Resistance, Redistribution and Investor-friendliness*

Sourav Bhattacharya† Tapas Kundu‡

October 2011

Abstract

Poor communities sometimes resist private investment and destroy economic surplus even if the government has the willingness and ability to redistribute. We interpret such acts of resistance as demands for redistribution: destruction contains credible information about how affected groups value surplus, which helps the government in implementing the optimal redistribution policy. Destruction is increasing in the extent of political marginalization of the affected group. While resistance has informational value, it has two distinct costs: it directly reduces surplus and also reduces the investor's incentives to create surplus. The government uses a tax/subsidy on the investor to maximize weighted social surplus, and we show that the possibility of destruction may force the government to be too soft in its negotiations with the investor. We discuss conditions under which the government should ban resistance or should allow resistance but compensate the investor for its losses incurred in order to enhance social welfare.

Keywords: Resistance, Redistribution, Investor-friendliness, Signaling

*We thank participants at seminars at University of Pittsburgh, Frisch Center at University of Oslo, Indian Statistical Institute Kolkata, North American Summer Meeting of the Econometric Society at Boston 2009, 2010 UECE Meeting on Game Theory and Applications, Lisbon and Public Economic Theory Conference 2011 at Indiana University Bloomington, for valuable comments. This paper was previously circulated under the title "Resistance to Outside Investment: A Rational Model of Surplus Destruction". Any errors that remain in the paper are our sole responsibility.

†Department of Economics, University of Pittsburgh. Email:sourav@pitt.edu

‡Centre for the Study of Civil War, International Peace Research Institute, Oslo (PRIO), Email: tapas.kundu@prio.no. While carrying out (part of) this research, Tapas Kundu was associated with the centre of Equality, Social Organization, and Performance (ESOP) at the Department of Economics at the University of Oslo. ESOP is supported by the Research Council of Norway.

1 Introduction

Over the last couple of decades, local, provincial and national governments the world over have been increasingly relying on outside private investors to provide the impetus for growth in jobs and output (Sheshinski and Lopez-Calva 2003, Bortolotti and Siniscalco 2004, Shirley and Walsh 2004, Cavaliere and Scabrosetti 2008 and Estrin et al. 2009). Privatization has widely been promoted in developed and developing countries alike (Galal et al. 1994, World Bank 1995, Megginson et al. 1994).[1] Consequently, governments are actively pursuing private capital by providing incentives and otherwise creating conditions favorable for investment. Industry groups monitor the *investor friendliness* of governments, and governments often compete with each other in wooing private capital (Oman 2000, Stern 2001). Concomitantly, there is a rising trend, especially in the developing economies, of local communities resisting private capital (Molano 1997 in the context of privatization in telecommunication industries in Latin America; Bardhan 2006a, Uba 2005 in the context of economic liberalization program in India; Beinen and Waterbury 1989, Rodrik 1999, Stiglitz 2002). Some of this resistance has taken the form of actual destruction of productive assets, disruption of production, or in some other way creating conditions that lower the productive capacity of the investor.[2] As globalization spreads deeper into the developing world, one can expect such occurrences only to grow in frequency and intensity.

What is puzzling about these protests is that local communities seem to be resisting precisely what is necessary to lift them out of the poverty trap. The simplistic explanation that globalization always leaves local communities impoverished is inconsistent with the idea that the government can redistribute surplus from productive investment (Bardhan 2006b). Theoretically, as long as there is a positive surplus created from investment, the government can ensure that it is distributed in such a way that makes everyone better off: thus, destructive activities that ultimately reduce the available surplus seem counterproductive.

This paper studies resistance as a rational response by purported beneficiaries of the investment when the government is willing and able to redistribute the surplus from investment, and is in no way interested in the benefit of the external investor. The object of the paper is two-fold. First, we look at the net welfare consequences of such resistance from the point of view of a benevolent government. Second, we examine how resistance affects the government's contract with the private investor, and build what is to our knowledge the first formal theory of investor-friendliness.

The analysis rests on the following three premises.

1. There is incomplete and asymmetric information about benefits from investment. Outside investment benefits different social groups (skilled and unskilled labor, industry and agriculture) differently. However, when the government offers conditions to the investor there is considerable uncertainty about the actual level of benefits (number of jobs, multiplier effect, etc.) to a certain group, referred to as the *affected group* hereafter. In addition, the level of benefits, which can be *high* or *low*, is privately realized by the affected group at an interim stage, but the government cannot directly elicit this information through the democratic process.

2. The affected group can signal its private information for preferential treatment. The signaling activities

[1] The term privatisation has been used to cover an array of different policies. It involves not only the sale of state-owned enterprises (SOEs) or assets to private economic agents by the government, but also a more general process of attracting private funds in financial and various economic sectors including infrastructure, water, health and education. Megginson and Netter (2001) provides a comprehensive survey of the literature.

[2] Uba (2005, 2008) documents the anti-privatization protest in the context of India. Between the years 1991 and 2003, there had been more than 178 protest actions against the government's privatization policy. About 24% of these protests were strikes or demonstrations involving an average of two million participants. More recently, the issue of land acquisition policy by the state governments for industrialization faced intense protests and agitation in West Bengal, resulting in violence and loss of lives (Ray 2010).

can take various forms, including demonstrations, protest, strikes or other violent means to disrupt production. Importantly, such signaling creates negative externality for the investor and other groups.

3. The government may value the welfare of different social groups asymmetrically, but it does not care directly about the profits of the external investor. The government can redistribute benefits between the affected group and the non-affected group to maximize a composite welfare function incorporating both groups' benefits.

The first premise captures two specific features of the privatization process in the developing economies. First, the realization of benefits to different social groups is not instantaneous. In many countries, privatization has been part of a larger economic reform process. For societies undergoing economic reform, it may be hard for the government as well as for the social groups to foresee the actual benefit that these investments would generate in the long run. Second, we assume existence of an information gap between policy makers and social groups at the interim stage. The information gap often plays a fundamental role in the political economy of redistribution in developing countries (Ray 2007, Ch. 14). In a centralized system, bureaucrats often lack information on local needs. Decentralization does not necessarily reduce the informational gap between policy maker and the social communities if local agents do not function appropriately (Bardhan 1996, Bardhan and Mookherjee 2006).

The second premise is motivated by the fact that the nature of anti-investment mobilization movements in developing countries often has externalities to the whole society.[3] Uba (2005, 2008) documents events that disrupt productive activities in a larger scale, including road blocks, rallies, nation-wide strikes. Finally, the third premise is used as a device to understand how resistance can occur without any rent-seeking motivation on the part of the government. We do not intend this as an assertion about reality that there is never any covert nexus between the government and the external investor. On the contrary, our intention in making this assumption is to demonstrate that we may have resistance to investment even in absence of such a nexus. Violent protests may arise due to informational constraints in the society even with the most benevolent of governments.

In our model, there are four players: the government, an external investor and two social groups (of which one has a limited role). The government first offers a tax/subsidy to the investor, based on which the investor decides on the scale of the project. The valuation of the affected group is realized *after* the size of the project is decided, and the group signals its valuation through destructive action. The government implements a redistribution scheme between the two groups by using information contained in the signal. Therefore such destruction can be interpreted in equilibrium as a demand for redistribution of surplus.

The model yields the following insights. First, if a government is responsive to information but suffers from an informational constraint, resistance can be used as a signal to transmit valuable information to the policy maker. In this sense, we share features in common with a literature that conceives costly actions such as protest or delay or other forms of group mobilization to disrupt productive activities as a device to transmit private information (see, for example, Hart 1989 and Cramton and Tracy 1992 on strikes, Lohmann 1994 on political protest, Harstad 2007 on delay).

Second, the extent of resistance is critical in determining the credibility of resistance to transmit private information. In particular, it must solve an adverse selection problem - if the government offers a favorable redistribution scheme to the affected group after observing a low level of resistance, the affected group will

[3] There can be various reasons behind it. Actions that create externality to the whole society are likely to generate high visibility. Additionally, if the policy maker lacks information about the benefit of the affected group, she may also be informationally constrained about the private cost that the group incurs to signal. On the other hand, if the policy maker is better informed about the investor's situation or some other group's situation, socially costly actions may have broader scope of transmitting private information.

have an incentive to show resistance even when its actual benefits from investment is high. We find that the extent of resistance in equilibrium is less if the government is favorably biased toward the affected group. This is because the affected group expects a high post-redistribution surplus from investment when the government is favorably biased, reducing the marginal incentive to destroy surplus.[4] The affected group thus internalizes the social cost of resistance more when government is more favorably biased. The other way to look at the same result is that the more marginalized a group is in the political system, the more violently it will resist private investment. This result is broadly consistent with the general observation that in India, the more militant of anti-privatization movements occur in the districts which have a higher proportion of indigenous tribes.

In addition, the fact that the government values the relationship with the investor only in terms of possible gains to the groups internal to the society helps us endogenize the extent of investor friendliness of the government. Our model helps us to identify conditions under which the government subsidizes the investor at the cost of the society or taxes the investor and distributes the proceeds in the society. Under full information, the government subsidizes the investor when the investment has a larger marginal return to the society than to the investor, and taxes the investor otherwise. However, the threat of surplus destruction mutes the investor's incentives and government in certain situations is forced to offer more favorable terms to the investor at the cost of society. While it is often argued that resistance to private investment is a response to the government selling out, we argue that there is a reverse causality too: the possibility of resistance may weaken the government in its negotiations with the investor and force it to make concessions that would be unnecessary in absence of information constraints. However, it is also possible that the government can act too aggressively compared to the full information benchmark. The direction of distortion of the equilibrium tax/subsidy over the full information benchmark depends on a simple comparison of the benefits in the bad state, i.e. the state in which resistance occurs. The government is too soft (aggressive) if and only if the society's total benefits in the bad state is lower (higher) than that of the investor.

In order to assess the economic value of resistance, we consider two modified versions of the basic model. The first extension looks at the redistribution problem in absence of the signaling possibility. In our framework, the government faces a trade off: while resistance provides information that helps in setting a better redistributive scheme within the society, there are two costs: (a) the direct cost of reduced surplus which hurts all groups, and (b) muted incentives for the external investor. To examine the net benefit of resistance, we compare results of our basic model with a regime where there is no signaling and the government commits to a suboptimal redistribution scheme in advance. We find that the government prefers the no-signaling regime when the probability of the *bad state* (a state in which the affected group's benefit is low) is high or the government's bias in favor of the affected group is sufficiently high. The intuition behind the first effect is straight forward: as resistance would occur only in the bad state, a high probability of the bad state occurring would reduce the attractiveness of the costly signaling channel. The second affect is surprising, especially in connection with the fact that the volume of resistance is low when government is favorably biased towards the affected group. What resolves this apparent puzzle is that the government finds the redistribution problem less acute when it is favorably biased to the affected group. In this situation, the optimal redistribution involves redistributing most of the surplus from the non-affected group to the affected group irrespective of what the affected group directly gets from investment. As there is less uncertainty

[4] Uba (2008) suggests that labor unions' affiliation with the ruling parity both at the central level as well as at the state level play a key role in the anti-privatization movements in different Indian states between 1991 and 2003. A specific example is the case of West Bengal, which is ruled by CPIM (the Communist Party of India, Marxist)-led left government and has a strong presence of the left wing trade unions. Most of the anti privatization protests in this state were targeted against the central government's policy even if the left government at the state was actively involved in the privatization process through various public-private joint ventures. This observation is consistent with our prediction if we believe that the left wing labour unions were expecting that a better redistributive scheme would be at place by the state government.

with the non-affected group's benefits, the government can implement a redistribution scheme close to the optimal one, even without acquiring the private information.

The second extension of our model looks at a situation when the government gives financial insurance to the investor in case of surplus loss due to resistance. From the investor's perspective, the first extension is a form of legal protection where as the second deals with financial protection. An important insight from our analysis is that if the financial compensation is paid by taxing the society, the affected group will internalize the cost of resistance more. As a result, less resistance would be required to transmit private information in equilibrium. Therefore, the equilibrium under the case of financial protection Pareto dominates the equilibrium in our basic model. Comparison between the case of financial protection and the case of legal protection is qualitatively similar to comparing our results under signaling and no-signaling regimes. In particular, we find legal protection would be welfare improving when the probability of the bad state is high or the government's bias in favor of the affected group is sufficiently high.

This result has normative implications. We predict when banning resistance may or may not create any welfare improvement in terms of trading off its informative value against the cost of destruction. Besley and Burgess (2002) documented variation in terms of labour regulations across states in India.[5] Some of the states have passed regulation to authorize state government to issue orders to prohibit strikes or lockouts in connection with industrial disputes, if the government find it necessary to maintain public safety or securing industrial peace. The authors consider such legislation as a pro-employer legislation. Here we provide a normative benchmark in assessing such legislations based on informative value of resistance.[6]

Our paper shares common features with several strands of work. The literature on wage bargaining between the firm management and the union demonstrates that strikes (leading to loss of surplus) can arise as a mechanism by which the firm can credibly transmit private information about its profitability to the union. This literature includes Fudenberg et al. (1985), Grossman and Perry (1986), Admati and Perry (1987), Cramton (1992), Hart (1989), Cramton and Tracy (1992) and a host of other papers that followed. While the literature has concentrated on different mechanisms (signaling, screening, war of attrition or a mix of these) that can explain the duration of strikes, the broad theme is the following: unions initiate strikes, and the management endures strikes in order to credibly signal a low valuation of the surplus. Harstad (2007) demonstrates a game where two parties bargain over the share of payment for a public good, where each party uses delay (which is costly to both parties) to signal its valuation of the good to the other party. While our paper also relies on destruction of economic surplus as a channel of signaling valuation, the mechanism considered is different in two important ways. First, in our case, the social groups bargain over redistribution in presence of an arbitrator (the government). Second, unlike in the strikes literature, it is the party with private information that initiates the destruction in order to signal information to the arbitrator.[7] Moreover, while the bargaining literature by and large starts with an exogenously given surplus, the amount of surplus to be bargained over is itself endogenous in our model, due to the presence of an important third party: the investor.

