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# A signaling model of peaceful political change

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**Abstract.** The interaction between social activists and politicians is modeled by a signaling game in which activists send messages and politicians interpret them, attempting to understand the activists' goals. These goals range between extreme radical and very moderate changes that activists wish to achieve in policy or in the political system. The formal model shows the conditions for equilibrium with separating and pooling regions dependent on the type of social activists and the demands they raise. In the pooling region an activist who wants to achieve a certain degree of radical change sends a false signal, thus possibly leading politicians to enter negotiations under unfavorable conditions. This creates a momentum of peaceful political change.

## 1 Introduction

Dynamics of peaceful political change are usually characterized by a close interaction between politicians and social activists. Social activists raise demands for certain changes and politicians respond by cooperation or non-cooperation. Since politicians will accept demands only when it is too costly not to do so, social activists are required to adopt strategies and coordinate social efforts that increase political costs. Social activists thus address two audiences – their followers and the government.

In analyzing this twofold interaction, social scientists tend to concentrate on the collective action problem and the ways in which social activists solve it (Olson 1965; Frohlich et al. 1971; Hardin 1982; Axelrod 1984; Taylor 1987; Ostrom 1990; Chong 1991; Calvert 1992; Colomer 1995; Gavious and Mizrahi 1999). The interaction between social activists leading social movements and politicians has been modeled as a signaling process. In this process social activists recognize their own type of activism – typified by their power and

mobilization abilities – while politicians are not fully informed about these types (Ainsworth and Sened 1993; Lohmann 1993, 1994; Karklins and Pattersen 1993). In these models, social activists send signals to the government regarding their power, abilities and/or identity through the number of actions and participants that they mobilize. Politicians then interpret the signals and decide whether the accumulative effect has reached a critical threshold that threatens their rule. These studies conclude that since politicians form their strategies depending on the number of participants in protest actions, social activists who desire change attempt to maximize this number.

This paper analyzes the signaling process between social activists and politicians from a different point of view. It is assumed that politicians also consider the activists' final goals and attempt to understand the activists' intentions by interpreting their demands and messages. Since activists who mobilize collective action always raise certain demands, politicians necessarily take these demands as a possible indication of the activists' goals and intentions. These demands/goals represent a certain combination in the range between extreme radical and very moderate political or policy change. In planning their signaling strategy social activists attempt to keep their followers' support (Ainsworth and Sened 1993).

The paper analyzes a dynamic of peaceful political change as opposed to revolutionary one. In the peaceful dynamic the key decision of politicians is whether to enter negotiation with social activists thus legitimizing their demands and activity. The framework can explain processes of peaceful transition toward democracy though other applications are possible as well.

We present a formal model of a signaling game showing that in equilibrium there are three regions that depend on the type of social activists and the demands they raise. In this model, we accept the argument that the scope of collective action influences activists' power as well as politicians' beliefs, but we focus on the ways in which activists' demands are signaled and interpreted. In that way, we extend the signaling process introduced in the literature to include the demands raised by activists, and not only the numbers mobilized.

Specifically, the formal model shows the conditions for a semi-separating equilibrium with separating and pooling regions dependent on the type of social activists and the demands they raise. In the separating region, politicians respond by a cooperative or non-cooperative strategy depending on the activists' true type that is revealed through the signal. In the pooling region an activist who wants to achieve a certain degree of radical change sends a false signal thus creating the impression that he/she is interested in a more moderate change than he/she really is. This leads politicians to enter negotiations under unfavorable conditions, and legitimize the political/radical aspirations of social activists. This equilibrium analysis implies that a necessary condition for radical change is the existence of enough entrepreneurs with no clear orientation toward change – whether radical or moderate change – who raise demands that are more moderate than their true type. Only then will politicians enter negotiations and radical changes may be expected. Otherwise, either moderate change will be achieved by moderate entrepreneurs or clear

radical demands raised by radical entrepreneurs will be rejected. Thus, radical political changes often happen when entrepreneurs strategically use a signaling strategy that leads politicians to misinterpret entrepreneurs' goals and intentions. The rationales and insights of the model are empirically illustrated by reference to the Monday demonstrations in Leipzig, East Germany, 1989, that finally led to regime transition in 1990.

The signaling game developed here relies on a very rich literature such as Spence (1973), Milgrom and Roberts (1982), Orzach and Tauman (1996). The model developed here has a functional structure similar to the models suggested, in a different context, by Gilligan and Krehbiel (1987) and Epstein (1999). Gilligan and Krehbiel (1987) suggest a two-stage signaling game between a standing committee and the floor, where the committee signals through the bill about certain exogenous conditions. Their model explains the conditions for a separating and a pooling equilibrium using a similar utility function to the one we develop for the informed player. Epstein (1999) also develops a signaling game between a standing committee and the floor where there are multiple signalers.

Section 2 introduces the formal model. Section 3 presents the equilibrium analysis. Section 4 discusses the theoretical rationales and offer empirical illustrations.

## 2 A signaling game between entrepreneurs and politicians

Political collective action is intended to induce politicians to make certain changes in public policy or in the institutional setting. Such changes may range between extreme radical and very moderate (minor) ones. The model focuses on the dynamic of peacefully achieving radical changes though it also explains moderate changes.

