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Winning Hearts and Minds: Public Good Provision in the Shadow of Insurgency

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Abstract

A simple model of public good expenditure is developed where government service levels are affected by a potential insurgency. Counterinsurgency measures can reduce the effectiveness of resistance and alter the level of support for the government. In general, a very limited counterinsurgency is not useful; the government would rather alter he policy mix to reduce support for insurgents. In some cases, enhanced counterinsurgency capacity can lead to more rather than less resistance as the mix of projects adjusts to account for the lower effectiveness of resistance.

Keywords: Public Good Provision, Insurgency, Conflict

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Governments contending with insurgencies must compete to gain the loyalty of the populations that rebels depend upon for material support, cover and new recruits. When the conflict is over sharing the economic rents from control of a territory, the competition may become a “bidding war” between the in-group and the out-group. The conflict may also be deeper, a disagreement over what policies are best, and the insurrection may restrict the government’s ability to implement its preferred policies. Military action against the insurgents may help or hinder this process, depending upon, among other things, how the counterinsurgency measures affect the community support for the government’s agenda. This paper explores the interaction between a government’s public policies choices and the military measures it uses to defeat an insurgency.

In the model, a government allocates resources to two types of public goods. The government’s preferences over the public goods do not fully align with those of the community subject to the insurgency, which can disrupt the government’s ability to deliver any goods. For example, building schools to provide basic education may convince some to support the government, or be viewed as a threat to traditional values. Combating drug production may improve the standing of the government in the international community, but undermine an important income source in rural communities. Even basic transportation infrastructure can be contentious: during the 1960s, British road building in South Yemen was resisted vigorously and successfully by mountain clans worried about losing work transporting goods by camel across mountain passes (Walker, 2008). In the model, each community member has a “tipping point” ratio of spending between the two goods, beyond which they withdraw support for the government and join the resistance. The insurgency acts to limit all government activity, and the stronger the insurgency, the lower is the output of both public goods.

The government has access to a set of military measures that can counteract the strength of insurgents. These measures affect both "hearts" -- the community preferences over government policy -- and "minds" -- community knowledge of the effectiveness of resistance. It may be, for example, that security measures protecting villagers from guerrilla attacks increase support for the government, despite its imperfect policy mix. Conversely, heavy-handed population relocations, night raids and air strikes may effectively neutralize insurgents, but also destabilize social structures and lessen support for the government. Military measures also affect the "minds" of community members by directly altering the capability of insurgents to affect government limit development. Here it is likely that more military expenditures lead to less effective insurgents.

The model illustrates the tradeoff between winning hearts and minds and implementing a potentially controversial policy agenda in a standard and familiar framework. The model is flexible and many outcomes are possible. Some representative cases are presented as simulation experiments. In one particularly interesting case, a government with access to more effective military measures will make policy choices that engender an insurgency when with a less effective military response, none would have occurred. Taken to an extreme, military measures are always effective in reducing the effect of the insurgency on blocking government policy choices, but only at the cost of widespread political discontent. In the end, only winning the hearts of the community will truly end an insurgency.

It has long been recognized that to defeat insurgents, governments must defeat “political subversion” (e.g., Thompson 1965). The interaction between governments and insurgents is typically modeled with a Contest Success Function where a party’s chance of success is a function to the resources deployed by all contestants (see, for example, Skaperdas 1996, Hirshleifer 2000). This technique is analytically convenient, and intuitive properties of specific CSFs can capture a range of interesting outcomes. But in the extreme, the CSF is a black-box that obscures the underlying interactions between the contestants.