The model in our paper can be interpreted as one with two groups lobbying the government for redistributive transfer in presence of asymmetric information. In this respect, we share similarities with the literature on informational lobbying where interest groups use costly signals of their private information to establish

[5] The purpose of this paper is not to explain the variation in regulation, rather in studying the effect of such variation on economic performances.

[6] There are other positive political theories that can explain government's differential attitudes based on investors' ability to influence government's policy (Persson and Tabellini 2000, Ch. 7).

[7] Susanne Lohmann (1993, 1994 and 1995a), studies costly political actions taken by informed activists as a form of credible communication to the leader. Unlike our paper, the focus of these papers is whether such actions taken by many activists can lead to aggregation of dispersed information in the society. Moreover, while resistance in our paper imposes costs on all parties involved, Lohmann studies a model where the costs are entirely private to the individual taking the signaling action.

credibility (see Austen-Smith and Wright 1992; Austen-Smith 1993, 1994, 1995; Lohmann 1995a, 1995b, 1998 and Laffont 1999). While most of these papers deal with informational efficiency, our focus is on comparing the informational benefits with the cost in terms of lost economic surplus. Esteban and Ray (2006) studies an informationally constrained government depending on lobbies for information necessary for optimally allocating resources. The paper shows that inefficient allocation may happen due to signal jamming by richer lobbies, and therefore higher inequality may lead to more inefficient allocation of resources. The authors conclude that inefficient resource allocation in developing countries may arise simply due to higher inequality rather than due to bureaucratic corruption. Our paper has a similar message: governments may be forced to offer softer deals to investors as a result of endemic informational problems, and not necessarily due to inherent corruption.

The paper is organized as follows. In Section 2, we introduce the basic analytical model. Section 3 presents the benchmark full information case and then studies in detail the two second-best situations: one where the government uses information obtained from destructive resistance to redistribute optimally and the other where the government redistributes suboptimally in absence of information. Section 4 discusses when resistance is beneficial to the government and when it is not. Section 5 considers an extension of our model in which the government provides financial compensation to the investor in case of surplus loss due to resistance and Section 6 concludes.

2 Analytical framework

2.1 Environment

2.1.1 Role of investment

Consider a development project that benefits the local economy and suppose that the government does not have the necessary resources (technical expertise, financial strength, human resources) for efficient implementation. The government, G, identifies an external investor, I, with such resources to implement the project.[8] G offers an investment tax $\tau \in R$ to the investor on the size of investment. A negative value of τ implies a subsidy to the investor. I decides the size of the project $x \geq 0$, after observing τ. Investment is costly and the investment cost is given by $\frac{x^2}{2k}$, where $k > 0$ measures productivity of investment.[9] From an investment of scale x, an investor gets a revenue of qx with $q > 0$. The parameter q can be interpreted as the price at which the investor is able to sell output generated by the project. A more rewarding way to think of q is the following: suppose the investment has already been made, i.e. sunk. Now, qx is the valuation of the project from the point of view of the investor, and thus q is the valuation per unit of scale. The project creates economic externalities for the local community, which for our purposes is the society. The society comprises of two groups A and B, who derive utility from the project. Groups may have different valuations of the project. Group J's total valuation of the project is given by $v^J x, J \in \{A, B\}$, and valuation per unit scale is v^J.

2.1.2 Informational constraints

We assume uncertainty about the economic externality that the project generates. The uncertainty affects the government's redistributive concern. This can be modeled by introducing uncertainty over the values of

[8] In our basic framework, we assume that the government is the sole buyer of the investment. A geographically specific investment opportunity (e.g. mining) may be a relevant example here.

[9] Our results hold for any strictly increasing and convex cost function. The assumption of quadratic cost function is taken for simplicity and tractability of our results.

v^A, or v^B, or both. To keep the model simple, we only consider one-sided uncertainty. While v^A is assumed to be fixed, v^B can be either *high* or *low*. Thus, in our model, group B should be thought of as the "affected group". In the low state which occurs with probability p, group B is affected adversely and v_B takes the value $\underline{v}$. In the high state which occurs with probability $1-p$, v_B equals $\overline{v}$. We assume that $p \in (0,1)$ and $\underline{v} < \overline{v}$. The distribution of v^B is commonly known, but v^B itself is realized after investment is made by the investor. The realized value of v^B is private information to group B.

2.1.3 Redistribution and signaling

In our framework, G decides on two different kinds of redistributive transfer. Through the investment tax, as described above, a redistribution of surplus takes place between the investor and the society. If there is a positive investment tax (when $\tau > 0$), G distributes the tax revenue among the citizens. Conversely, when offering a subsidy to I (when $\tau < 0$), G collects the subsidy from the society.

At the final stage, G decides on a redistributive transfer between the two groups A and B. The timing of the redistributive transfer between groups is particularly important in our framework. If the transfer takes place after v^B is realized, group B has an incentive to signal its private information to affect the level of redistributive transfer. In particular, irrespective of the true valuation, B would like to pose as a low-valuation type to attract a higher transfer from the government. However, a high valuation type, by definition, values the surplus more than the low-valuation type. This creates an opportunity for the low valuation type to credibly signal its valuation by taking (publicly observable) action to destroy some surplus. Such destructive actions come in the form of protests, strikes or delaying the production process by other means. The government uses information inferred from such public action to implement an appropriate redistribution scheme. Such signaling, however, comes at a cost of surplus reduction which hurts all parties concerned. We assume that by taking an action of level $a \geq 0$, B effectively reduces the size of investment by ax. In this sense, the action is interpreted as the "share of output destroyed". Notice that the action reduces the value of investment for the investor and for each of the two groups. Following an action of level a, group J's payoff from the project becomes $v^J x(1-a)$.

Let $w^J, J = A, B$ denote group J's surplus before the between-groups transfer takes place. We can write $w^A = v^A x(1-a) + s\tau x$ and $w^B = v^B x(1-a) + (1-s)\,\tau x$, where s is the proportion at which the tax/subsidy revenue is split between two groups. Note that both s and t are instruments of intergroup transfer. We therefore assume that $s \in (0,1)$ is fixed at some level and that $t \in \mathbb{R}$, the redistributive transfer from group A to group $B$is the only instrument that G chooses. Therefore, post-transfer surplus of groups A and B are given by

$$w^A - t = v^A x(1-a) + s\tau x - t, \text{ and} \tag{1}$$
$$w^B + t = v^B x(1-a) + (1-s)\,\tau x + t. \tag{2}$$

The following condition is assumed throughout our analysis.

Assumption 1 $v^A + \underline{v} > 0$.

Assumption 1 guarantees that the total surplus generated by the project is large enough to ensure positive surplus for the groups in every state. By making this assumption, we move away from the 'adverse selection' problem of choosing bad projects, and focus only on the informational problem related to the redistribution of surplus.

2.2 Payoffs

A group's payoff is given by its post-transfer surplus (1), (2). In our framework, group A is not considered as a strategic player, and does not take any action to influence its payoff. Group B chooses the level of action to signal its valuation of the project.

The investor's payoff is given by[10]

$$qx(1-a) - \frac{x^2}{2k} - \tau x. \tag{3}$$

In our framework, we do not model the government as a rent-seeker. Instead, it plays the role of a planner with two concerns - *a)* inducing private investment that is necessary for development, and *b)* redistribution of surplus among different groups within society. Its motivation for redistribution implicitly stems from a concern over unequal distribution of surplus. To capture the redistribution motivation, we therefore introduce a measure of inequality. The cost of inequality to G is given by

$$L(t) = \left[\lambda\left(w^A - t\right) - (1-\lambda)\left(w^B + t\right)\right]^2.$$

In the above expression, λ measures G's bias towards group B when measuring the difference in post-transfer surplus.[11] For $\lambda = 1/2$, this measure of inequality is simply the square difference between two groups' post-transfer wealth. As λ increases (decreases) from 1/2, high post-transfer wealth of A (relative to B) is considered to be costly to G, thus creating a bias toward group B's wealth in determining the level of inequality. The exact opposite effect works as λ decreases from 1/2.

For a given level of inequality, G prefers high total surplus of the society. Therefore, its payoff function can be given as

$$\begin{aligned} & \left[\left(w^A - t\right) + \left(w^B + t\right)\right] - \left[\lambda\left(w^A - t\right) - (1-\lambda)\left(w^B + t\right)\right]^2 \\ = \; & \left[w^A + w^B\right] - \left[\lambda\left(w^A - t\right) - (1-\lambda)\left(w^B + t\right)\right]^2 \equiv S - L(t) \end{aligned} \tag{4}$$

The first component in (4), $w^A + w^B$, is the total surplus S of the society, and the second component reflects the loss from inequality $L(t)$. Both S and L depend on v^B and a. But the redistributive transfer t affects only the inequality loss. While the transfer t is used by the government to minimize the weighted inequality, the tax τ is used by the government to maximize the surplus.

There is an alternative expression for the objective function that is equivalent in terms of the optimal choice of the government and of the other parties. If the government has Cobb-Douglas preferences over the group utilities, i.e. if the objective function is $\left(w^A - t\right)^{1-\lambda}\left(w^B + t\right)^{\lambda}$, then we are really solving the same optimization problem for the government. Thus, the government in our model is a weighted social welfare maximizer. While the Cobb-Douglas objective function is perhaps easier to interpret, it has the problem that the expression is undefined for negative values of the utilities. Since w^A and w^B are themselves endogenous, there is no easy way of avoiding this problem. We therefore work with the inequality weighted objective function.

[10] In the basic framework, we assume that the investment tax/subsidy is contingent on the total size of the project. The government does not provide any insurance to the investor against the losses due to costly action. We later show in an extension that if the government can compensate the investor for its losses by raising money from the society, the results do not change qualitatively, but there is some welfare improvement in equilibrium.

[11] The bias toward one of the groups may result from several factors such as lobbying power, number of swing voters etc. We are particularly interested in analyzing the distortionary effect of this bias on private investment.

2.3 Sequence of events

The sequence of events in the basic model is described below:

1. Policy stage: G decides the investment tax/subsidy τ.
2. Investment stage: I decides the size of investment x.
3. Signaling stage: v^B is realized but only B can observe v^B. B takes an action $a \geq 0$ to signal its valuation v^B to G.
4. Redistribution stage: G decides a transfer $t \in \mathbb{R}$ from A to B.

To identify the impact of signaling, we discuss an alternative sequence of events in Section 3. In particular, we assume G determines the transfer before v^B is realized, and commits not to renegotiate the amount. Therefore, B finds no incentive to signal through costly action after v^B is realized. The scenario effectively has three stages of actions - policy stage, investment stage and redistribution stage. Finally, after the redistribution stage, nature determines v^B and payoffs are realized.

3 Equilibrium analysis

We proceed to solve the model by considering three different informational regimes. First, in section 3.2, we consider the *full information benchmark* case where the valuation of group B is known to the government. In this case, the government can optimally allocate the surplus created by the investment at no cost, and moreover, there is no distortionary effect on investment. Next, in section 3.3, we proceed to the *costly signaling* regime, in which the group with private information can signal its valuation through action that is costly to the society. Note that in a separating equilibrium signaling fully reveals information. Therefore, G can still redistribute the surplus optimally, but the level of investment gets affected due to costly destructive action. A comparison between full-information and costly-signaling regimes measures the distortionary effect of the signaling channel on investment. In section 3.4, we consider the *no-signaling* regime in which G decides on the redistributive transfer before the valuation is privately observed, and commits not to renegotiate later. In this case, there is no incentive for group B to signal its valuation, and since the transfer is decided only on basis of expected valuation rather than realized valuations, it is ex-post suboptimal. However, there is no distortionary effect on investment. Comparing the no-signaling regime with the full information benchmark we can measure the effect of the informational constraint on the government in absence of signaling. Further, the comparison between the costly signaling and the no-signaling regimes reflects the trade-off faced by the government between allocative efficiency and its twin costs - direct destruction of surplus and indirect distortion of incentives of the investor.

We will begin with describing players' strategies and the equilibrium concept for our analysis.

