the benefits of allowing more emissions being concentrated and the costs dispersed, a less-than-compensatory

¹ Residents may display rational ignorance at this stage as well. Thus, their preference may be weakly expressed, but will be unanimous.

penalty for emission is likely to occur. The outcome is at point D, where residents have utility less than Y, but firms profit more than at point C.

In this regime, rational anticipation of the outcome at D leads residents to block entry of firms into the community at the initiation of the game at node O. They practice NIMBY. The outcome at B is attained. This is despite the fact that the outcome at C is Pareto superior; residents are just as well off at a B but firms are better off. But with political determination of emissions ex post, outcome C is not attainable. Residents are left with the choice between B and D. For residents, B is clearly preferred. NIMBY is a predictable outcome of having politically determined “rights” instead of entrenched ones, but one that prevents value enhancing economic activity.

The case where NIMBY can enhance value is the scenario where the transactions costs of implementing the property rights regime are prohibitively high. This is illustrated in the final column of figure 2. When residents anticipate bearing the cost, T, of implementing the property rights regime, they correctly anticipate that it will not be worth it. NIMBY is rational from their viewpoint and can also be efficient. In this example, it makes sense to put the burden of implementing the property rights regime on firms. Residents are always made whole, but if the transactions costs of doing so are higher than any profit gain, firms simply will not seek entry into the city. NIMBY is not required.

VI. Conclusion

This paper shows that NIMBY is likely to be more common in a setting where there are weak property rights to deal with externality-creating activities. In such a setting, entry of those creating the external enables them to politically alter policy in their favor and at the expense of residents. Rationally anticipating this, residents block entry into the location in the first place.

This holds even if there are net benefits of allowing some externality – with compensation – into the community.

Under an entrenched property rights regime, residents can be reasonably assured that they will not suffer harm from the entry of a new entity to the community. Thus, there is less need to engage in NIMBY. The exception to this is if the transactions costs of implementing the property rights regime are too high, residents may preclude entry with no loss in efficiency.

Political determination of the externality generally unbundles decision rights from incentives. In other words, firms can decide how much to pollute without bearing the full costs of the pollution. Thus, in this regime, if firms are allowed into the community, there is a lot of pollution. If residents block entry, there is zero pollution. But regardless of what residents choose, the choice is between extremes. It is likely, however, that the efficient outcome is somewhere between. NIMBY is a rational response to the political regime, but it nevertheless will result in inefficient outcomes. To attain the efficient outcome, the second stage process of how pollution is determined must be changed, i.e., the property rights regime must be in place.

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