The interaction between social activists and politicians over radical change usually develops in two stages. First, social activists attempt to force negotiations in order to gain legitimacy and government recognition and then they try to maximize the benefits to their specific interests through such negotiations. The first objective is particularly significant in non-democratic systems, where rulers consider protest activity threatening and therefore illegal. To a large extent, forcing the government to start negotiations is a political accomplishment in and of itself.[1] Such interactions usually involve various factors, yet here we will try to explain how social activists force negotiation by strategically using information and signaling. Thus, a cooperative strategy on the politicians' side means that they enter negotiations with social activists while a non-cooperative strategy is rejection of demands without negotiating. The

[1] For example, in the August 1980 events in Poland as well as in the 1989 transition processes in Eastern Europe, the fact that the government entered negotiations legitimized the opposition and created a momentum of concessions (Kemp-Welch 1991; Wolchik 1991; Bruszt 1992).

model constructed in this paper does not refer to the strategies and outcome of the negotiation stage itself.

In the signaling process between social activists and politicians, the former are the informed players who have private information about their preferences and goals, including the degree of willingness to bear the costs of struggle. These parameters constitute the social activists' type, which they can choose to reveal or hide by means of their signals. Hence, following other signaling models, social activists are "Senders" and politicians are "Receivers" in the signaling game (Ainsworth and Sened 1993; Lohmann 1993, 1994).

Politicians are members of a government that composes a unitary player in our model as for example in non-democratic systems. In democracies there are coalitions and conflicts within the government, yet once decision is reached, the government act as a unitary player. Therefore, the model describes both non-democratic and democratic systems with emphasis on the first.

Social activists, henceforth termed "entrepreneurs," may be of various types ranging from extremely radical entrepreneurs, i.e., entrepreneurs who are only interested in radical change of policy or institutional setting, to very moderate entrepreneurs, i.e., entrepreneurs who are only interested in minor changes. This definition corresponds to the distinction between High and Low types, respectively, usually used in the signaling literature. Entrepreneurs then signal their goals and intentions by raising a certain combination of demands, which does not necessarily match their type, ranging from extreme radical demands to very moderate ones. Politicians then interpret the entrepreneurs' signal and decide whether to enter negotiations or not.

### *2.1 The timing of the game*

Our model starts from the point where a certain level of collective action has been mobilized, and focuses on the nature of demands raised by social activists compared to their true type – whether radical or moderate. The timing of the game and notations are as follows.

1) Nature selects entrepreneur type $\theta \in [0, 1]$, where $\theta = 0$ represents an extreme radical entrepreneur and $\theta = 1$ represents a very moderate entrepreneur. Other values of $\theta$, i.e., in the range $0 < \theta < 1$, represent the degree of change in policy or institutional setting that the entrepreneur wishes to achieve. As the value of $\theta$ increases, the degree of change desired is lower. The entrepreneur's type, $\theta$, is drawn by a probability density, $f(\theta)$, defined in $[0, 1]$. The function, $f(\theta)$, is common knowledge, meaning that both the entrepreneur and the politician know it. However, entrepreneur's type, $\theta$, is only known to him/her, while the politician is only informed about $f(\theta)$.
2) The entrepreneur observes $\theta$ and chooses a message, i.e., the degree of change to be demanded, $d \geq 0$, which becomes common knowledge. Similarly to the variable $\theta$, the scale of $d$ ranges from $d = 0$ for extreme radical demands through $0 < d < 1$ to $d = 1$ for very moderate demands. In practice, the demands are raised through mobilizing social support.

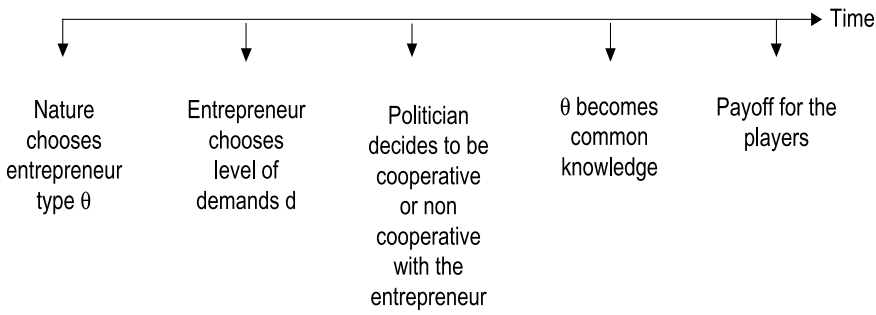


**Fig. 1.** The time line of the game

3) The politician observes $d$ and decides whether to adopt a cooperative or non-cooperative strategy ($C$ and $NC$ respectively), i.e., enter or not enter negotiations. The politician's decision is represented by $s \in \{C, NC\}$.
4) The type of the entrepreneur, $\theta$, becomes common knowledge. Based on the politician's decision, the entrepreneur obtains a payoff represented by the function $B(s, d, \theta)$. The payoff for the politician is given by $V(s, \theta)$. Note that this payoff is independent of the type of demands raised by the entrepreneur, $d$, because after the game ends, the type of demands is sank cost for the politician.

The time line of the game is presented in Fig. 1. We now explain the assumptions regarding politicians and entrepreneurs.

### *2.2 Politicians*

The payoff for the politician is given by $V(s, \theta)$ which is continuous with respect to $\theta$. The basic assumption regarding politicians' calculations is that while they do not want to relinquish power, they are willing to achieve quiet by negotiating over minor changes.