3.1 Strategies, belief and equilibrium concept

The strategy of the investor I is the size of investment $x(\tau) \in \mathbb{R}$, given an investment tax τ. The marginal valuation of the project to Group B, i.e. $v^B \in \{\underline{v}, \overline{v}\}$ is private information only to B. B's strategy is $a\left(\tau, x, v^B\right) \in \mathbb{R}_+$, the level of action taken by B after observing an investment tax τ, the size of the project x and the marginal valuation of the project v^B. G chooses two different taxes. First, it decides on an investment tax that will be imposed on the investor. Finally, after observing the action taken by B, G decides on a redistributive transfer between A and B. Therefore, G's strategy is given by a tuple (τ, t)

such that $\tau \in \mathbb{R}$ is the investment tax and $t(\tau, x, a)$ is the redistributive transfer from A to B, given an investment tax τ, size of investment x and action level a. Let $\mu(\tau, x, a) \in [0,1]$ denote G's belief that group B has low valuation for the project, after observing a feasible choice tuple (τ, x, a) in which τ is the tax rate chosen by G, x is the size of investment and a is the action made by group B. We will look for the set of *Perfect Bayesian Equilibrium* (PBE) that involves a strategy profile and a belief system such that the strategy profile is sequentially rational and beliefs are derived by Bayes' rule when possible. The set of signaling equilibria is large because of broad flexibility permitted by PBE in specifying out-of-equilibrium beliefs. To get more tractability of our results, we restrict our attention only to the separating equilibria satisfying the *Intuitive Criterion* (Cho and Kreps 1987).

We introduce a few notations for convenience of exposition. We shall sometimes refer to groups' surplus by $w^A = w^A(a)$ and $w^B = w^B(v,a)$ with v and a denoting the realized valuation of B and the level of signaling action respectively. There are other arguments in the expression for w^A and w^B, but we are suppressing them now.

$$\begin{aligned} w^A(a) &= [v^A(1-a) + s\tau]x \\ \text{and } w^B(v,a) &= [v(1-a) + (1-s)\tau]x. \end{aligned}$$

Similarly, the total surplus can be expressed as a function of group B's marginal valuation v and level of action a, in the following way:

$$S(v,a) = \left[w^A(a) + w^B(v,a)\right] = [(v^A + v)(1-a) + \tau]x \tag{5}$$

Finally, G's payoff depends on B's marginal valuation, v, the action, a, and the redistributive transfer, t. We therefore often express it as $W(v,a,t)$.

$$\begin{aligned} W(v,a,t) &= \left[w^A(a) + w^B(v,a)\right] - \left[\lambda\left(w^A(a) - t\right) - (1-\lambda)\left(w^B(v,a) + t\right)\right]^2 \\ &\equiv S(v,a) - L(v,a,t). \end{aligned}$$

3.2 The benchmark case: full information

As the benchmark, we consider a situation in which the government can gain information about groups' valuation at no cost. It is important to note that the realized value of v^B will still be unknown at the policy stage and the investment stage, but will only be known at the redistribution stage. The total surplus available to the government for redistribution within groups is then $S\left(v^B, 0\right) = (v^A + v^B + \tau)x$, given the investment tax τ and the size of investment x. At the redistribution stage, G chooses $t \in R$ to maximize $W\left(v^B, 0, t\right)$, which is equivalent of minimizing $\left[\lambda\left(w^A(0) - t\right) - (1-\lambda)\left(w^B\left(v^B, 0\right) + t\right)\right]^2$. The optimal group transfer is given by

$$t^o = \lambda w^A(0) - (1-\lambda) w^B\left(v^B, 0\right).$$

Essentially, the weighted inequality is set to zero at this transfer and the post transfer payoff to G is

$$S\left(v^B, 0\right) = (v^A + v^B + \tau)x.$$

It is easy to check that the payoffs of groups A and B are given by $(1-\lambda) S\left(v^B, 0\right)$ and $\lambda S\left(v^B, 0\right)$ respectively.

Next, we turn to the investment stage and the policy stage. The government decides the tax on the investor by balancing the following tradeoff: an increase in the tax will depress investment and therefore reduce surplus, but on the other hand, it will lead to a larger transfer from the investor to the government given a scale of investment. The tax is therefore determined by balancing the marginal valuation of investment x by the government with that of the investor.

To solve for optimal tax and investment, we use a result which will prove very useful throughout the rest of our analysis. Suppose that at the policy stage, (i.e. before the valuations are made public), the government's payoff and the investor's net profit as a function of the investment x is $Vx+\tau x$ and $Qx-\frac{x^2}{2k}-\tau x$ respectively. While in the different informational regimes, V and Q will have different values, these can be treated as constants at the policy/investment stage of a given regime. We can think of V as the government's marginal valuation of investment at the policy stage. Similarly, we think of Q as the investor's effective marginal return from investment once the cost of the project is sunk. Alternatively, Q can be thought of the imputed price that the investor obtains per unit of produced output.

Lemma 1 *Suppose the investor's pre-tax profit from investment x is $Qx - \frac{x^2}{2k}$ and the government"s pre-tax payoff is Vx. Then, for any given tax rate τ, the optimal level of investment chosen by the investor is $k(Q-\tau)$. In the policy stage, government's optimal choice of tax rate is $\frac{1}{2}(Q-V)$ and the maximized payoff is $\frac{k}{4}(Q+V)^2$.*

Proof. Given a tax rate τ, the optimal size of investment is given by

$$x(\tau) = \arg\max_x \left(Qx - \frac{x^2}{2k} - \tau x \right) = k\,(Q-\tau)$$

At the policy stage, the government's payoff for any tax rate τ is $Vx(\tau)+\tau x(\tau)$. Therefore, the government's optimal tax rate is

$$\tau^* = \arg\max_x \,(V+\tau)\,x(\tau) = \frac{1}{2}(Q-V)$$

Simple calculations show that the payoff of the government is $k\,(V+\tau^*)\,(Q-\tau^*) = \frac{k}{4}(Q+V)^2$. ■

Based on this result, two comments are in order. First, notice that the government taxes the investor if the society's marginal valuation of output V is lower than the investor's marginal return Q, and subsidizes the investor otherwise. The tax rate is decided *as if* it results from an underlying bargaining scenario. If after completion of the project, G has a relatively higher stake (i.e., when $V > Q$), it takes a soft position in dealing with the investor and offers subsidy. On the other hand, if I has a relatively high stake after completion (i.e., when $V < Q$), the converse effect holds. This line of interpretation turns out to be useful throughout our analysis. Comparing relative stakes of two parties after completion of the project in different scenarios, it is easy to interpret how and why G becomes more or less aggressive in dealing with the investor.

Second, while we have assumed that the government is not directly interested in the investor's profits, the government's payoff increases both in the investor's marginal return of output Q and productivity (inverse of k). If the investor has a larger incentive to invest, then the project size will be larger, leading to a larger total surplus for the society. Therefore, a government always benefits if the investor finds it beneficial to invest more.

Lemma 1 helps us determine the optimal tax and the resulting size of investment in the full information case. When the state is known, the government's payoff from investment x is $\left(v^A + v^B + \tau\right)x$. However, the state is not yet revealed at the policy stage. Thus, for purpose of deciding the tax on the investor, the government's payoff is $\left(v^A + Ev^B + \tau\right)x$ where $Ev^B \equiv (1-p)\,\overline{v}+p\underline{v}$. In terms of Lemma 1, when information is costlessly available, we have $V = v^A + Ev^B + \tau$. On the other hand, since there is no destruction, $Q = q$. As a straightforward application of the result, the following Proposition outlines the equilibrium actions and payoffs in absence of the informational problem.

Proposition 1 *Consider a situation in which groups' marginal valuations are public information. The following action profile (t^o, x^o, τ^o) constitutes the unique equilibrium:*

$$\begin{aligned} t^o &= \lambda w^A(0) - (1-\lambda) w^B\left(v^B, 0\right), \\ x^o &= k(q - \tau^o), \\ \tau^o &= \frac{q - v^A - Ev^B}{2}. \end{aligned}$$

Further, the government's expected payoff is

$$W^o = \frac{k}{4}\left(q + v^A + Ev^B\right)^2$$

The following corollary suggests that if there is free access to information about group valuations, the government will tax ($\tau > 0$) the investor if the society's expected total valuation $v^A + Ev^B$ of investment is less than the investor's marginal return q and subsidize ($\tau < 0$) the investor otherwise . This will serve as the benchmark for the rest of the paper.

Corollary 1 *Consider a situation in which groups' marginal valuations of the project are public information. G will tax investment if and only if*

$$v^A + Ev^B < q.$$

After completion of the project, of the investment is $v^A + Ev^B$, and the investor's marginal valuation is q. The above corollary states that G will tax ($\tau > 0$) investment if and only if the society's expected total marginal valuation exceeds the investor's pre-tax marginal return. The apparent simplicity of the result depends on two assumptions: quadratic costs and fixed marginal valuations.

3.3 The standard case: Private information and signaling

In this section, we analyze the problem when B's valuation of the project is private information and B can signal by taking a costly public action. We solve the game by backward induction.

First consider the redistribution stage. In that stage, the investment tax τ, the size of investment x and the level of action a are known. Having observed a history, the government places probability μ on the state being low. For any belief $\mu \in [0,1]$ over types, the optimal transfer is

$$t(\mu, a) \in \arg\max_{t'} \left[\mu W(\underline{v}, a, t') + (1-\mu) W(\overline{v}, a, t')\right] \tag{6}$$

The following lemma identifies the equilibrium transfer in the redistribution stage.

Lemma 2 *Suppose $x > 0$. For beliefs $\mu \in [0,1]$,*

$$t(\mu, a) = \lambda w^A(a) - (1-\lambda)\left[\mu w^B(\underline{v}, a) + (1-\mu) w^B(\overline{v}, a)\right]$$

The transfer to group B is strictly increasing in μ if $a < 1$ and constant if $a = 1$.

Proof. In appendix. ■

The above Lemma not only identifies the transfer explicitly, it also ensures that the transfers lie in a bounded set. Moreover, calculated from the point of view of the government, given a belief μ, the post transfer payoff of group A is $(1-\lambda)ES(a)$ and that of group B is $\lambda ES(a)$, where $ES(a) = \mu S(\underline{v}, a) + (1-\mu) S(\overline{v}, a)$..In other words, the optimal transfer ensures that the expected surplus is divided among the two groups in the ratio $1-\lambda:\lambda$, where the expectation is taken with respect to the belief μ. This also means that the share of group B is increasing in the belief that the low valuation has occurred.

Next, consider the signaling stage, where the investment tax τ and the size of investment x (>0) are known. We examine the separating equilibria of the signaling game. In a separating equilibrium, the two types take actions $\overline{a}$ and $\underline{a}$ respectively, with $\overline{a}\neq\underline{a}$, and beliefs satisfy $\mu(\overline{a})=0$ and $\mu(\underline{a})=1$. The next lemma characterizes the level of action B takes if it has low valuation of the project.

Lemma 3 *Suppose $x>0$ and Assumption 1 holds. Then, the set of separating equilibria of the signaling subgame is given by actions $\underline{a}\in[a_L,\min\{a_H,1\}]$ and $\overline{a}=0$, where*

$$a_L=\frac{(1-\lambda)\left(\overline{v}-\underline{v}\right)}{\left(\left(v^A+\overline{v}\right)-(1-\lambda)\left(v^A+\underline{v}\right)\right)},\ \textit{and}\ a_H=\frac{(1-\lambda)\left(\overline{v}-\underline{v}\right)}{\lambda(v^A+\underline{v})}.$$

Proof. In appendix. ■

Lemma 3 says two things. First, it says that in any separating equilibrium, group B takes a costly action if and only if it has low valuation. Thus, destructive action is a credible signal for low valuation. Second, there is an interval of actions such that any level in that interval can be supported in a separating equilibrium. The equilibrium action for the low-valuation type should be large enough (weakly higher than a_L) so that the high-valuation type does not have an incentive to mimic the low-valuation type and engage in destruction. Similarly, the action cannot be too high (weakly lower than a_H) so that the low-valuation type indeed gains from the transfer despite a reduced total surplus.

Since we have a continuum of separating equilibria in the signaling subgame, we restrict our attention to the equilibria that satisfy the intuitive criterion. The following lemma shows that there is a unique separating equilibrium that survives the restriction.

Lemma 4 *Suppose $x>0$ and Assumption 1 holds. The only separating equilibrium of the signaling subgame that survives the Cho-Kreps intuitive criterion is $\underline{a}=a^e=\frac{(1-\lambda)(\overline{v}-\underline{v})}{((v^A+\overline{v})-(1-\lambda)(v^A+\underline{v}))}$ and $\overline{a}=0$.*

Proof. In appendix ■

At the equilibrium that satisfies the Cho-Kreps criterion, the destruction is just large enough to ensure that the high-valuation type is indifferent between mimicking the low-valuation type and not doing so. An important feature of this equilibrium is that among the set of separating equilibria of the signaling subgames, it is the *Pareto efficient* one. From now on, we will treat this equilibrium as our predicted outcome of the signaling subgame. Given the unique equilibrium of the signaling game (satisfying our criterion), we are now in a position to solve for the optimal size of investment and the investment tax at the preceding stages.