The model here contributes to a growing literature that goes inside the black-box of the CSF to model directly particular aspects of the underlying contest between insurgents and governments. Fearon (2008) separates the contest over resources (a taxable population) from the armed struggle itself. Increasing the number of rebels increases the insurgents’ ability to tax the population, but also the probability of detection, raising the chance that individual rebels will be captured or killed. He uses the model to explain the fact that wealthier countries are less subject to insurrections, despite the bigger prize in the contest for power. Besley and Persson(2011) develop and test a model where peace, political repression and civil war may each arise endogenously, depending on wealth and the degree of political cohesion in the country. They find that states with institutions that allow the in-group to more effectively exclude the out-group from a share in the benefits of power are less likely to be at peace. Scoones and Child (2012) develop a variant of the model here to explore how post-conflict reconstruction spending by occupying forces can fail to engender the expected increase in support for occupying troops. In that model, there is no role for military measures to limit the insurgency.

1. The model

A government is providing public goods in the face of a potential insurgency by members of the local community. The government is a unified decision maker with well defined preferences over public good expenditure. The community members are heterogeneous, varying in the preferences over the public goods, and as a result differing in their propensity to join (or support) the insurgency. Insurgents have the potential to interfere with public good production, and government has access to certain military measures to limit the effectiveness of the insurgency.

There are two types of public good, g and b. These denote "good" and "bad" projects, taking the perspective of potential insurgents. The government considers both projects to be "goods." It would prefer a balance of projects between these sectors, represented by a Cobb-Douglas utility function:

$$V = gb. \tag{1}$$

All community members agree that g is beneficial and b is not, but vary in their relative distaste for b. The preferences of community member i is represented by

$$U_i = \alpha g - \beta_i b \tag{2}$$

The parameter β_i captures individual community member i's distaste for project 'b'. This is taken to be uniformly distributed on the unit interval, so no community member positively values the "bad" project. The parameter $\alpha \geq 0$ scales the relative distaste for b at a common rate for all community members. For any given mix of projects selected by the government, the smaller is α the greater is the share of community members who will view the government's actions as being, on balance, a bad thing. For larger values of α this animosity is increasingly mitigated by the higher value placed on the "good" project.

Public Good Production

The government is able to allocate a fixed budget between the two public projects: [1]

$$E = S_g + S_b \tag{3}$$

where E is the budget, S_g is spending on 'g' and S_b is spending on 'b'. The production function for the output in each project is

$$g = S_g(1-R)^{\theta} \ \ , b = S_b(1-R)^{\theta} \tag{4}$$

where $R \in [0,1]$ is the (endogenous) proportion of the community that chooses to participate in the insurgency and $\theta \in [0,1]$ is a coefficient that captures effectiveness of the insurgency in disrupting the public projects.

Military measures

The government can also undertake military actions against insurgents. Counterinsurgency measures are denoted by $m \in [0, \overline{m}]$. Counterinsurgency enters the model in two places. First, the greater the strength of the counterinsurgency, the less is the ability of the resistance to disrupt public good production: $\theta = \theta(m)$ and $\theta'(m) < 0$. Second, m affects community members' perceptions of the government's legitimacy, altering members' valuation of all projects: $\alpha = \alpha(m)$. Unlike for θ, however, the direction of the effect is allowed to be positive or negative.

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[1] What ultimately matters is the ratio of spending in these sectors. The fixed budget clarified this trade-off and is useful for construction of diagrams that follow below.

The government does not value military measures for their own sake (see equation 1), but only in so far as these assist it in achieving its desired level of public good spending. It principle, it may be that the government has control over the level of m. For simplicity, for most of the paper I assume that the government's choice is binary -- either it mounts a counterinsurgency or it does not -- and examine how this choice depends on its fixed "counterinsurgency capability," m. The question of how, if it were able to, the government would choose m is discussed below in section 4.

Timing

The model is a sequential move game. Government and community preferences, the public project technology, the effect of counterinsurgency measures are all assumed to be common knowledge among the players. The government moves first, choosing the mix of spending on b and g, and whether or not to undertake a counterinsurgency. Observing these choices, the community members individually decide on whether or not to join the insurgency. Payoffs are then realized, and the game ends.

I restrict attention to subgame perfect, pure strategy equilibria. Community members observe the spending allocation and counterinsurgency measures before deciding whether to join the resistance; the government knows this rationally anticipates the coming level of resistance. To solve the model I first calculate the response of community members to any given spending mix and set of military measures. With this and the production functions (4), I compute the government's set of feasible public projects. This is a function of α and θ, and thus of m. This defines the government's choice set, over which it chooses spending on g, b, and whether mount a counterinsurgency to maximize (1).