Thus, politicians in any political system are assumed to be more flexible (or cooperative) when entrepreneurs are more moderate. However, they are likely to regard attempts to radically change policy or the institutional setting as a major threat. Therefore, their benefits from a cooperative strategy grow as the entrepreneurs are more moderate, meaning that the function $V(C, \theta)$ monotonically increases with $\theta$.

By the same rationale, politicians in office who adopt a non-cooperative strategy toward entrepreneurs will have greater benefits, as the entrepreneurs are more radical.[2] It is thus assumed that $V(NC, \theta)$ is a monotonic decreasing function with $\theta$, and that $V(NC, 0) > V(C, 0)$, meaning that the politician is better off being non-cooperative, as compared to cooperative, vis-à-vis

[2] Note also that as entrepreneurs' demands are more radical, they bear higher costs for politicians, since they weaken their deterrence ability. These costs are not part of the formal model because they complicate the model without significantly influencing the results.

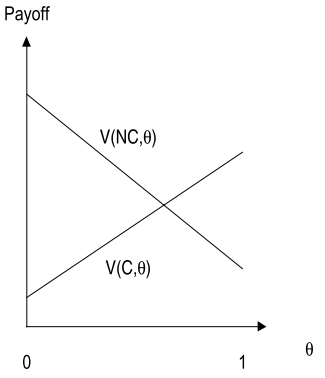


**Fig. 2a.** The structure of the politician's utility function

an extreme radical entrepreneur. By the same reasoning, $V(NC, 1) < V(C, 1)$. These assumptions, as summarized in Fig. 2a, imply that there is a unique point of intersection between the functions $V(NC, \theta)$ and $V(C, \theta)$.

### *2.3 Entrepreneurs*

Entrepreneurs are those people who are able to rally the members of an interest group, set up an organization, mobilize resources and press the government to provide the collective good in which the group is interested. They mobilize collective action and advocate policy or political change because of a certain gain that they can get rather than due certain altruistic motivations. Colomer (1995) suggests that the decisive incentives for an individual to try to lead a group come from his or her opportunity costs, that is, the comparison between the potential benefits associated with the role of leader and the rewards that can be obtained from other professional, social or private activities. In other words, social activists receive some positive utility from the surplus of the collective goods, i.e., private payoffs such as power, social status, prestige, and political career (Frohlich et al. 1970; Colomer 1995). Since these payoffs are significantly influenced by entrepreneurs' reliability vis-à-vis their followers as well as by the necessity to guarantee long term support, entrepreneurs form their signaling strategy depending on the costs and benefits vis-à-vis that audience.

In this respect, it is assumed that the cost of mobilization decreases and the benefit from the outcome increases, as the demands resemble to a greater degree the entrepreneurs' true type. The cost will be minimized and the benefit will be maximized when $d = \theta$. In that way, entrepreneurs achieve two goals. First, they are most likely keeping their reputation and reliability toward their followers. Second, it is guaranteed that if the government cooperates with them and enter negotiation, they will be able to achieve their true goals to a greater degree thus strengthening their social status as competent social leaders. For example, extreme radical entrepreneurs who achieve the government cooperation around moderate demands will hardly be able to achieve their radical goals in negotiations and may lose their social status as

radical activists. Therefore, entrepreneurs basically want that the government will negotiate with them over their true goals.

Regarding the costs of mobilization, it is assumed that each type of entrepreneur has a natural group of supporters (followers) who have goals similar to those of entrepreneur. These particular entrepreneurs have an easier time mobilizing this group, big or small, around these common goals. Therefore, it is assumed that the entrepreneurs' cost function reaches its minimum when the demands exactly fit the entrepreneurs' true type. The entrepreneurs' cost increases as the goals and intentions that they want to signal through the demands differ to a greater degree from their true type. In such a case, entrepreneurs have to invest heavily to mobilize a group that does not include their natural followers while also losing reliability and reputation vis-à-vis their natural followers.

Thus, the entrepreneur's cost from raising demands, $C(\theta, d)$ is assumed to be a continuous and convex function achieving its minimum at $d = \theta$, and has the form $C(\theta, d) = C(d - \theta)$. In other words, we assume that $C(x)$ is continuous, convex and attains its minimum at $x = 0$ where $x$ represents $d - \theta$.

The entrepreneur's benefit from the outcome – whether it is cooperative or non-cooperative strategy adopted by the politician – increase as the demands resemble to a greater degree their true type. Then, followers give them the credit for the achievement in the first case or do not blame their insincere strategy for the failure in the second case. In both cases the maximal value of this benefit function is reached when the demands completely match the entrepreneur's true type. For example, consider a situation in which moderate entrepreneurs mobilize their followers around moderate goals and then raise radical demands that are rejected. In such a case, followers are expected to see the entrepreneurs' signaling strategy as the main reason for the failure and therefore the entrepreneurs' reliability will be significantly damaged. In comparison, if the same entrepreneurs raise moderate demands that are rejected, followers are expected to regard other factors, such as the government's attitudes, as the main reason for the failure.