To solve for the optimal size of investment, assume that the tax rate τ is given. I chooses x to maximize its expected return from investment. For a given investment tax τ, the investor's payoff is given by

$$q[(1-p)\,x+p\,(1-a^e)\,x]-\frac{x^2}{2k}-\tau x=\left(q(1-pa^e)-\tau\right)x-\frac{x^2}{2k} \tag{7}$$

Therefore, once the investment is sunk, the pre-tax marginal return for the investor is $Q=q(1-pa^e)$, since a proportion a^e of the produced output is lost due to resistance with probability p. According to Lemma 1, given a tax τ, the optimal size of investment is

$$x^e(\tau)=k(q(1-pa^e)-\tau)$$

Finally, at the policy stage, G decides the optimal investment tax that maximizes its expected payoff. From the redistribution stage, we see that if v^B is truthfully revealed, G chooses the between-groups transfer in a way that makes cost of inequality to zero. Therefore, G's expected payoff at the policy stage is

$$\begin{aligned} EW &= (1-p)\,W\left(\overline{v},0,t\left(\overline{v},0\right)\right)+pW\left(\underline{v},a^e,t\left(\underline{v},a^e\right)\right) \\ &= \left(v^A+Ev^B-pa^e\left(v^A+\underline{v}\right)\right)x^e(\tau)+\tau x^e(\tau) \end{aligned}$$

Effectively, the government's marginal valuation of investment is $V=\left(v^A+Ev^B\right)-pa^e\left(v^A+\underline{v}\right)$, in which the first term is the expected total marginal valuation of the society and the second term is the expected marginal loss due to destructive action. From Lemma 1, the optimal investment tax is given by

$$\begin{aligned} \tau^e &= \frac{q(1-pa^e)-\left(v^A+Ev^B\right)+pa^e\left(v^A+\underline{v}\right)}{2} & (8)\\ &= \frac{pa^e\left(v^A+\underline{v}-q\right)-\left(v^A+Ev^B-q\right)}{2}. & (9) \end{aligned}$$

and the welfare of the government is given by

$$\begin{aligned} W^e &= \frac{k}{4}\left[q(1-pa^e)+\left(v^A+Ev^B\right)-pa^e\left(v^A+\underline{v}\right)\right]^2 \\ &= \frac{k}{4}\left[\left(v^A+Ev^B+q\right)-pa^e\left(v^A+\underline{v}+q\right)\right]^2 \end{aligned}$$

The following proposition summarizes above results and provides a complete characterization of the unique PBE satisfying the intuitive criterion.

Proposition 2 *Assume that group B's valuations of the project is private information and it can signal through costly public action. The following action profile (t^e,a^e,x^e,τ^e) with belief $\mu\left(\underline{v}\right)$ constitute the unique separating PBE satisfying the intuitive criterion:*

$$\begin{aligned} t^e &= \begin{cases} \lambda w^A\left(a^e\right)-(1-\lambda)\,w^B\left(\underline{v},a^e\right) & \textit{if } a=a^e \\ \lambda w^A\left(0\right)-(1-\lambda)\,w^B\left(\overline{v},0\right) & \textit{otherwise} \end{cases}, \\ a^e &= \frac{(1-\lambda)\left(\overline{v}-\underline{v}\right)}{\left(\left(v^A+\overline{v}\right)-(1-\lambda)\left(v^A+\underline{v}\right)\right)}, \\ x^e &= k(q(1-pa^e)-\tau^e), \\ \tau^e &= \frac{pa^e\left(v^A+\underline{v}-q\right)-\left(v^A+Ev^B-q\right)}{2}, \\ \mu\left(\underline{v}\right) &= \begin{cases} 1 & \textit{if } a=a^e \\ 0 & \textit{otherwise} \end{cases}. \end{aligned}$$

Further, the government s expected payoff is

$$W^e=\frac{k}{4}\left[\left(v^A+Ev^B+q\right)-pa^e\left(v^A+\underline{v}+q\right)\right]^2$$

.

From the above proposition, we see that G will tax investment ($\tau^e>0$) if and only if

$$\left(v^A+Ev^B-q\right)<pa^e\left(v^A+\underline{v}-q\right). \tag{10}$$

As before, we can interpret this condition by comparing society's expected marginal valuation with the investor's marginal return of produced output. If G has a relatively high stake after completion (i.e., when $v^A + Ev^B - pa^e\left(v^A + \underline{v}\right) > q(1 - pa^e)$), it takes a soft position in dealing with the investor and offers subsidy. In the converse scenario, G will tax investment.

It is easy to see that the condition for taxation holds only if the right hand side is negative. Therefore, G offers subsidy whenever $v^A + \underline{v} > q$. In such a case, the government's stake in both states ($v^B = \underline{v}$ *or* $\overline{v}$) is comparatively high, and therefore it offers subsidy to provide an incentive to the investor to increase size of investment. On the other hand, when $v^A + \underline{v} < q$, G offers subsidy if the probability of bad state p is high or if the extent of costly destruction a^e is high. It is worthmentioning here that the parameter set in which the government offers subsidy expands compared to the full information scenario. Since the extent of destruction is itself endogenous, we next look into how the parameters of the model affect the extent of resistance observed in equilibrium.

3.3.1 Destruction of output

Certain conclusions are obvious from the set-up. We do not observe resistance to all investment, it occurs only when an affected group considers the valuation of investment to be low, and uses destructive means to demand more compensation. Second, since a^e is independent of the scale of investment, the total destruction $a^e x$ is strictly increasing in the scale of investment. Thus, large projects face large resistance. Also, since high subsidies are associated with large scale projects (yielding high social return), one can see that more destruction of total output will be seen to occur when the volume of subsidies is high, seemingly explaining the high correlation between increased resistance and highly subsidized projects of governments.

The following proposition tells us how the share of output destroyed, a^e, depends on the nature of investment project and the political structure of the society.[12]

Proposition 3 *As λ, which is G's bias in favor of the affected group increases from 0 to 1, the optimal action a^e by the group decreases monotonically from 1 to 0. Ceteris paribus, a^e is strictly decreasing in v^A and $\underline{v}$, strictly increasing increasing in $\overline{v}$ and is independent of p.*

Notice that the equilibrium action is determined by the level at which the high type is indifferent between taking the action and not doing so. The comparative static effect of $\lambda, \underline{v}$ and v^A can simply be seen from the fact that the gain in transfer for a certain level of action (for either type) is decreasing in each of these parameters, while the high type's cost of misrepresentation is left unaffected.

The first part of proposition 3 shows that the more politically marginalized the affected group is, the more destructive action it undertakes. On the other hand, if G is favorably biased toward the affected group, it expects a high transfer in each state. This creates an incentive not to destroy too much of surplus, since such destruction eventually hurts the total amount of post-transfer wealth. The optimal action a^e decreases in v^A and $\underline{v}$ because an increase in these parameters increases the marginal valuation of output in each state, creating an incentive to destroy less. The intuition for the effect of $\overline{v}$ is a little more subtle. Notice that a^e is determined by equating the gain in transfer from action and the high type's cost of taking action. While an increase in $\overline{v}$ leads to a larger transfer, it also increases the cost of misrepresentation to the high type. In fact, a marginal increase in $\overline{v}$ increases transfer by $(1 - \lambda)x$ while it increases cost by $a^e x$. Since $a^e < 1 - \lambda$, the extent of action increases with $\overline{v}$.

[12] The proof follows from the first order differentiation of a^e, defined in Lemma 4, with respect to various parameters. The algebra is straightforward, we therefore skip the proof of this proposition.

3.4 The alternative regime: No signaling

In the previous section, the government uses information about valuations to implement the optimal redistribution scheme, but such information comes at a public cost. Additionally, the possibility of such a cost being imposed on the investor leads to a distortion in the government's deal with the investor. To balance the extent of the benefit of optimal redistribution against these two costs, we need to compare the government's payoff in the previous section with another benchmark - an alternative regime where there is no signaling (and therefore no cost), and the government has to implement a redistribution scheme without the precise knowledge of the group valuations.

Previously, we have assumed however that the government cannot commit to not use the information about valuations once it is made available. In this section, we assume that the government commits not to use such information even if it is made available. Such commitment takes away the incentive for signaling activity by social groups. In reality, an announced ban on signaling will have the same effect. While we develop the equilibrium predictions for this no-signaling benchmark in this section, in the next section, we show that the government may sometimes be better off by committing not to use information.

The game is the same as it was in section 3.3, except that we force the value of a to be 0. Equivalently, there is no signaling stage. In the redistribution stage, the government uses the transfer that maximizes the expected welfare. Therefore, the tax offered to the investor is given by

$$\begin{aligned} t^{ns} &= \arg\max_{t \in R} pW(\underline{v}, 0, t) + (1-p)W(\overline{v}, 0, t) \\ &= \arg\max_{t \in R} pL(\underline{v}, 0, t) + (1-p)L(\overline{v}, 0, t) \\ &= \lambda w^A(0) - (1-\lambda)Ew^B(v^B, 0) \end{aligned}$$

where $Ew^B(v^B, 0) = pw^B(\underline{v}, 0) + (1-p)w^B(\overline{v}, 0)$. Thus, while the transfer under full information sets the inequality loss to zero, the transfer under incomplete information sets the expected inequality loss to zero. This solution depends specifically on the additive separation between the twin objectives (surplus maximization and inequality minimization) of the government.

After some algebra, the loss $L(v^B, 0, t^{ns})$ for each of the pair of values of v^B can be calculated as

$$\begin{aligned} L(\overline{v}, 0, t^{ns}) &= [p(1-\lambda)(\overline{v} - \underline{v})x]^2 \\ L(\underline{v}, 0, t^{ns}) &= [(1-p)(1-\lambda)(\overline{v} - \underline{v})x]^2 \end{aligned}$$

The size of the investment is the same as before,

$$x^{ns}(\tau) = k(q - \tau)$$

Finally, the optimal investment tax solves

$$\begin{aligned} \tau^{ns} &= \arg\max_{\tau} pW(\underline{v}, 0, t^{ns}) + (1-p)W(\overline{v}, 0, t^{ns}) \\ &= \arg\max_{\tau} (v^A + Ev^B)x^{ns}(\tau) + \tau x^{ns}(\tau) - [pL(\underline{v}, 0, t^{ns}) + (1-p)L(\overline{v}, 0, t^{ns})] \\ &= \arg\max_{\tau} (v^A + Ev^B)x^{ns}(\tau) + \tau x^{ns}(\tau) - F[x^{ns}(\tau)]^2 \end{aligned}$$

where $F = p(1-p)(1-\lambda)^2(\overline{v} - \underline{v})^2$, and the size of the investment $x^{ns}(\tau)$ is $k(q-\tau)$. Notice that the government's payoff is no longer a linear function of the investment, and therefore, we cannot apply Lemma

1. After some algebra, we get

$$\tau^{ns} = \frac{[q - (v^A + Ev^B)] + 2qkF}{2 + 2kF}$$

We collect the above results in proposition 4.

Proposition 4 *Assume that group B's valuations of the project is private information, but it cannot convey the information to the government. The following action profile* $(t^{ns}, x^{ns}, \tau^{ns})$ *constitutes the unique SPNE of the game:*

$$\begin{aligned} t^{ns} &= \lambda w^A(0) - (1-\lambda)\left[p w^B(\underline{v}, 0) + (1-p) w^B(\overline{v}, 0)\right], \\ x^{ns} &= k\left(q - \tau^{ns}\right) \\ \tau^{ns} &= \frac{[q - (v^A + Ev^B)] + 2qkF}{2 + 2kF} \end{aligned}$$

Further, the Government' s expected payoff is given by

$$W^{ns} = \frac{k}{4} \frac{(q + v^A + Ev^B)^2}{1 + kF}$$

where $F = p(1-p)(1-\lambda)^2(\overline{v} - \underline{v})^2$.

The proof follows from simple algebra, which we skip.

The following corollary establishes that the government will tax investment if and only if the total expected marginal return to the society is greater than a threshold strictly greater than the marginal return to the investor.

Corollary 2 *Assume that group B's valuations of the project is private information, but it cannot convey the information to the government. Then, the government will tax the investor if and only if*

$$v^A + Ev^B < q(1 + 2kF)$$

where $F = p(1-p)(1-\lambda)^2(\overline{v} - \underline{v})^2 > 0$.

In other words, when $v^A + Ev^B \in (q, q[1 + 2kF])$, the government taxes the investor under no-signaling while it would have subsidized the investor under full information. In this sense, the government acts sufficiently aggressively compared to what it would do under full information.

4 Role of Resistance

In this section we examine the role of destructive resistance. First we look at the economic value of destructive resistance as a signaling channel: in particular, when is it beneficial. Then we demonstrate how resistance affects investor-friendliness of the government

4.1 Economic value of resistance

As discussed before, while signaling allows the government to implement the optimal redistribution scheme, it involves lost surplus and also distorts the government's deal with the investor. We compare the government's payoff under signaling with that under no-signaling to see when destructive resistance as a signaling channel is overall beneficial to the society. Another way to ask the same question is this: suppose the government could choose to enforce a ban on signaling/resistance activities: when would it actually do so? Our main result is the signaling regime is preferred over the no-signaling regime only if the affected group is moderately marginalized and the bad state is sufficiently unlikely. In other words, signaling is valuable to the government in situations where there is a possibility of a severe outcome for a marginalized group, but such an event is not very likely.