2. Equilibrium

The equilibrium is a utility maximizing choice by the government of spending levels on each project, and a utility maximizing decision by each community member whether to resist or acquiesce to government spending.

A community member's problem:

In equilibrium, community members are partitioned into two groups, insurgents and non-insurgents. Thus, the equilibrium choices of all members can be characterized by a single value, β_i^*, that separates the two groups. Substituting the production functions (4) into the community member utility function in (2) (suppressing the dependence on m), community member's utility can be written as a function of the insurgency's size R:

$$\mathrm{U_i} = \alpha\, \mathrm{S_g}\, (1 - \mathrm{R})^{\theta} - \beta_{\mathrm{i}}\, \mathrm{S_b}\, (1 - \mathrm{R})^{\theta}$$

Each member's decision has an infinitesimal effect on the level of insurgency, and these choices are made independently. Accordingly, they treat R as fixed in their decision to join the insurgency. Nevertheless, depending on β_i, community member i's choice will tend to raise or lower his utility; if it increases he will join, otherwise he will not. Taking the derivative of utility with respect to insurgency size yields

$$\partial U_i/\partial \mathrm{R} = -\alpha\theta \mathrm{S_g}(1 - R)^{\theta-1} + \beta_i \theta S_b (1 - R)^{\theta-1} \qquad (5)$$

The marginal insurgent is determined by the value of β that equates this derivative to zero. Denote this value β^*. It may be that the parameters are such that all the community rebels, in which case $\beta^* = 1$. Thus,

$$\beta_i^* = \min\{\alpha S_g / S_b, 1\} \tag{6}$$

Community members for whom $\beta_i > \beta^*$ participate in the insurgency, hence the "size" of the insurgency is $R = 1 - \beta_i^*$, so

$$R = \begin{cases} 1 - \alpha S_g/S_b & \text{if} \quad \alpha S_g/S_b \leq 1 \\ 0 & otherwise \end{cases} \tag{7}$$

The Public Good Possibility Set[2]

The feasible set of public good projects is determined by the level and effectiveness of insurgency, and hence by the counterinsurgency effort of the government. The boundary of this set is the public good production frontier, $b = P(g; m)$. In general, as g increases along the frontier, it reaches a critical point beyond which no community member will choose to join the insurgency. At this point, even the most negatively disposed member of the community (that with $\beta_i = 1$), feels that resistance is counterproductive: the reduction of the small level of b is offset by the attendant decline in g. Solving (7) for $R = 0$, this critical point occurs when $\alpha S_g / S_b = 1$.

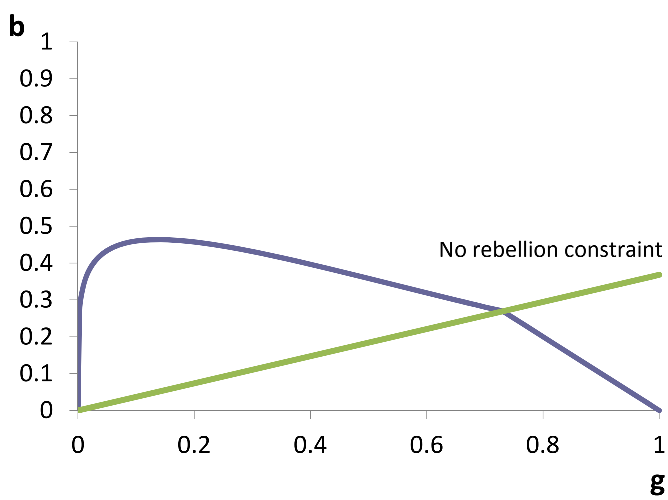
For values of values of g at and above this critical value, the production functions (4) are linear, so spending on the public goods is equal to output. Geometrically, the line $b = \alpha g$ serves as a "no rebellion constraint". This is a political rather than

[2] Scoones and Child (2012) develop the formal properties of this set, there denoted the "reconstruction possibility set," for what, in the context here, amounts to a specific choice of m. In this paper, I describe its constructed, and simply assert the resulting form.

production constraint: it is the limit of spending on b necessary to prevent every community member from joining or supporting the rebellion.