Thus, it is assumed that the entrepreneur's benefit is represented by the function $B(s, d - \theta)$. It is also assumed that $B(C, d - \theta) > B(NC, d - \theta)$, meaning that benefits to entrepreneurs when politicians adopt a cooperative strategy are always higher than the benefits in the case of a non-cooperative strategy for the same $d$ and $\theta$. For every type, $\theta$, and politician's action, $s$, the function $B(s, d - \theta)$ obtains its maximum at $\theta = d$. The function $B(s, d - \theta)$ is continuous, monotonically increasing with $d$ for $d < \theta$, and monotonically decreasing otherwise. In other words, we assume that $B(s, x)$ is continuous, strictly concave and attaining its maximum at $x = 0$. From these assumptions, the utility function of the entrepreneur is given by

$$U(s, d - \theta) = B(s, d - \theta) - C(d - \theta). \tag{1}$$

We conclude that $U(s, x)$ is concave, attaining its maximum at $x = 0$. The assumptions over $U(s, d - \theta)$ are summarized in Fig. 2b.

Based on these assumptions, we now present the equilibrium analysis.

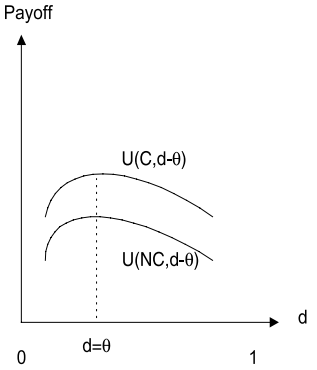


**Fig. 2b.** The structure of the entrepreneurs' utility function

## 3 The sequential equilibrium

There are various concepts of equilibrium that predict the outcome in signaling games. The most commonly used concept is the sequential equilibrium (SE) (Kreps and Wilson 1982).[3] We start by introducing the sequential equilibrium using our notations. First, let us define by $\mu(\theta|d)$ the politician's beliefs given the entrepreneur's demands $d$. Given entrepreneur's equilibrium strategy $d^*(\theta)$, let $A(d) = \{\theta \,|\, d = d^*(\theta)\}$, i.e., $A(d)$ is the set of all types $\theta$ that send the demands $d$ in equilibrium.

**Definition.** *A sequential equilibrium is a triple* $(s^*(d), d^*(\theta), \mu(\theta|d))$ *that satisfies*

1) *For every* $\theta, d^*(\theta) \in \underset{d \in [0,1]}{\arg\max}\ U(s^*(d), d - \theta)$
2) $s^*(d) \in \underset{s \in \{C, NC\}}{\arg\max}\ E_\theta(V(s, \theta) \,|\, d^*(\theta))$
3) *For every* $d$ *such that* $\int_{\theta \in A(d)} f(\theta)\, d\theta > 0$ *the beliefs* $\mu(\theta|d)$ *satisfy*

$$\mu(\theta|d) = \frac{f(\theta)}{\int_{\theta \in A(d)} f(\theta)\, d\theta}.$$

*If* $A(d)$ *is a singleton, then* $\mu(\theta|d) = 1$; *otherwise* $\mu(\theta|d) = 0$.

Note that the expectation in (2) is taken with respect to $\mu(\theta|d)$.

In addition, let $\widehat{\theta}$ be the intersection point between $V(C, \theta)$ and $V(NC, \theta)$,

[3] The sequential equilibrium is defined as a solution concept for games in which the set of types is discrete, while in the game constructed here, the set of types is continuous. Yet, following Mailath (1992), we extend the sequential equilibrium to the continuous case. We choose this solution concept although there is another concept that fits our model directly, i.e., the Perfect Baysian Equilibrium (PBE). Generally, the sequential equilibrium is a stronger concept that can help reduce the number of equilibria, while, according to Fundenberg and Tirol (1991), in a two-stage signaling game the set of PBE is the same as that of sequential equilibrium.

i.e., $V(C, \widehat{\theta}) = V(NC, \widehat{\theta})$. For a type, $\widehat{\theta}$, the politician is indifferent towards both cooperation and non-cooperation. Let us present the situation in which the entrepreneur is indifferent between a cooperative strategy adopted by the politician after the entrepreneur signaled $d \neq \theta$ and a non-cooperative strategy adopted by the politician after the entrepreneur signaled $d = \theta$, by the equation $U(C, d - \theta) = U(NC, 0)$. Let $d - \theta = U_C^{-1}(U(NC, 0))$, where $U_C^{-1}(\cdot)$ is the inverse function of $U(C, x)$ for $x \geq 0$. Denote $m^* = U(NC, 0)$, then $d = \theta + U_C^{-1}(m^*)$.

**Proposition 1.** *If* $\widehat{\theta} + U_C^{-1}(m^*) < 1$ *then there is a sequential equilibrium such that*

$$d^*(\theta) = \begin{cases} \theta, & 0 \leq \theta \leq \theta^*, \\ d^*, & \theta^* \leq \theta \leq d^*, \\ \theta, & d^* \leq \theta \leq 1, \end{cases} \tag{2}$$

*and*

$$s^*(d) = \begin{cases} C, & d \geq d^* \\ NC, & d < d^*. \end{cases} \tag{3}$$

$$\mu(\theta|d) = \begin{cases} 1 & d = \theta < \theta^* \text{ or } d = \theta > d^*, \\ \dfrac{f(\theta)}{\int_{\theta^*}^{d^*} f(\theta)\, d\theta} & d = d^*, \theta^* \leq \theta \leq d^*, \\ 0 & \text{otherwise}. \end{cases} \tag{4}$$

*where* $\theta^*$ *satisfies the inequality*

$$\int_{\theta^*}^{\theta^* + U_C^{-1}(m^*)} (V(C, \theta) - V(NC, \theta)) f(\theta)\, d\theta \geq 0, \tag{5}$$

*and*

$$d^* = \theta^* + U_C^{-1}(m^*).$$

*Proof.* See Appendix.