Proposition 5 *Fix* $\{v^A, \underline{v}, \overline{v}, q\}$ *and let* p *and* λ *vary as parameters. Now compare the government's welfare in the no-signaling regime with that in the regime where the government allows signaling. For any* λ*, there is a unique cut-off* $p(\lambda) < 1$ *such that the government strictly prefers the no-signaling regime if* $p > p(\lambda)$*, strictly prefers the signaling regime if* $p < p(\lambda)$*, and is indifferent between the two regimes if* $p = p(\lambda)$*. There exists some (possibly empty) interval* $[\underline{\lambda}, \overline{\lambda}]$ *such that whenever* $\lambda \notin [\underline{\lambda}, \overline{\lambda}]$*, we have* $p(\lambda) = 0$*, i.e. no-signaling is preferred for all* $p \in (0, 1)$*. We always have* $\overline{\lambda} < 1$*, i.e.* $p(\lambda) = 0$ *for large enough* λ*. On the other hand, given* $\{v^A, \overline{v}\}$*, if* $\underline{v}$ *is sufficiently small, then* $\underline{\lambda} = 0$*.*

Proof. In appendix. ■

The proposition says several things. First, for any degree of marginalization, the government prefers no-signaling when the probability of the bad state is higher than a cut-off and allows signaling when the probability is below the cut-off. However, for some values of λ, that cut-off can be 0, meaning that the government prefers the no-signaling regime for any probability of the bad state happening. The proposition also tells us that if the affected group enjoys enough favor of the government (i.e. λ is sufficiently high), then the government does not allow signaling and simply prefers to make a transfer to the affected group. If the affected group is moderately marginalized, then the government prefers the signaling regime when the bad state is sufficiently unlikely. If the affected group is very marginalized (i.e. if λ is low), the government prefers signaling *only if* the surplus in the bad state is sufficiently low. Thus, broadly, the government prefers to allow signaling if the bad outcome is severe but rare and the affected group is at least somewhat marginalized. We explain the partial intuition for these results in the next two paragraphs.

In the signaling regime, the surplus is optimally distributed in each state, but the surplus in the bad state is further reduced by a share a^e due to destructive resistance. On the other hand, in the no-signaling regime, there is no reduction of surplus, but the redistribution is suboptimal in each state. To see how the government's preference over the two regimes depends on the probability p of the bad state happening, fix λ and the valuation parameters. When $p = 0$, the informational problem does not exist, and both regimes lead to the same payoff. In the no-signaling regime, the loss due to suboptimal redistribution (measured as G's payoff difference from the full information benchmark) is the highest when the uncertainty is high, i.e. when p is neither too high, nor too low. On the other hand, the government's expected payoff in the signaling equilibrium decreases monotonically with p since the likelihood of destruction increases. Therefore, whenever the probability of the bad state (and hence destruction) is high enough, the government prefers to prevent such destruction by committing to a suboptimal redistribution scheme.

How does the government's preference over groups λ affect its preference over regimes? Here our assumption that there is no uncertainty over group A's valuation makes a difference. Under full information, the transfer from group A to B is $\lambda w^A(v^A) - (1-\lambda)w^B(v^B)$. The *difference* between the transfers in the two states is $(1-\lambda)(\overline{v} - \underline{v})x$, which is low when λ is high and high when λ is low. Thus, when λ is high, the government can transfer all of group $A's$ surplus to group B without caring much about the informational problem − this is why the government prefers the no-signaling regime when it cares sufficiently about the affected group. Conversely, it is more difficult for the government to ascertain the transfer when it cares more about group A. In this sense, the informational problem for the government is more severe when λ is low. In this situation, the real tradeoff between the two regimes kicks in – the government prefers signaling when the cost of information in terms of expected destruction is low and no-signaling when the said cost is high. According to proposition 3, the destruction a^e is high when the affected group is more marginalized. Therefore, the government allows signaling for low enough p when λ is in a moderate interval, and destruction is not very high. When λ is sufficiently low, the *share* of output destroyed is very high, and the government allows signaling only if the total surplus is low enough, so the amount of output lost due to destructive resistance is not significant.

It is very important to note here that we are comparing two responses of the government to a situation where information is valuable but costly. One response is to allow the costly channel and the other is not to allow the channel and redistribute without the information. Of course, when resistance is too costly for the government to allow, the real policy implication that comes out of our model is that the government should invest in alternative (possibly costly) channels of information flow.

4.2 Resistance and Investor-friendliness

We have already seen (proposition 2) that the possibility of resistance forces the government to offer a subsidy for certain parameter values where under full information, the government would have taxed the investor. On the contrary, in the no-signaling regime, the government taxes the investor under certain parameter values where it would have offered a subsidy to the investor under full information. In this section, we take a more detailed look at the tax rates offered by the government to the investor and compare the actual values of τ^o, τ^e and τ^{ns}. We say that the government is too investor-friendly if the tax rate in a given regime is lower than the benchmark full-information tax rate for the same parameter values, and say that the government is too aggressive if the tax rate in a given regime is higher than the benchmark.

In the following proposition we examine when resistance makes the government too aggressive or too soft in its negotiations with the investor in the above sense.

Proposition 6 *Compare the case when valuations are public information with the case when group B's valuation of the project is private information and it can signal through costly public action. The government will be less aggressive (i.e., $\tau^e < \tau^o$) in choosing the tax rate in the second case if and only if $v^A + \underline{v} < q$. Moreover, the difference between the tax offers in the two regimes $|\tau^e - \tau^o|$ is increasing in p, the probability of the bad state and a^e, the share of output destroyed.*

Proof. We can rewrite τ^e in (8) as a function τ^o as follows:

$$\tau^e = \tau^o + \frac{1}{2} p a^e \left(v^A + \underline{v} - q \right). \tag{11}$$

Therefore, $\tau^e < \tau^o$ if and only if $v^A + \underline{v} < q$. For the second part, note that $|\tau^e - \tau^o| = \frac{1}{2} p a^e \left(|v^A + \underline{v} - q| \right)$.
■

According to the proposition, the possibility of destructive signalling introduces a distortion over the full information benchmark τ^o. This distortion is the second term in (11). Increasing the tax rate has two effects: raising revenue per unit of investment the one hand and depressing total investment on the other. If $v^A + \underline{v} > q$, the society's marginal loss from resistance is relatively high, society values output increase that much less. As a consequence, output loss due to increased tax rate costs a little less in the margin, and the government raises tax above τ^o. On the other hand, if the society values output relatively less in the bad state, i.e. $v^A + \underline{v} < q$, then the government is softer, i.e. more investor friendly, than it would be under full information. The second part of the proposition says that higher the resistance, the stronger is the distortion.

The import of the proposition is that if the society's valuation in the bad state is not very high, resistance forces the government to be too investor friendly. While the common rhetoric suggests that such resistance arises in response to the government being too investor-friendly, the point of the paper is to show that a reverse causality exists. Notice that higher resistance may happen due to increased marginalization (decrease in λ) of the affected group. Thus, the political structure of the society as encapsulated by λ may have a significant impact on the deal offered to a foreign investor and consequently, the scale of investment.

What if the government could ban signaling? Simple algebra shows us that $\tau^{ns} > \tau^{o}$. Both under the benchmark case and no-sinaling case, there is no output loss due to resistance, but in the latter case, the surplus is suboptimally distributed across groups. Thus, the marginal value of increased output is lower in the latter case than the benchmark. Therefore, the government sets a higher tax than the benchmark case when signaling is banned.

Next, we compare the tax rate in the no-signaling regime with that under signaling. We know that $\tau^{ns} > \tau^{o}$. Also, from proposition 6, we have that $\tau^{e} < \tau^{o}$ whenever $v^A + \underline{v} < q$. Therefore, if $v^A + \underline{v} < q$, the government is more aggressive under no-signaling compared to the signaling regime. When $v^A + \underline{v} > q$, i.e. output destruction is relatively costly, the comparison between τ^{ns} and τ^{e} remains ambiguous: in the signaling case, increase in output is devalued by destructive resistance, and in the no-signaling case, value of increased output is reduced by suboptimal redistribution. If the former effect is larger (smaller) than the latter, the government is more (less) aggressive under the signaling regime than under the no-signaling regime.

5 Extension: Insurance for the Investor

In the no-signaling regime, the government legally protects the investor from resistance, and is forced to redistribute suboptimally. In this section, we consider financial (instead of legal) protection for the investor. Suppose that the government makes a commitment to the investor to pay it back the amount it lost due to resistance. This may not be always feasible in practical terms, which is really why we consider the possibility in the extension. First, there may be accounting problems in estimating damages, and related issues of moral hazard or adverse selection. Second, making such compensation may be politically difficult. However, the point of this extension is to show that if such a compensation can be paid to the investor, then the payoff of the government strictly increases in the signaling regime. Thus, if signaling is to be allowed, the government must consider some form of compensation for the investor. Such a compensation increases welfare in two ways: first, it removes the disincentive for the investor and second, by making destruction more costly to the society, it reduces the extent of destruction. However, destruction has the same informational content as before and the government can still implement the optimal redistribution policy. Moreover, since there is no distortion of the investor's incentives due to destruction, the government is never forced to be too soft in negotiation with the investor. In fact, the government is always too aggressive compared to the full information benchmark since the possibility of destruction reduces the marginal value of output.

Formally, the game is the same as before except that in case B takes an action a that destroys investor's revenue by qax, G compensates I by the same amount. That amount is raised from the society and group J bears a share r^J of the amount with $r^A + r^B = 1$. We call this game as *the game with full compensation.* Therefore, each group's pre-transfer payoff is

$$w^J(v,a) = v^J x(1-a) + s^J \tau x - r^J qax, \ J = A, B$$

where $s^A = s$, $s^B = 1 - s$, and the surplus is

$$S(v, a) = (v^A + v)x(1 - a) + \tau x - qax \tag{12}$$

The government, as usual, maximizes $S(v, a) - L(v, a, t)$. The investor's payoff is $x - \frac{x^2}{2k} - \tau x$ irrespective of the value of a.

The following Lemma identifies the level of action in separating equilibrium of the signaling subgame with full compensation for the investor. We again use the Intuitive criterion to refine the equilibria. We find that the extent of action a^* with compensation is strictly lower than the extent of destruction a^e without compensation. The fact that action a reduces the social surplus by qax is the reason why compensation reduces destruction.

Lemma 5 *Consider the game with full compensation. Assume that $x > 0$ and Assumption 1 holds. The set of separating equilibria of the signaling subgame is given by actions $\underline{a} \in [a'_L, \min\{a'_H, 1\}]$ and $\overline{a} = 0$, where*

$$a'_L = \frac{(1-\lambda)(\overline{v} - \underline{v})}{((v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v})) + \lambda q}, \text{ and } a'_H = \frac{(1-\lambda)(\overline{v} - \underline{v})}{\lambda(v^A + \underline{v}) + \lambda q}.$$

Moreover, in any separating equilibrium of the game with full compensation that satisfies the Cho-Kreps intuitive criterion, the action a^* of the low valuation type is strictly lower than a^e, the corresponding action in the game with no compensation.

Proof. In appendix ■

We have not been able to uniquely predict the extent of destruction in the game with full compensation. However, the intuitive criterion refines the separating equilibria enough for us to predict that the extent of destruction will be lower. In what follows, we make statements that are true about any separating equilibrium satisfying the intuitive criterion.

Given the solution to the signaling subgame, we now turn to the policy and investment stages of the game with compensation. Because of full insurance, the investor's pre-tax marginal return from investment is simply $Q = q$. In the separating equilibrium, the government's welfare is given by the marginal value of the expected surplus, calculated from equation 12

$$\begin{aligned} V &= (v^A + \overline{v})(1-p) + (v^A + \underline{v})(1 - a^*)p - pqa^* \\ &= v^A + Ev^B - pa^*(v^A + \underline{v} + q) \end{aligned}$$

The following proposition provides a partial equilibrium characterization of the game with compensation.

Proposition 7 *Consider any separating equilibrium of the game with full compensation game that satisfies the intuitive criterion. Suppose the action taken by the low valuation type in the particular equilibrium is a^*. Then, the equilibrium tax, size of investment and the government's expected payoff are given respectively by*

$$\begin{aligned} x^* &= k(q - \tau^*), \\ \tau^* &= \frac{1}{2}[pa^*(v^A + \underline{v} + q) - (v^A + Ev^B - q)], \\ W^* &= \frac{k}{4}[(v^A + Ev^B + q) - pa^*(v^A + \underline{v} + q)]^2 \end{aligned}$$

We skip the formal proof of the proposition as it follows directly from Lemma 5, 1 and the previous discussion. Next, we point out some important features of the class of suitably refined equilibria of the game with full compensation arising from the above proposition.

First, we compare the equilibrium tax τ^* of the full compensation game with the optimal tax τ^o under full information and the equilibrium tax τ^e of the signaling game. It can be shown that τ^* is always greater than τ^o.[13] The intuition is straightforward: Compared to full information case, G's expected marginal return from investment is reduced due to possible destruction, but I's marginal return is unaffected due to compensation. This makes G more aggressive compared to the full information case. An important implication of this result is that a promise of compensation reverses the fact that resistance may force the government to be too investor-friendly.

However, the equilibrium tax τ^e in the game without compensation can be higher or lower than τ^*. Compared to the no compensation game, I's expected marginal valuation increases due to insurance, but G's marginal valuation can either increase (due to reduced destruction) or decrease (due to compensation). Together, the sign of $(\tau^* - \tau^e)$ can go either way.