With a smaller share of g, spending violates the no rebellion constraint, and some members of the community will support the insurgency. The effect this has on public good provision depends on θ, and the government's counterinsurgency measures. In general, as long as insurgents have any power to disrupt public goods production, allocating a large budget share to b is counterproductive. In the limit when $S_g = 0$, all community members join the insurgency, $R = 1$, and from (4) both b and g will be zero. On the other hand, if counterinsurgency efforts are so successful that $\theta(m) = 0$ then the government is free to choose its most prefered mix of projects. In general for $\theta > 0$, the public good production possibility set is as illustrated in Figure 1. The no rebellion constraint has slope α.

Figure 1. Public Good Possibility Frontier



The government's problem

The government chooses S_b, S_g and decides whether to mount a counterinsurgency to maximizs (1) subject to $P(g;m)$. There are three classes of equilibria in this model, depending on whether the governments optimal project mix lies above, at, or below the no rebellion constraint[3].

3. Equilibrium Characterization

This section characterises the equilibrium by solving the government's problem numerically for specific parameterisations of $\theta(m)$ and $\alpha(m)$. These functions are assumed to be linear:

$$\theta(m) = \theta_1 + \theta_2 m \qquad (8)$$

$$\alpha(m) = \alpha_1 + \alpha_2 m \qquad (9)$$

Depending on the specific value of the four parameters in (8) and (9), the model will in general have one of three classes of equilibrium: an active insurgency, no insurgency, or a borderline case where any increase in spending on projects b will lead to an insurgency[4].

I compute three sets of experiments by varying the values of $\theta_1, \theta_2, \alpha_1$ and α_2. The parameters used in the three experiments are shown in Table 1[5]. For each case, I assume that $E = 1$, $\alpha_1 = 0.4$, and $\overline{m} = 1.2$. These two conditions imply that in the

[3] The government's problem is worked out in detail in Scoones and Child (2012) for the case where the government has no recourse to counterinsurgency measures.
[4] For some parameter values, there exists no equilibrium.
[5] These experiments were conducted using Maple. The model is fully specified with the parameter assumed, and the diagrams are plotted from the simulated data.

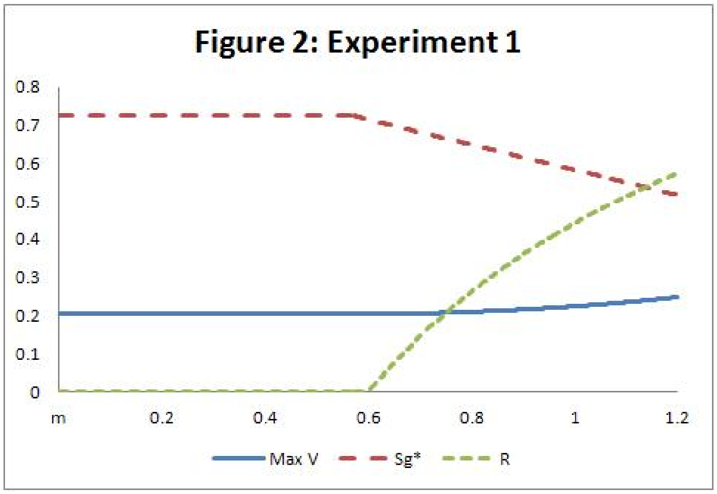
absence of military action (i.e. $m = 0$) the government will face an insurrection whenever $S_g < 0.71$.