Proposition 1, Fig. 3 and Table 1 show that when the payoff of entrepreneur, $\theta$, in the case of a true signal is bigger than the payoff in the case of an extreme signal $d = 1$, i.e., $d = \theta + U_C^{-1}(m^*) < 1$, the sequential equilibrium has three regions. For $\theta \in [0, \theta^*]$, entrepreneurs reveal their true type when demanding $d = \theta$ and the politician responds by a non-cooperative strategy. Entrepreneurs of the type $\theta \in [\theta^*, \theta^* + U_C^{-1}(m^*)]$ send the same combination of demands $d^* = \theta^* + U_C^{-1}(m^*)$, meaning that they are pooling. The politician responds by a cooperative strategy. Finally, entrepreneurs of the type $\theta \in [\theta^* + U_C^{-1}(m^*), 1]$ reveal their true type by signaling $d = \theta$, and the politician responds by a cooperative strategy.

The intuition for the third region, where there is a separation, is simple. Entrepreneurs with very moderate goals know that the politician will respond by a cooperative strategy and, therefore, by raising demands that reveal their

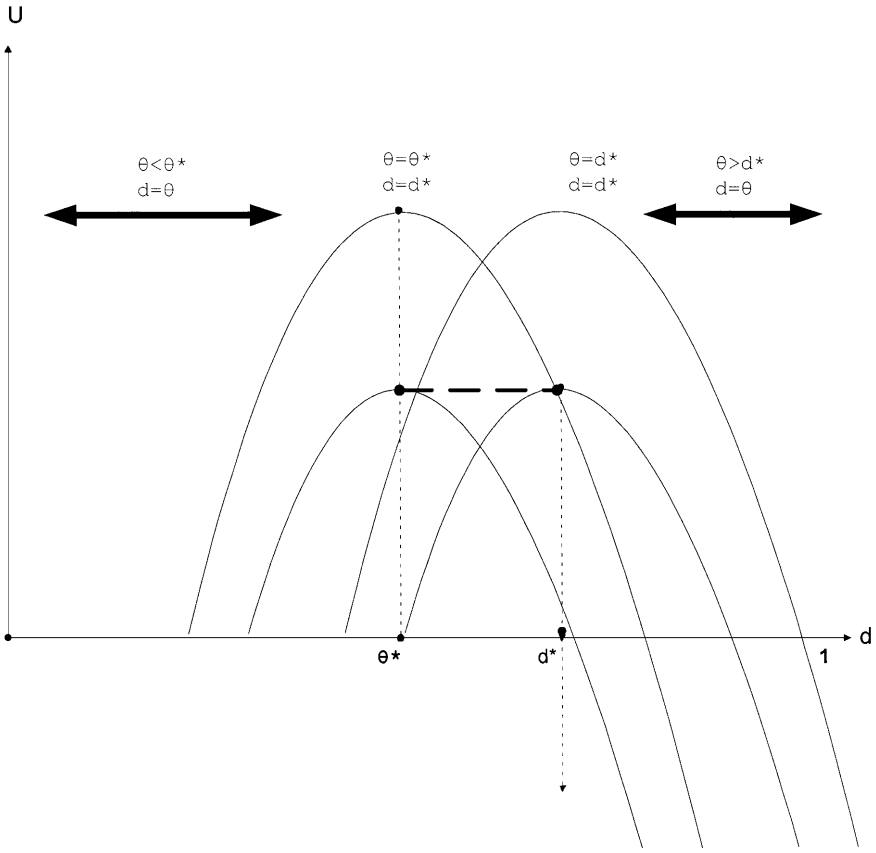


**Fig. 3.** A characterization of entrepreneurs' signaling strategy depending on their type

**Table 1.** A summary of the equilibria in the game

| Entrepreneur type | $0 \leq \theta \leq \theta^*$ | $\theta^* \leq \theta \leq d^*$ | $d^* \leq \theta \leq 1$ |
|---|---|---|---|
| Entrepreneur's strategy, $d$ | Separate $d = \theta$ | Pooling $d = d^*$ | Separate $d = \theta$ |
| Politician's response, $s$ | Non-cooperative | Cooperative | Cooperative |

true type they gain twice. They achieve the politician's cooperation while also preserving their reliability vis-à-vis their followers.

Indeed, the significant weight of reliability and social status in entrepreneurs' utility function helps rationalizing the results in the first region where there is also a separation. Entrepreneurs who have extreme radical goals benefit more from a non-cooperative response of the politician after sending a true signal than from a cooperative strategy after signaling a moderate orientation. In the first case, radical entrepreneurs benefit from keeping their repu-

tation and social status as radical activists. In the second case their followers will see them less reliable in the short term while they can hardly achieve their radical goals in negotiations, i.e., they will lose their status as radical entrepreneurs in the long term. The model shows that in order to achieve reputation and social status radical entrepreneurs must signal their true type. The result is different for entrepreneurs whose goals do not reflect clear orientation.