Next, we turn to the question of comparison of welfare comparison under the three regimes: signaling without compensation, signaling with compensation and no-signaling. It makes a clear policy implication: some form of protection for the investor (either legal or financial) is not only better for the investor, it is better for the society too, since it helps increase surplus. This conclusion however presupposes that the government has complete control over the instruments of surplus redistribution: within the society (using t) and between the society and the investor (using τ).

Proposition 8 *Suppose that the payoff of the government under the unique equilibrium satisfying the intuitive criterion in the signaling regime without compensation is W^e, the payoff in* some *equilibrium satisfying the intuitive criterion in the signaling regime with full compensation is W^* and the payoff of the government in the no-signaling regime is W^{ns}. Then the government always prefers signaling with compensation to signaling without compensation, i.e. $W^* > W^e$ for all parameter values. Moreover, for any λ there is a unique cut-off $p^*(\lambda) < 1$ such that the $W^* < W^{ns}$ if $p > p^*(\lambda)$, $W^* > W^{ns}$ if $p < p^*(\lambda)$, and $W^* = W^{ns}$ if $p = p^*(\lambda)$. In other words, the government prefers signaling with compensation to no-signaling if and only if the probability of destruction is small enough.*

The proof of this proposition is very similar to that of proposition 5. Comparing expressions for government welfare in proposition 7 and proposition 2, the welfare of the government is *always higher with compensation than without*, and the reason is that $a^* < a^e$. Compensation not only corrects the distortion of the investor's incentives, it also ensures that the government obtains information at a lower social cost. While the compensation itself acts as a transfer from the government to the investor, since the government's welfare is an increasing function of the total valuation of the output of the two groups and the investor, such a transfer does not reduce the overall welfare of the government. In equilibrium, the only effect that compensation has on the government's payoff is that it reduces the government's cost of information acquisition. Therefore, there is an unambiguous increase of welfare, i.e. $W^* > W^e$.

Third, how does W^* compare to W^{ns}? In other words, given a choice, would the government prefer to ban destruction and legally protect the investor or compensate and financially protect the investor? Since W^* and W^e have exactly the same expressions except for different values of destruction, it turns out that we have a result that is very similar to proposition 5. In particular, there is a cut-off $p^*(\lambda)$ such that no-signaling is better than signaling with compensation if and only if $p \geq p^*(\lambda)$.[14] Moreover, whenever signaling is better than the no-signaling regime, the government should prefer signaling with compensation to both. Therefore, we can conclude that the government should always consider some form of protection for the

[13] We must remember, however, that in this case, an aggressive tax scheme is accompanied by a compensation in case of damage.

[14] The proof is exactly same as that of claim 1 in proposition 5, since the said proof does not depend on the value of a^*.

investor: financial protection if the probability of severe outcome is low enough and legal protection if the said probability is high.

6 Conclusion

In our paper, we constructed a framework of interaction between the government, affected groups and the investor to analyze the extent of destructive action and investor friendliness of governments. We show that destructive action may have informational value especially in a less developed society where the bottom-up channels of information may not work very well. The government may indeed want not to ban or enforce strictures on such destructive actions. However, it is always better for the government to have some protection for the investor. While legal protection for the investor involves enforcing a ban on resistance, financial protection involves allowing resistance (possibly through weak enforcement) and compensating the investor for its losses incurred. It turns out that it is preferable for the government to provide financial insurance to the investor while still allowing destructive resistance if, broadly, the bad outcome is severe but rare and the affected group is at least somewhat marginalized Otherwise, it makes sense for the government to commit to avoid such signaling and redistribute under the veil of ignorance. We also show that political structure of the society has an important effect in the sense the extent of destructive action increases with the marginalization of the affected group.

Moreover, in order to develop a theory of the government's investor friendliness, we model the government as a weighted social welfare maximizer and not as a rent-seeker. The informational constraint on the government introduces a distortion to the full-information benchmark. The possibility of destruction mutes the investor's incentives, and forces the government to be softer in its negotiations provided that the bad outcome is sufficiently severe. The message of this result is that inefficiencies in decision-making can arise simply from informational constraints on a government rather than from rent-seeking motivation. Therefore, softness in the government's dealing with external investors in less developed economies should not necessarily be taken as evidence of bureaucratic dishonesty or corruption. In fact, we point out that the inefficiency may actually go in the other direction: if the government finds it preferable to ban resistance, then suboptimal redistribution reduces the marginal value of surplus and makes the government too aggressive compared to the full information benchmark.

There are other interesting questions that are closely linked with the issue of resistance to private investment. For example, we assume that resistance has a public cost and creates externality to the whole society. The assumption is primarily motivated by the fact that in developing countries, resistance by groups typically takes a form that creates externality to the whole society. Theoretically, affected individuals can potentially signal the private information with actions that involves private cost.[15] It would be interesting to have a systematic analysis on when and why the groups may find it optimal to signal through activities with high public cost. This issue is possibly related to heterogeneity in the realized valuation. The substantive import of our assumption of uncertainty only about one group's valuation is that all affected individuals are affected the same way, which makes coordinating group actions easier. While we have not formally considered the problem of coordination that the group has to face in imposing public costs, such a problem would increase manyfold if there is heterogeneity regarding valuations.

We have considered that a government can redistribute the surplus freely. This is probably an extreme assumption, as redistributing surplus comes not in terms of lumpsum payments but setting up changes in the structure of the local economy which may involve deadweight losses. The actual effects will depend on

[15] Uba (2008) mentions events of hunger strikes – an activity with private cost – as a device to gain public and politicians' attention in the context of anti-privatization mobilization in India. However, the data on such events has been limited.

how such losses are distributed across groups. However, as long as these costs are small, all the conclusions of our model go through, with the caveat that the extent of resistance will be lower.

We recognize that in dealing with an investor, governments may face severe external constraints in the form of competing governments. There is a large literature on tax competition in Public Finance that shows that local governments might end up with a race to the bottom in trying to attract a monopoly investor (see Rauscher 1995 and Haufler and Wooton 1999 for two related instances). It is easy to show in our model that when two governments compete for a single investor, they will engage in a subsidy war where both lose, and all the gains accrue to the investor. Such a war may lead to economic inefficiencies as the investor might find it profitable locate in a less action-prone destination (high λ) rather than a more productive destination (low k). This result also indicates that the political structure of a society (e.g. extent of marginalization of relevant groups) matter for determining the investment destination. It is a challenge for governments in less developed economies to solve this problem by coordinating with each other. A possible solution would be for the more productive region to get the investment and arrange some side payments with the other society. We look into such alternative solutions in our further research.

7 Appendix

Proof of Lemma 2. Denote the maximand $\mu W(\underline{v}, a, t') + (1-\mu)W(\overline{v}, a, t')$ by $E_\mu W(a, t')$. Now,

$$\begin{aligned}
\frac{dE_\mu W(a,t)}{dt} &= \frac{d}{dt}[\mu S(\underline{v}, a) + (1-\mu)S(\overline{v}, a)] \\
&\quad -\frac{d}{dt}\mu[\lambda(w^A - t) - (1-\lambda)(w^B(\underline{v}) + t)]^2 \\
&\quad -\frac{d}{dt}(1-\mu)[\lambda(w^A - t) - (1-\lambda)(w^B(\overline{v}) + t)]^2 \\
&= 2[\lambda(w^A - t) - (1-\lambda)\{\mu w^B(\underline{v}) + (1-\mu)w^B(\overline{v}) + t\}]
\end{aligned}$$

Therefore, $\frac{d^2 E_\mu W(a,t)}{dt^2} = -2$, and the maximum occurs where

$$\begin{aligned}
\lambda(w^A - t) - (1-\lambda)\{\mu w^B(\underline{v}) + (1-\mu)(w^B(\overline{v}) + t)\} &= 0, \text{ implying} \\
t(\mu, a) = \lambda w^A(a) - (1-\lambda)\left[\mu w^B(\underline{v}, a) + (1-\mu)w^B(\overline{v}, a)\right]
\end{aligned}$$

Since $w^B(\overline{v}, a) - w^B(\underline{v}, a) = (\overline{v} - \underline{v})x(1-a)$, is easy to see that given a, the transfer $t(\mu, a)$ is strictly increasing in μ if $x > 0$ and $a < 1$. If $x = 0$ or $a = 1$, $t(\mu, a) = 0$ for all μ. ■

Proof of Lemma 3. The proof proceeds in two steps. First, we establish that in any separating equilibrium, the high-valution type sets $\overline{a} = 0$. Then, we establish the range of $\underline{a}$ in equilibrium. In this proof, sometimes we abuse notation by writing $t(0, a)$ as $t(\overline{v}, a)$ and $t(1, a)$ as $t(\underline{v}, a)$.

In any separating equilibrium, we have $\mu(\overline{a}) = 0$ and $\mu(\underline{a}) = 1$. Suppose that $\overline{a} > 0$. In a separating equilibrium, the transfer to the high type is $t(\overline{v}, \overline{a})$ and the resultant utility of the high type is $\lambda[(\overline{v} + v^A)(1-\overline{a}) + \tau]x$. On the other hand, the payoff obtained from deviating to $a = 0$ is $\overline{v}x + t(\mu(0), 0) + s\tau x$. Now, from Lemma 2, since $\mu(0) \geq 0$, we must have $t(\mu(0), 0) \geq t(\overline{v}, 0)$. Therefore,

$$\overline{v}x + t(\mu(0), 0) + s\tau x \geq \overline{v}x + t(\overline{v}, 0) + s\tau x = \lambda[(\overline{v} + v^A) + \tau]x > \lambda[(\overline{v} + v^A)(1-\overline{a}) + \tau]x$$

We can then say that the deviation payoff is strictly higher than the equilibrium payoff if $\overline{a} > 0$ since $\overline{v} + v^A > 0$ by assumption 1, and $x > 0$. This establishes that $\overline{a} = 0$ in any separating equilibrium. Next, we turn to the determination of $\underline{a}$.

A necessary condition that the optimal level of actions $(\underline{a}, 0)$ would have to satisfy is that neither type would gain by misrepresenting its own type. Let $w^B(a, t|v)$ denote group B's payoff given its true marginal valuation v, a redistributive transfer t, and an action a. The no-lying constraint for the high type is

$$w^B(0, t(\overline{v}, 0)|\overline{v}) \geq w^B(\underline{a}, t(\underline{v}, \underline{a})|\overline{v}) \tag{13}$$

And the no-lying constraint for the low type is

$$w^B(\underline{a}, t(\underline{v}, \underline{a})|\underline{v}) \geq w^B(0, t(\overline{v}, 0)|\underline{v}) \tag{14}$$

By rearranging terms, we see that inequalities (13) can be summarized as (14),

$$\overline{v}\underline{a}x \geq \Delta t(a) \geq \underline{v}\underline{a}x, \text{ where } \Delta t(a) = t(\underline{v}, \underline{a}) - t(\overline{v}, 0)$$

The gain in transfer $\Delta t(\underline{a})$ from representing oneself as of having low valuation by taking an action of level $\underline{a}$ is given by

$$\Delta t(a) = x\left[(1-\lambda)(\overline{v} - \underline{v}) + \underline{a}\left((1-\lambda)\underline{v} - \lambda v^A\right)\right].$$

After rearranging terms, we see that in any separating equilibrium,

$$\frac{(1-\lambda)(\overline{v} - \underline{v})}{((v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v}))} \leq \underline{a} \leq \frac{(1-\lambda)(\overline{v} - \underline{v})}{\lambda(v^A + \underline{v})}. \tag{15}$$

where the upper bound comes from condition 13 and the lower bound from condition 14. Condition 15 is only necessary for there to be a separating equilibrium. We now show that any $\underline{a} \in [a_L, a_H]$ will be an equilibrium, given beliefs

$$\mu(a) = \begin{cases} 0 \text{ if } a \in [0, \underline{a}) \cup (\underline{a}, 1] \\ 1 \text{ if } a = \underline{a} \end{cases}$$

For the high type, the utility from taking any action a rather than 0 is

$$w^B(a, t(\mu, a)|\overline{v}) = \begin{cases} \lambda((\overline{v} + v^A)(1-a) + \tau)x \text{ if } a \in [0, \underline{a}) \cup (\underline{a}, 1] \\ w^B(\underline{a}, t(\underline{v}, \underline{a})|\overline{v}) \text{ if } a \in \underline{a} \end{cases}$$

$w^B(0, t(\overline{v}, 0)|\overline{v}) = \lambda((\overline{v} + v^A) + \tau)x > \lambda((\overline{v} + v^A)(1-a) + \tau)x$ since $\overline{v} + v^A > 0$ and $w^B(0, t(\overline{v}, 0)|\overline{v}) \geq w^B(\underline{a}, t(\underline{v}, \underline{a})|\overline{v})$ by the no-lying constraint 13. Thus, the high type has no profitable deviation. For the low type, the utility from taking any other action a rather than $\underline{a}$ is $w^B(a, t(\overline{v}, a)|\underline{v})$, which is weakly lower than $w^B(a, t(\mu, a)|\underline{v})$ by the no-lying constraint of the low type, i.e. inequality 14.
When does a separating equilibrium exist? It does, only if $[a_L, \min\{a_H, 1\}]$ is a non-empty interval. By inspection, it is easy to see that if $\overline{v} + v^A > 0$, $a_L \in (0, 1)$. Also, after a little algebra, we see that

$$a_H - a_L = \frac{(1-\lambda)(\overline{v} - \underline{v})^2}{[(v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v})]\lambda(v^A + \underline{v})}, \tag{16}$$

and thus $a_H > a_L$ if and only if $(v^A + \underline{v}) \geq 0$, which holds true given Assumption 1. ■