Table 1

Experiment	α_1	α_2	θ_1	θ_2
1	0.4	0	0.4	-0.33
2	0.4	-0.33	0.4	-0.33
3	0.4	0.33	0.4	-0.33

Experiment 1:

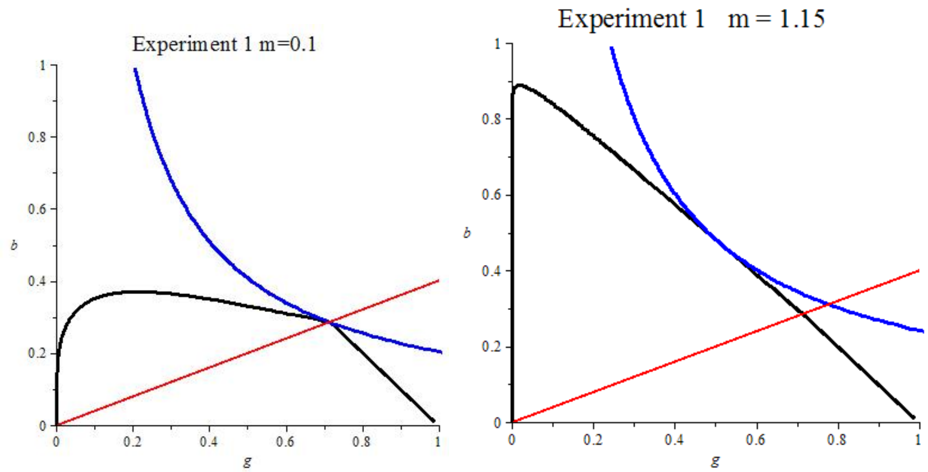
In this experiment, the "hearts" of community members are unaffected by military action: the parameter α is independent of m, and so the no rebellion constraint is unaffected by the counterinsurgency. Figure 2 plots the maximized level of government utility, the budget share of S_g, and the proportion on the community supporting the resistance for a range of values of m. For example, when $m = 0.1$, government utility is 0.20, $S_g^* = 0.71$ and $R = 0$. Despite there being no resistance, the government is constrained to spend a greater share on g that it would prefer (i.e. $S_b \neq S_g$). A government with limited counterinsurgency capability would accomplish nothing. However, with sufficiently large capacity, the government will choose to mount a counterinsurgency: when $m = 0.6$, the disruptive effect of insurgents is decreased sufficiently that the government prefers to increase the share of b and contend with the resulting resistance. That is, R rises, but S_g falls and government utility increases. *Even though military measures are more effective, the equilibrium involves more rather than less conflict.*



To illustrate the government's problem more clearly, Figure 3 shows the public good possibility set, no rebellion constraint and level of government utility for two specific values of m. In the left pane, $m = 0.1$, and the maximized value of government utility is at the kink in the production possibility set. At this kink point, any increase in sector b spending will result in an insurgency of sufficient strength to be counter-productive. That is, the slope of the frontier of the production possibility set is sufficiently flat that the increase in b is insufficient to compensate for the reduction in g required to bring it about.

As m rises from 0.1 the public good production frontier becomes steeper as the effectiveness of resistance in blocking government projects declines. Because the equilibrium is a kink, this has no effect for a range of low values of m. Eventually the frontier becomes sufficiently steep that the trade off from increasing b becomes worthwhile. The right pane of Figure 3 depicts the equilibrium mix of spending when $m = 1.15$.

Figure 3



Experiment 2

In this experiment, military measures affect both the “hearts” and “minds” of community members. However, the affect on hearts is counterproductive: $\alpha_2 < 0$. This represents a case where a poorly designed counterinsurgency increases sympathy for the insurgency. More military expenditure reduces the effectiveness of resistance, but lowers the community’s acceptance of even good projects. When limited measures are available, increased military action is worse than useless, it’s counterproductive. A government that deploys a counterinsurgency must also reduce spending on b to avoid rebellion. This is clearly paradoxical: a poorly designed counterinsurgency engenders resistance which then needs to be offset by *further* utility reducing restrictions on the public good choice.