The second region represents entrepreneurs whose goals do not reflect clear orientation – either radical or moderate one. These entrepreneurs know that the politician will adopt a cooperative strategy if the demands signal a certain minimal level of moderate goals as expressed by $d^*$. Since these entrepreneurs do not have a significant orientation, either radical or moderate, they can benefit from entering negotiation over a combination of demands that are more moderate than their true type. At the same time, they do not lose reliability vis-à-vis their followers. Thus, all the types of entrepreneurs whose combination of goals do not represent a clear orientation will raise demands which are more moderate than their true type. Since the combination of demands fits the minimal threshold of moderate demands required by the politician, s/he responds by a cooperative strategy. Yet, since in the second region entrepreneurs are pooling, politicians calculate the expected utility. Equation 5 shows that the expected utility of the politician from cooperation is higher than from non-cooperation in the pooling region. Therefore, politicians may enter negotiation with entrepreneurs who are more radical than the politicians would have preferred if they had known their true type prior to their decision. In such cases politicians may enter negotiations under unfavorable conditions.

Note that also extreme radical entrepreneurs can basically adopt such a strategy but for them the required demands, $d^*$, differ too much from their true type so that the benefit from the government's recognition are low compared to the cost of losing reputation and social status vis-à-vis followers. This rationale will be exemplified in the next section.

To identify the set of possible sequential equilibria, let us define $\theta^* = \widehat{\theta}$ the efficient equilibrium for the politician. Given the function $d^*(\theta)$, as specified by (2) for every $\theta \in [0, 1]$, define $\underline{\theta}$ to be the lower boundary of the SE set, i.e., the solution for

$$\int_{\underline{\theta}}^{\underline{\theta}+U_C^{-1}(m^*)} V(C,\theta)\mu(\theta|d^*)\,d\theta = \int_{\underline{\theta}}^{\underline{\theta}+U_C^{-1}(m^*)} V(NC,\theta)\mu(\theta|d^*)\,d\theta. \qquad (6)$$

For $\underline{\theta}$, $\widehat{\theta}$ defined above, let $\underline{d}$, $\widehat{d}$ be the corresponding demands such that $\underline{d} = \underline{\theta} + U_C^{-1}(m^*)$, $\widehat{d} = \widehat{\theta} + U_C^{-1}(m^*)$.[4]

The set of semi-separating SE corresponds to $d^* \in [\underline{d}, \widehat{d}]$ and $\theta^* \in [\underline{\theta}, \widehat{\theta}]$, yet we can reduce the set of equilibria to a singleton. Riley (1979) argues that

[4] When $\widehat{\theta}$ approaches zero, Equation (6) may be not binding and in this case $\underline{\theta} = 0$, meaning that a politician who faces moderate demands always cooperates. This characterizes situations where politicians are very sensitive to moderate demands, e.g., due to a legitimacy crisis.

the equilibrium in a signaling game should be efficient for the informed player. The Pareto equilibrium that is not dominated in our context and satisfies this condition is the one that corresponds to $\theta^* = \underline{\theta}$. Another refinement concept, which achieves the same result in our model, is the concept of undefeated equilibrium. Mailath, Okuno-Fujiwara and Postlewaite (1993) suggest that if in one equilibrium there is an informed player of a certain type who prefers a second equilibrium while the other types do not lose, but the beliefs in the first equilibrium do not support this deviation then, the second equilibrium defeats the first one. When equilibrium is not defeated by any other equilibrium, we say that it is an undefeated equilibrium. The equilibrium that corresponds to $\theta^* = \underline{\theta}$ is undefeated, furthermore, it is simple to verify that it is not dominated lexicographically by all the other possible equilibria.

Proposition 1 is based on the assumption that $\widehat{\theta} + U_C^{-1}(m^*) < 1$, yet this condition may be not satisfied, namely, $\widehat{\theta} + U_C^{-1}(m^*) \geq 1$. In such a case, all types $\theta > \widehat{\theta}$ send an extreme signal $d = 1$. It is easy to show that under this condition, the sequential equilibrium has only two regions.

## 4 Discussion and empirical illustration

The model elaborated in this paper extends the signaling process between social activists and politicians beyond the scope of existing studies (Ainsworth and Sened 1993; Lohmann 1993, 1994; Karklins and Pettersen 1993). Our model starts from the point when a certain level of collective action has already been mobilized and focuses on the nature of demands raised by social activists depending on their true type – whether radical or moderate. The costs of mobilizing different types of followers are expressed in the entrepreneurs' cost function.

We believe that this extension of existing signaling models is crucial to better apply signaling games to the interaction between social activists and politicians, because it makes the possibility of sending false signals in this interaction realistic. Such a possibility, which makes the use of signaling games interesting, hardly exists in the afore-mentioned models of collective action and political change. In these models, the possibility of false signals and the actual meaning of false signals are unclear. Consequently, the game is actually about whether or not the threshold number of people required to bring politicians to change their attitudes is achieved.

As Lohmann (1993: 322) puts it:

> "One implication of the model is that the political leader shifts policy if the political action turnout exceeds a critical threshold."

And also:

> "When the information dispersed in the population is only partially revealed, the realized number of political actions may be a misleading indication of the state of world. In this situation, the political leader may

'mistakenly' make a decision that is disadvantageous for a majority.'' (Lohmann 1993: 321).