Proof of Lemma 4. Consider any separating equilibrium with $\underline{a} > a_L$, and $\overline{a} = 0$. That there exists such an $\underline{a}$ is guaranteed by that fact that since $\overline{v} - \underline{v} > 0$, we will never have 0 in the right hand side of equation

16. Consider some action $a' \in (a_L, \underline{a})$. For any belief $\mu \in [0,1]$,

$$\begin{aligned}
w^B(a', t(\mu, a')|\overline{v}) &= \overline{v}x(1-a') + t(\mu, a') + s\tau x \leq \overline{v}x(1-a') + t(\underline{v}, a') + s\tau x \\
&= \overline{v}x(1-a') + [\lambda\{v^A x(1-a') + (1-s)\tau x\} - (1-\lambda)\{\underline{v}x(1-a') + s\tau x\}] + s\tau x \\
&= \lambda\tau x + \{\lambda v^A + \overline{v} - (1-\lambda)\underline{v}\}x(1-a') \\
&< \lambda\tau x + \{\lambda v^A + \overline{v} - (1-\lambda)\underline{v}\}x(1-a_L) \\
&= \lambda\tau x + \{\lambda v^A + \overline{v} - (1-\lambda)\underline{v}\}x\left(1 - \frac{(1-\lambda)(\overline{v}-\underline{v})}{\lambda v^A + \overline{v} - (1-\lambda)\underline{v}}\right) \\
&= \lambda\tau x + \lambda(v^A + \overline{v})x = \lambda(v^A + \overline{v} + \tau)x = w^B(0, t(\overline{v}, 0)|\overline{v}).
\end{aligned}$$

Therefore, for all possible beliefs μ arising from action a', the high type would get a lower utility from playing a' that it does in equilibrium. Thus, a' is equilibrium dominated for the high type, and hence we must have $\mu(a') = 1$. If $\mu(a') = 1$, then the payoff of the high type from playing action a' is

$$w^B(a', t(\underline{v}, a')|\underline{v}) = \lambda((\underline{v} + v^A)(1-a') + \tau)x > \lambda((\underline{v} + v^A)(1-\underline{a}) + \tau)x = w^B(\underline{a}, t(\underline{v}, \underline{a})|\underline{v}).$$

Therefore, the low type has a deviation yielding a higher payoff than the equilibrium payoff. Thus, the separating equilibrium with $\underline{a} > a_L$, and $\overline{a} = 0$ does not survive the intuitive criterion. ■

Proof of proposition 5. Fix $\overline{v}, \underline{v}$ and λ, and consider W^e and $W\!\!\!/^{ns}$ as functions of p. Now, it is easy to see that

$$\frac{W\!\!\!/^{ns}(p)}{W^e(p)} = \left[\frac{N(p)}{S(p)}\right]^2$$

where

$$N(p) = \frac{v^A + Ev_B + q}{\sqrt{1 + kF(p)}}, \; F(p) = p(1-p)(1-\lambda)^2(\overline{v} - \underline{v})^2 \tag{17}$$

$$S(p) = (v^A + Ev_B + q) - pa^e(v^A + \underline{v} + q), \; a^e = \frac{(1-\lambda)(\overline{v} - \underline{v})}{(v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v})} \tag{18}$$

Since $(v^A + Ev_B + q) - pa^e(v^A + \underline{v} + q) > 0$, we can say that $W\!\!\!/^{ns}(p) \lesseqgtr W^e(p)$ if and only if $N(p) \lesseqgtr S(p)$.

First, notice that $N(0) = S(0) = v^A + \overline{v} + q$. Also, $N(1) = (v^A + \underline{v} + q) > S(1) = (1 - a^e)(v^A + \underline{v} + q)$ since $a^e \in (0,1)$. Next, note that

$$\frac{dS(p)}{dp} = (\underline{v} - \overline{v}) - a^e(v^A + \underline{v} + q) < 0 \tag{19}$$

According to 18, $S(p)$ is a downward sloping straight line. On the other hand,

$$\begin{aligned}
\frac{dN(p)}{dp} &= \frac{1}{1 + kF(p)}\left\{(\underline{v} - \overline{v})\sqrt{1 + kF(p)} - (v^A + Ev_B + q)\frac{k(1-\lambda)^2(\overline{v} - \underline{v})^2}{2\sqrt{1 + kF(p)}}(1 - 2p)\right\} \\
&= \frac{(\underline{v} - \overline{v})}{\sqrt{1 + kF(p)}} - (v^A + Ev_B + q)\frac{k(1-\lambda)^2(\overline{v} - \underline{v})^2}{(1 + kF(p))^{\frac{3}{2}}}\left(\frac{1}{2} - p\right)
\end{aligned} \tag{20}$$

Notice that

$$\frac{dN(p)}{dp}|_{p=0} = (\underline{v} - \overline{v}) - \frac{1}{2}k(v^A + \overline{v} + q)(1-\lambda)^2(\overline{v} - \underline{v})^2 \tag{21}$$

Next, we claim that *for any $p^* \in (0,1)$ for which $N(p) = S(p)$, we must have $\frac{dN(p)}{dp} > \frac{dS(p)}{dp}$.* We call this claim 1. We prove this claim as a next step of the proof of proposition 5.

Suppose claim 1 is not true, and there is some $p^* \in (0,1)$ satisfying $N(p) = S(p)$, and $\frac{dN(p)}{dp} \leq \frac{dS(p)}{dp}$. Therefore, from 20 and 21, for p^*, we must have

$$\begin{aligned} \frac{(\underline{v}-\overline{v})}{\sqrt{1+kF(p)}} - (v^A + Ev_B + q)\frac{k(1-\lambda)^2(\overline{v}-\underline{v})^2}{(1+kF(p))^{\frac{3}{2}}}(\frac{1}{2}-p) &\leq (\underline{v}-\overline{v}) - a^e(v^A+\underline{v}+q), \text{ or} \\ (v^A + Ev_B + q)\frac{k(1-\lambda)^2(\overline{v}-\underline{v})^2}{(1+kF(p))^{\frac{3}{2}}}(\frac{1}{2}-p) - a^e(v^A+\underline{v}+q) &\geq \frac{(\underline{v}-\overline{v})}{\sqrt{1+kF(p)}} - (\underline{v}-\overline{v}) \end{aligned}$$

Since $p^* > 0$, $\sqrt{1+kF(p)} > 1$, and since $(\underline{v}-\overline{v}) < 0$, the right hand side is strictly positive. Therefore, we must have

$$(v^A + Ev_B + q)\frac{k(1-\lambda)^2(\overline{v}-\underline{v})^2}{(1+kF(p))^{\frac{3}{2}}}\left(\frac{1}{2}-p\right) > a^e(v^A+\underline{v}+q) \tag{22}$$

From 17 and 18, since $N(p) = S(p)$ at p^*, we have

$$\begin{aligned} \frac{v^A + Ev_B + q}{\sqrt{1+kF(p)}} &= (v^A + Ev_B + q) - pa^e(v^A+\underline{v}+q) \\ v^A + Ev_B + q &= \frac{pa^e(v^A+\underline{v}+q)}{\left[1-\frac{1}{\sqrt{1+kF(p)}}\right]} \end{aligned} \tag{23}$$

Using 23, condition 22 reads

$$a^e(v^A+\underline{v}+q)\frac{k(1-\lambda)^2(\overline{v}-\underline{v})^2\left(\frac{1}{2}-p\right)p}{\left[1-\frac{1}{\sqrt{1+kF(p)}}\right](1+kF(p))^{\frac{3}{2}}} > a^e(v^A+\underline{v}+q)$$

which is true if and only if

$$\begin{aligned} \left[1-\frac{1}{\sqrt{1+kF(p)}}\right](1+kF(p))^{\frac{3}{2}} &< k(1-\lambda)^2(\overline{v}-\underline{v})^2\left(\frac{1}{2}-p\right)p, \text{ or} \\ (1+kF(p))^{\frac{3}{2}} - (1+kF(p)) &< k(1-\lambda)^2(\overline{v}-\underline{v})^2\left(\frac{1}{2}-p\right)p, \text{ or} \\ \left[1+k(1-\lambda)^2(\overline{v}-\underline{v})^2(1-p)p\right]^{3/2} &< k(1-\lambda)^2(\overline{v}-\underline{v})^2\left(\frac{1}{2}-p\right)p + 1 + k(1-\lambda)^2(\overline{v}-\underline{v})^2(1-p)p \\ &= 1 + k(1-\lambda)^2(\overline{v}-\underline{v})^2 p\left(\frac{3}{2}-2p\right) \end{aligned} \tag{24}$$

Now, from the Taylor series expansion of the left hand side,

$$\begin{aligned} \left[1+k(1-\lambda)^2(\overline{v}-\underline{v})^2(1-p)p\right]^{3/2} &> 1 + \frac{3}{2}k(1-\lambda)^2(\overline{v}-\underline{v})^2(1-p)p \\ &= 1 + k(1-\lambda)^2(\overline{v}-\underline{v})^2 p\left(\frac{3}{2}-\frac{3}{2}p\right) \\ &> 1 + k(1-\lambda)^2(\overline{v}-\underline{v})^2 p\left(\frac{3}{2}-2p\right) \end{aligned} \tag{25}$$

since $p^* > 0$. Inequality 25 is a contradiction to inequality 24. Since inequality 24 is false, condition 22 is not satisfied. This proves claim 1.

According to claim 1, whenever $N(p^*) = S(p^*)$ other than $p^* = 0$, $N(p)$ should cut $S(p)$ from below. This implies that there is at most one solution to $N(p) = S(p)$ for $p \in (0,1]$. To see that, suppose there were more than one solutions to $N(p) = S(p)$. By claim 1, in case of each solution, $N(p)$ should cut $S(p)$ from below. But since both $N(p)$ and $S(p)$ are continuous, by the intermediate value theorem, between any two such distinct solutions, there must be some p' such that $N(p') = S(p')$ where $N(p)$ cuts $S(p)$ from above. This is a contradiction to claim 1. From claim 1, it follows that there is at most one solution to $N(p) = S(p)$ for $p \in (0,1]$. Also, if there exists such a solution p^*, for $p < p^*$, $N(p) < S(p)$ and for $p > p^*$, $N(p) > S(p)$. Moreover, since $N(1) > S(1)$, we must have $p^* < 1$.

Since $N(0) = S(0)$, there is an interior solution p^* to the equation $N(p) = S(p)$ if and only if there is some $\epsilon > 0$ such that $N(p) < S(p)$ for the interval $(0, \epsilon)$. Such an ϵ exists if and only if $\frac{dN(p)}{dp} < \frac{dS(p)}{dp}$ at $p = 0$. Comparing 19 and 21, the condition is

$$a^e(v^A + \underline{v} + q) < \frac{1}{2}k(v^A + \overline{v} + q)(1-\lambda)^2(\overline{v} - \underline{v})^2 \tag{26}$$

Condition 26 can be broken down further as

$$\begin{aligned} \frac{(1-\lambda)(\overline{v} - \underline{v})}{(v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v})} &< \frac{(v^A + \overline{v} + q)}{(v^A + \underline{v} + q)}\frac{1}{2}k(\overline{v} - \underline{v})^2(1-\lambda)^2, \text{ or} \\ (1-\lambda)\left[(v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v})\right] &> \frac{(v^A + \underline{v} + q)}{(v^A + \overline{v} + q)}\frac{2}{k(\overline{v} - \underline{v})} \end{aligned} \tag{27}$$

Taking $(1-\lambda) = x$, $v^A + \underline{v} = a$ and $v^A + \overline{v} = b$, we can rewrite condition 27 as $f(x) \equiv ax^2 - bx + \frac{2}{k(b-a)}\frac{a+q}{b+q} < 0$. Now, $f(0) > 0$ and $f''(x) = a > 0$. Thus, we have at most an interval of x such that $f(x) < 0$. If that range is $[x_1, x_2]$, then $\overline{\lambda} = \max\{1 - x_1, 0\}$ and $\underline{\lambda} = \max\{1 - x_2, 0\}$. Since $f(0) > 0$, we have $x_1 > 0$, implying $\overline{\lambda} < 1$. Also, $f(1) = -(b-a) + \frac{2}{k(b-a)}\frac{a+q}{b+q}$. Making a small enough, we can have $f(1) < 0$, which implies that $\underline{\lambda} = 0$.
■

Proof of Lemma 5. The proof of this lemma proceeds in several steps. Lemma 2 holds, the proof requires a very minor accounting change. Thus, the transfer $t(\mu, a)$ is strictly increasing in μ except if $a = 1$ or $x = 0$, in which case, $t(\mu, a)$ is constant in μ. Now, suppose that in a separating equilibrium, the high valuation type takes action $\overline{a}$ and the low valuation type takes action $\underline{a}$.