Eventually, the disempowering of the insurgency compensates for the loss of community support. For $m > 0.36$, the share of b can increase, so S_g starts to decline, and $R > 1$. Notice that value of m for which facing an insurgency is preferred to being held at the kink in the production frontier is lower than it was in Experiment 1 (0.36 versus 0.60). This is simply the result of the negative effect of the counterinsurgency on community support: the no rebellion constraint has shifted and increased the marginal rate of substitution between b and g at the kink point.

Despite the fact that the picture gets better at the margin, a government with restricted access to counterinsurgencies would prefer to keep $m = 0$ and avoid the insurgency entirely, holding $S_g = 0.71$. A more capable government would undertake the counterinsurgency: if $m \geq 1.12$ government utility is higher when it contends with an inefficient insurgency, despite the overall reduction in community support.

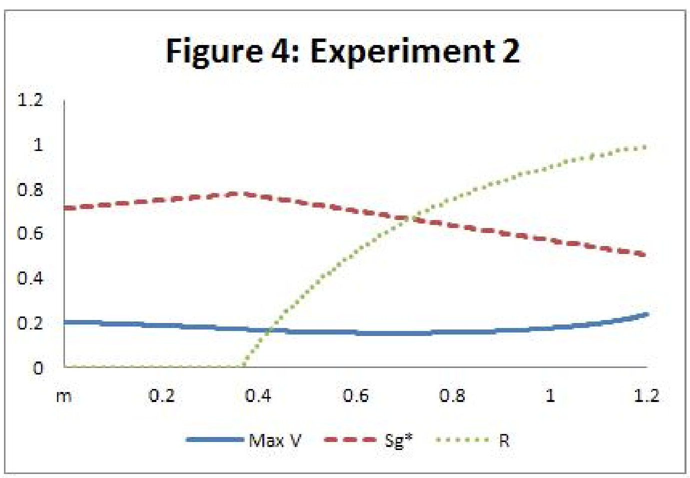
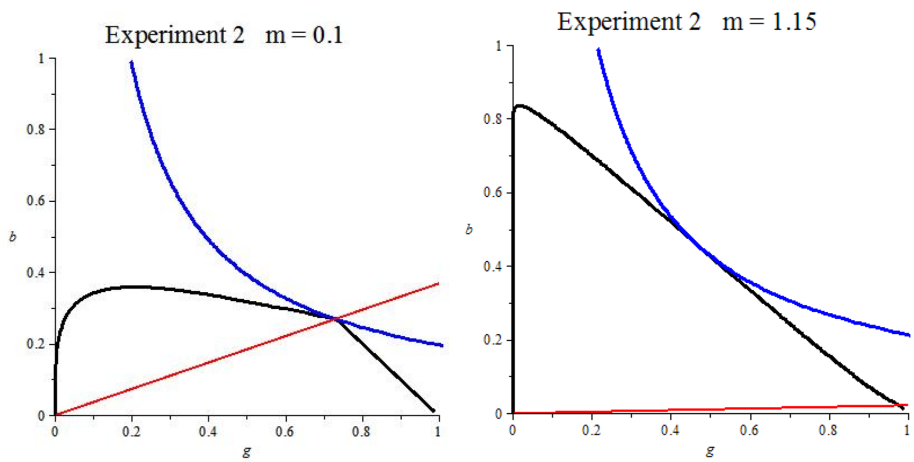


Figure 5 again illustrates presents the equilibrium public good choice at the same two points of m. When $m = 0.1$, public good provision is at the kink in the production frontier. But with $\alpha_2 < 0$, the increase in m shifts the no rebellion constraint down. With high enough capacity, the government would choose to face the resistance and move up the production frontier. The right pane when $m = 1.15$

is an example of this. For high values of m, the no rebellion constraint approaches the horizontal axis, and the equilibrium has almost all members of the community supporting the insurgency.