Thus, the political leader may make mistakes if the actual turnout does not truly reflect the preferences toward change in the population (e.g., due to the free rider problem), but the possibility of social players strategically sending a false signal to the political leader hardly exists in the model. We maintain that our model, which focuses on the calculations regarding the demands to be raised, completes the understanding of the signaling process between social activists and politicians.

To be more specific, we examine the signaling game elaborated by Lohmann (1993, 1994) as an informational cascade or a dynamic threshold model. The information updating mechanism in this model is based on a comparison between an individual's estimation of the expected turnout and the actual turnout at a given point in time. Lohmann (1994) suggests that ''the higher the turnout relative to prior expectations, the higher this estimate, and the higher the number of people who favor a regime change.'' In other words, the gap between the expected and the actual turnout indicates both the number and identity of those who are in favor of change. A small gap implies that mainly anti-status-quo extremists are in favor of change, while a large gap implies that many people, characterized by a wide variety of preference ordering, are in favor of change. It is assumed that a necessary condition for a policy shift is that a large enough number of moderates take political action to signal the median policy preference. Given that individuals in society have different prior expectations, the observed turnout will be interpreted differently by various players thus bringing people to join collective action at different points in time. This creates an informational cascade leading to the bandwagon effect. Lohmann (1994) also presents a detailed case study of the Monday demonstrations in Leipzig, East Germany, 1989–1991, showing the contribution of the informational cascade model to the explanation of the events.

However, while the Lohmann model provides a plausible explanation of the mechanism through which a bandwagon effect or informational cascade is created, it only partially explains the influence of that collective action on politicians' decisions. In fact, throughout the case study presented by Lohmann (1994), the protesters' identity and goals are interpreted based on their demands, rather than by comparing the prior expectations of different players regarding the size of turnout and the actual turnout, as her original model suggests.

To empirically demonstrate the insights of our model, we refer to the Monday demonstrations in Leipzig as studied by Opp et al. (1995) based on questionnaires, interviews and protocols.[5] The events, that later spread all over East Germany and finally led to the fall of the communist regime, were

[5] Similar dynamics that can empirically exemplify our model characterized the events in Poland 1980–1981 where Solidarity emerged as a central opposition group, as well as events in other East European states in the years 1989–1991. We do not discuss these examples because of lack of space.

set into motion by a demonstration of 5,000 people on September 25, 1989, followed by a larger demonstration of 70,000 people on October 9, 1989. The process that followed these demonstrations can be basically divided into two main periods: before and after the fall of the Berlin Wall on November 9, 1989. In the first period the main practical demand was to legalize opposition groups, particularly the Neues Forum, while in the second period the demands included reunification of Germany and a total regime transition. Our model can be applied to analyze the first period, since it explains the dynamics that lead politicians to legalize opposition groups and negotiate with them.

The Neues Forum was founded as a major opposition group on September 10, 1989 and few days later its members applied for recognition throughout the entire German Democratic Republic as a non-profit organization. By doing so they initiated a concrete demand to the government and dared to challenge it publicly thus becoming social activists or entrepreneurs. Their demand was initially rejected, but about one month later it was accepted by the government. This behavior can be explained by our model if we show that entrepreneurs with no clear orientation raised demands that were more moderate than their true types, while radical entrepreneurs raised radical demands. We argue that in East Germany, and particularly in Leipzig, these two conditions were fulfilled.

To begin with radical entrepreneurs, Opp et al. (1995: 156) argue that in the transition process in East Germany there were no active radical entrepreneurs simply because those dissidents who took genuine political action either were exiled, imprisoned or left the country on their own. This means that the government had clear signals from radical activists about their true type, and it responded by not cooperating with them. Furthermore, that signal served as a point of reference when the government had to interpret whether other demands were radical or not.

Indeed, such other demands were raised by members of the Neues Forum. We argue that they did not have a clear political orientation, but their signals were more moderate than their true type. Referring first to the true type, i.e., goals, of these entrepreneurs, the speaker of the Neues Forum noted:

> ''Our conception was that we simply wanted to help create a more democratic system and we believed that we could do it. We believed in a sort of democratic socialism, but we hadn't thought through all the details at the time. We only had certain program points, such as freedom of the press, freedom of speech, freedom to convene, freedom of travel, pluralism, and so on.'' (Opp et al. 1995: 65).

Similarly, an activist in the group ''Democratic Upraising'' said:

> ''We weren't yet thinking about German unity in October. We were focusing mainly on protest against current conditions and for immediate changes, that is, for more freedom: freedom of the press, of elections, of travel.'' (Opp et al. 1995: 66).

Thus, at the first stages of the process, activists wanted to reform the

system rather than to alter it radically. Although they had certain political goals that could have been viewed as relatively radical, they only had general ideas about these goals and lacked a clear political program regarding the ways to achieve them. This fact enables us to classify them as having no clear orientation – whether radical or moderate.

In the absence of a clear program, the activists raised vague, general and relatively moderate demands. The only concrete demand was for legalizing opposition groups, while other demands for freedom were spelled out only generally and in the form of slogans (Opp et al. 1995: 60–64). By doing so they signaled that their primary goal was to influence the regime, not completely transform it. Thus, since the activists' goals went beyond legalization of opposition groups, their focus on that demand meant that the signal they sent was more moderate than their true type.