To check that $\overline{a} = 0$, suppose otherwise. In a separating equilibrium, the transfer to the high type is $t(\overline{v}, \overline{a})$ and the resultant utility of the high type is $\lambda[(\overline{v} + v^A)(1 - \overline{a}) + \tau - q\overline{a}]x$. On the other hand, the payoff obtained from deviating to $a = 0$ is $\overline{v}x + t(\mu(0), 0) + s\tau x$. Therefore,

$$\overline{v}x + t(\mu(0), 0) + s\tau x \geq \overline{v}x + t(\overline{v}, 0) + s\tau x = \lambda[(\overline{v} + v^A) + \tau]x > \lambda[(\overline{v} + v^A)(1 - \overline{a}) + \tau - q\overline{a}]x$$

We can then say that the deviation payoff is strictly higher than the equilibrium payoff if $\overline{a} > 0$ since $\overline{v} + v^A > 0$ by assumption 1, and $x > 0$. This establishes that $\overline{a} = 0$ in any separating equilibrium.

Next, we turn to the determination of $\underline{a}$. As in the proof of Lemma 3, the range of $\underline{a}$ satisfies

$$\overline{v}\underline{a}x \geq \Delta t\,(a) \geq \underline{v}\underline{a}x, \text{ where } \Delta t\,(a) = t(\underline{v}, \underline{a}) - t(\overline{v}, 0)$$

Now, we have for the transfers

$$\begin{aligned} t(\underline{v}, \underline{a}) &= \lambda[v^A x(1-a) + s^A\tau x - r^A qax] - (1-\lambda)[\underline{v}x(1-a) + s^B\tau x - r^B qax] \\ t(\overline{v}, 0) &= \lambda[v^A x + s^A\tau x] - (1-\lambda)[\overline{v}x + s^B\tau x] \end{aligned}$$

Hence, the gain in transfer $\Delta t\left(\underline{a}\right)$ from representing oneself as of having low valuation by taking an action of level $\underline{a}$ is given by

$$\Delta t(\underline{a}) = t(\underline{v}, \underline{a}) - t(\overline{v}, 0) = x[(1-\lambda)(\overline{v} - \underline{v}) + a\{\underline{v}(1-\lambda) - \lambda v^A\}] + qax\{(1-\lambda)r^B - \lambda r^A\}$$

The range of $\underline{a}$ given by

$$\begin{aligned} [(1-\lambda)(\overline{v} - \underline{v}) + a\{\underline{v}(1-\lambda) - \lambda v^A\}] + a\{(1-\lambda)r^B - \lambda r^A\} &\leq \overline{v}a + r^B aq \\ a'_L = \frac{(1-\lambda)(\overline{v} - \underline{v})}{(v^A + \overline{v}) - (1-\lambda)(v^A + \underline{v}) + \lambda q} &\leq a \end{aligned}$$

and that

$$\begin{aligned} (1-\lambda)(\overline{v} - \underline{v}) + a\{\underline{v}(1-\lambda) - \lambda v^A\}] + a\{(1-\lambda)r^B - \lambda r^A\} &\geq \underline{v}a + r^B aq \\ a'_H = \frac{(1-\lambda)\left(\overline{v} - \underline{v}\right)}{\lambda(v^A + \underline{v}) + \lambda q} &\geq a \end{aligned}$$

It can be easily checked that $a'_L < \min\{a'_H, 1\}$ and thus, a separating equilibrium always exists. Notice that $a'_L < a_L = a^e$.

Now, we turn to refining the set of equilibria using the Cho-Kreps criterion and showing that any equilibrium satisfying the criterion has the property that the action of the low valuation type a^* satisfies $a^* < a^e$.In particular, we show that no $\underline{a}$ with $\underline{a} > \max\left\{a'_L, \frac{a_L}{1+\lambda q}\right\}$ satisfies the Cho-Kreps criterion.

Consider any separating equilibrium with $\underline{a} > \max\left\{a'_L, \frac{a_L}{1+\lambda q}\right\}$, and $\overline{a} = 0$. Consider some action $a' \in \left(\max\left\{a'_L, \frac{a_L}{1+\lambda q}\right\}, \underline{a}\right)$. For any belief $\mu \in [0,1]$,

$$\begin{aligned} w^B(a', t(\mu, a')|\overline{v}) &= \overline{v}x(1-a') + t(\mu, a') + s\tau x - r^B qa'x \leq \overline{v}x(1-a') + t(\underline{v}, a') + s\tau x - r^B qa'x \\ &= \overline{v}x(1-a') + +s\tau x - r^B qa'x \\ &\quad +[\lambda\{v^A x(1-a') + (1-s)\tau x - r^A qa'x\} - (1-\lambda)\{\underline{v}x(1-a') + s\tau x - r^B qa'x\}] \\ &= \lambda\tau x + \{\lambda v^A + \overline{v} - (1-\lambda)\underline{v}\}x(1-a') - (\lambda r^A - (1-\lambda)r^B + r^B)qa'x \\ &= \lambda\tau x + [\lambda v^A + \overline{v} - (1-\lambda)\underline{v}][1 - a'(1+\lambda q)]x \\ &< \lambda\tau x + [\lambda v^A + \overline{v} - (1-\lambda)\underline{v}][1 - a_L]x \\ &= \lambda\tau x + [\lambda v^A + \overline{v} - (1-\lambda)\underline{v}]\left[1 - \frac{(1-\lambda)\left(\overline{v} - \underline{v}\right)}{\lambda v^A + \overline{v} - (1-\lambda)\underline{v}}\right]x \\ &= \lambda\tau x + \lambda(v^A + \overline{v})x = \lambda(v^A + \overline{v} + \tau)x = w^B(0, t(\overline{v}, 0)|\overline{v}). \end{aligned}$$

Therefore, for all possible beliefs μ arising from action a', the high type would get a lower utility from playing a' that it does in equilibrium. Thus, a' is equilibrium dominated for the high type, and hence we must have $\mu(a') = 1$. If $\mu(a') = 1$, then the payoff of the high type from playing action a' is

$$w^B(a', t(\underline{v}, a')|\underline{v}) = \lambda((\underline{v} + v^A)(1-a') - a'q + \tau)x > \lambda((\underline{v} + v^A)(1-\underline{a}) - \underline{a}q + \tau)x = w^B(\underline{a}, t(\underline{v}, \underline{a})|\underline{v}).$$

Therefore, the low type has a deviation yielding a higher payoff than the equilibrium payoff. Thus, the separating equilibrium with $\underline{a} > \max\left\{a'_L, \frac{a_L}{1+\lambda q}\right\}$, and $\overline{a} = 0$ does not survive the intuitive criterion. ■

References

Admati A. and M. Perry. 1987. "Strategic Delay in Bargaining" *Review of Economic Studies*, 54: 345-363.

Austen-Smith, D. 1993. "Information and Influence: Lobbying for Agendas and Votes". *American Journal of Political Science.* 37(3): 799-833.

Austen-Smith, D. 1994. "Strategic Transmission of Costly Information". *Econometrica.* 62(4): 955-963

Austen-Smith, D. 1995. "Campaign Contributions and Access". *American Political Science Review.* 89(3): 566-582

Austen-Smith, D and J. R. Wright. 1992 "Competitive Lobbying for a Legislator's Vote", *Social Choice and Welfare,* 9: 229-25

Bardhan, P. 1996. "Efficiency, Equity and Poverty Alleviation: Policy Issues in Less Developed Countries." *Economic Journal.* 106(September): 1344-1356.

Bardhan, P. 2006a. "Globalization Hits Road Bumps in India." *Yale Global Online*, October 2006.

Bardhan, P. 2006b. "Does globalization help or hurt the world's poor?" *Scientific American.* 294: 84-91.

Bardhan, P. and D. Mookherjee. 2006. "Decentralisation and Accountability in Infrastructure Delivery in Developing Countries." *Economic Journal*, 116 (January): 101–127.

Beinen, Henry , and Waterbury, John. (1989). The political economy of privatization in developing countries. *World Development.* 17(May): 617-632.

Besley,T. and R. Burgess. 2002. "Can Labor Regulation Hinder Economic Performance? Evidence from India." *Quarterly Journal of Economics.* 119(1): 91-134.

Bortolotti, B. and Siniscalco, D. 2004. *The Challenges of Privatization. An International Analysis.* Oxford: Oxford University Press.

Cavaliere, A. and S. Scabrosetti. 2008. "Privatization and efficiency: From principals and agents to political economy." *Journal of Economic Surveys.* 22: 685-710.

Cho, I-K. & D. M. Kreps. 1987. "Signaling games and stable equilibria." *Quarterly Journal of Economics.* 102: 179-221.

Cramton, P. 1992. "Strategic Delay in Bargaining with Two-Sided Uncertainty," *Review of Economic Studies*, 59: 205-25.

Cramton, P. and J. Tracy. 1992. "Strikes and Holdouts in Wage Bargaining:Theory and Data." *American Economic Review.* 82: 100-121.

Esteban, J. and D. Ray. 2006 "Inequality, Lobbying and Resource Allocation" *American Economic Review.* 96: 257-279.

Estrin, S., J. Hanousek, E. Kocenda, and J. Svejnar. 2007. "Effects of Privatization and Ownership in Transition Economies." *Journal of Economic Literature.* 47(3): 699–728.

Fudenberg, D., D. Levine and J. Tirole. 1985. "Infinite Horizon Models with One-Sided Incomplete Information" in Alvin Roth (ed.), Game Theoretic Models of Bargaining, Cambridge University Press.

Galal, A., L. Jones, P. Tandon and I. Vogelsang. 1994. *Welfare Consequences of Selling Public Enterprises*. Oxford: Oxford University Press.

Grossman, S. J. and M. Perry. 1986. "Sequential Bargaining under Asymmetric Information", *Journal of Economic Theory,* 39: 120-154.

Hart, O. 1989. "Bargaining and Strikes." *Quarterly Journal of Economics*. 104: 25-43.

Harstad, B. 2007. "Harmonization and Side Payments in Political Cooperation." *American Economic Review*. 97(3): 871-889.

Haufler, A. and I. Wooton. 1999. "Country Size and Tax Competition for Foreign Direct Investment". *Journal of Public Economics* 71: 121-139

Laffont, J.J,. "Political Economy, Information and Incentives", *European Economic Review*, 43: 649-669.

Lohmann, S. 1993. "A signaling Model of Informative and Manipulative Political Action" *The American Political Science Review* 87: 319-333.

Lohmann, S. 1994. "Information Aggregation Through Costly Political Action." *American Economic Review*. 84: 518-530.

Lohmann, S. 1995a. "A Signaling Model of Competitive Political Pressures." *Economics and Politics*. 5: 181-206.

Lohmann, S. 1995b. "Information, Access and Contributions: A Signaling Model of Lobbying." *Public Choice*. 85: 267-284.

Lohmann, S. 1998. "An Information Rationale for the Power of Special Interests" *The American Political Science Review* 92: 809-827.

Megginson, W. L., R. C. Nash and M. Van Randenborgh. 1994. "The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis." *Journal of Finance*, 49: 403-452.

Megginson, W. L., and J. M. Netter. 2001. "From State to Market: A Survey of Empirical Studies on Privatization." *Journal of Economic Literature*, 39: 321-389.

Molano, W. 1997. *The logic of privatization: the case of telecommunications in the Southern Cone of Latin America*. Greenwood Press.

Oman, C. P. 2000. *Policy Competition for Foreign Direct Investment: A study of Competition among Governments to Attract FDI*. OECD Development Center, Paris: OECD.

Persson, T. and G. Tabellini. 2000. *Political Economics: Explaining Economic Policy*. Cambridge: The MIT Press.

Rauscher, M. 1995. "Environmental Regulation and the Location of Polluting Industries" *International Public Finance* 2: 229-244

Ray, D. 2007. *A Game Theoretic Perspective on Coalition Formation*. Oxford: Oxford University Press.

Ray, D. 2010. "Uneven Growth: A Framework for Research in Development Economics." *Journal of Economic Perspectives*. 24(3): 45-60.

Rodrik, D. 1999. “The New Global Economy and Developing Countries: Making Openness Work.” Policy Essay No. 24. Overseas Development Council. Washington D.C.

Sheshinski, E. and Lopez-Calva, L.F. (2003) Privatization and its benefits: theory and evidence. *CESifo Economic Studies.* 49: 429–459.

Shirley, M.M. and Walsh, P. 2004. *Public versus Private Ownership: The Current State of the Debate*. Washington, DC: The World Bank.

Stern, Nicholas 2001. *A Strategy for Development*. Washington: World Bank.

Stiglitz, J. 2002. *Globalization and Its Discontents*. W.W. Norton & Company.

Uba, K. 2005. “Political Protest and Policy Change: The Direct Impacts of Indian Anti-privatization Mobilizations.” *Mobilization: An International Journal*. 10(3): 383-396.

Uba, K. 2008. “Labor union resistance to economic liberalization in India: what can national and state level patterns of protests against privatization tell us?” *Asian Survey*. 48(5): 860–884.

World Bank. 1995. *Bureaucrats in Business: The Economics and Politics of Government Ownership*. Washington DC: Oxford University Press for the World Bank.