Given that social setting, East German rulers had to interpret the signals and decide whether to cooperate, i.e., legalize opposition groups, or not. Opp et al. (1995: 171–172) argue that the rulers in East Germany indeed faced an information problem, because the information gathering mechanism was manipulated by several actors in the system. The rulers' interpretation of the situation in early October 1989 was described by Gunter Schabowski, a Politburo member, as follows:

> "The security forces were solely responsible for dealing with the opposition groups. We knew, of course, that they existed but the party members and leaders saw them as peripheral political groupings, which had an impact on the population but not a decisive one. They bothered us but we did not perceive them as a threat to our existence." (Opp et al. 1995: 176; Originally in: Mitter and Wolle 1990: 57).

According to Schabowski, even after Erich Honecker's resignation on October 18, 1989, no one wanted "to believe that the prevailing concept of socialism had failed" (Opp et al. 1995: 176; Originally in: Mitter and Wolle 1990: 117). Only in mid-November did the extent of opposition toward the regime become clear (Opp et al. 1995: 176; Originally in: Mitter and Wolle 1990: 140–141). Thus, in the early stages of the events, rulers interpreted the activists' signals as relatively moderate and cooperated with their demand to legalize opposition groups. Yet, in fact these groups were more radical than signaled by entrepreneurs and, therefore, that decision triggered further mobilization in the next stages of the process, finally leading to the collapse of the regime. This explanation improves the analysis suggested by Opp et al. (1995) because it is based on a general deductive model while, compared to Lohmann (1994), it offers new variables and insights.

Indeed, the basic result of the model developed in this paper means that radical changes are achieved peacefully, contrary to politicians' intentions, when entrepreneurs choose a signaling strategy that will lead politicians to misinterpret the goals and intentions of entrepreneurs. Yet, the model shows that a necessary condition for the success of such a strategy is the existence of enough entrepreneurs and followers with no clear orientation – whether

radical or moderate – who raise demands that are more moderate than their true type.

This theoretical framework also highlights the reputational motivation of entrepreneurs. Extreme radical activists generally prefer to truly signal their type, thus risking significant sanctions, rather than modifying their demands and achieving the government legitimacy for such demands. Indeed, in reality, radical or ideological groups are often not interested in modifying their demands although this can help mobilize masses and may improve the welfare of more people. Instead, they prefer to stick to their original radical orientation in order to maintain their reputation and social status as radical activists. The model suggests a formula to calculate the point on the relevant dimension that distinguishes between such extreme radical activists and activists with no clear orientation.

## Appendix

*Proof of Proposition 1*

Assume that the politician's decision rule is as given by (3). The values of $\theta^*$, $d^*$ should satisfy the following incentive compatibility inequalities for $s^*$ and every $d$

$$U(NC, 0) \geq U(s^*, d - \theta) \quad \text{if } \theta \leq \theta^*, \tag{A1}$$

$$U(C, d^* - \theta) \geq U(s^*, d - \theta) \quad \text{if } \theta^* \leq \theta \leq d^* \tag{A2}$$

$$U(C, 0) \geq U(s^*, d - \theta) \quad \text{if } \theta \geq d^* \tag{A3}$$

for the entrepreneur.

Given $d^*$ and $\mu(\theta|d^*)$ (Eqs. 4–5), $s^*$ satisfies

$$E_\theta(V(NC, d^*) \,|\, \theta) \geq E_\theta(V(C, \theta) \,|\, d^*), \quad d < d^*, \tag{A4}$$

$$E_\theta(V(C, \theta) \,|\, d^*) \geq E_\theta(V(NC, \theta) \,|\, d^*), \quad d = d^*, \tag{A5}$$

$$E_\theta(V(C, \theta) \,|\, d^*) \geq E_\theta(V(NC, \theta) \,|\, d^*), \quad d > d^*, \tag{A6}$$

for the politician where the expectation is with respect to $\mu(\theta|d^*)$. Inequality (A3) is satisfied trivially and for $\theta^* = d^* - U_C^{-1}(m^*)$, (A1) and (A2) are satisfied (see Fig. 3). Given the beliefs (4) and $d^*$ (2), the inequalities (A4) and (A6) are reduced to

$$V(NC, \theta) \geq V(C, \theta), \quad \theta < \theta^*, \tag{A7}$$

$$V(C, \theta) \geq V(NC, \theta), \quad \theta > d^*. \tag{A8}$$

Let $\widehat{\theta}$ be the intersection point between $V(C, \theta)$ and $V(NC, \theta)$, i.e., $V(C, \widehat{\theta}) = V(NC, \widehat{\theta})$. It follows that if $\theta^* \leq \widehat{\theta}$ and $d^* \geq \widehat{\theta}$, (A7) and (A8) are satisfied. For inequality (A5) we have

$$E_\theta(V(C,\theta) \mid \theta^* \le \theta \le d^*) \ge E_\theta(V(NC,\theta) \mid \theta^* \le \theta \le d^*).$$

When writing the last inequality explicitly we have

$$\int_{\theta^*}^{\theta^*+U_C^{-1}(m^*)} V(C,\theta)\mu(\theta|d^*)\,d\theta \ge \int_{\theta^*}^{\theta^*+U_C^{-1}(m^*)} V(NC,\theta)\mu(\theta|d^*)\,d\theta.$$

Thus, $\theta^*$ that satisfies the above inequality will satisfy (A5), and the result is obtained.

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