Figure 5



Experiment 3

In Experiment 3 military spending again affect both the hearts and minds of the community, but now it increases rather than decreases the willingness of community members to support the government's efforts. Now the beneficial effect of military effort on directly winning the support of community members reinforces rather than offsets its effect on the insurgency. This means that even in the neighborhood of $m = 0$, military action and spending in sector b are complementary, so S_g falls over the entire range of m and the government is able to choose an increasingly preferred mix of projects. Figure 6 depicts the optimal values of S_g, the level of R and government utility for a range of m. Figure 7 shows the equilibrium situation for $m = 0.1$ and $m = 1.15$. Note that in this example the government would choose a counterinsurgency for all values of m. Furthermore, as

m gets very large, the government will again disregard the insurgency to implement its preferred policy mix.

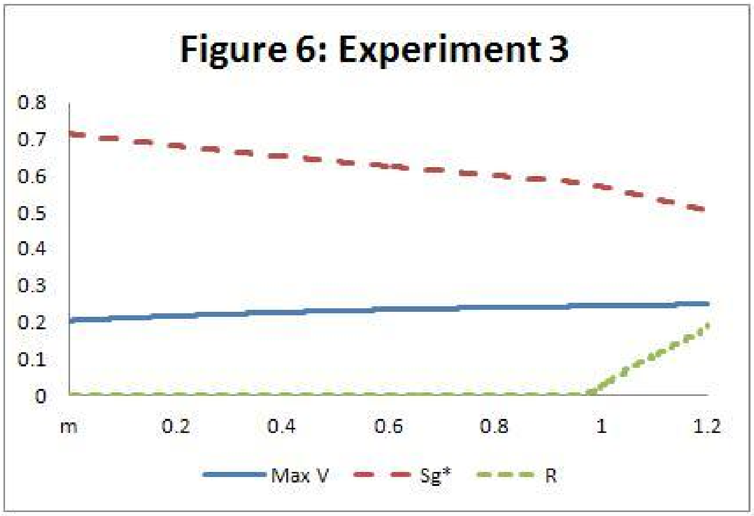
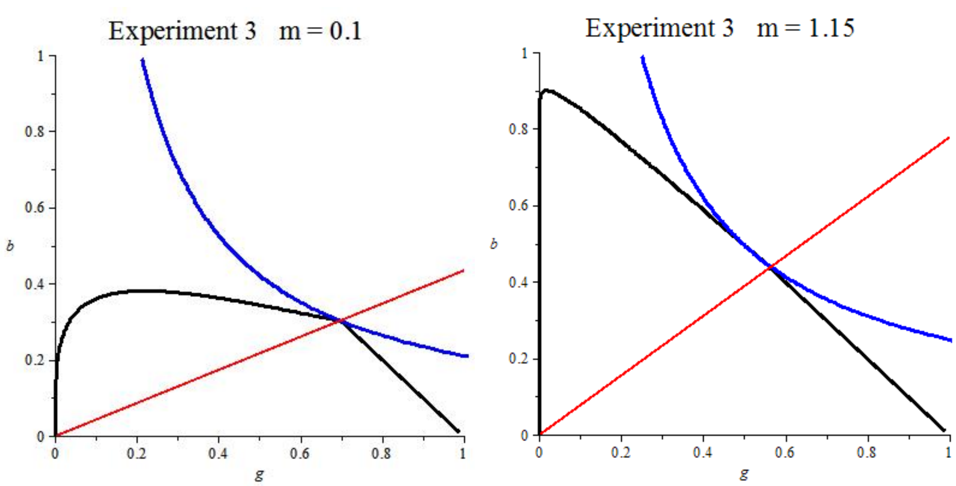


Figure 7



4. Optimal Military Measures

Even though military spending may be counterproductive over some range, in each of the experiments, a government with access to sufficiently large counterinsurgency capacity would opt for mounting the counterinsurgency, allowing it to approach the "unconstrained" optimum $S_g = S_b$. More generally, a government that can choose m would choose to set it at the upper bound, provided this is large enough.

There are a number of reasons to doubt this conclusion. Relaxing the linearity assumptions (8) and (9) could overturn this result, if the marginal value of counterinsurgency measures declines sufficiently. The model also assumes that the counterinsurgency has no cost, beyond its possible negative effect on community preferences. With more notation, this assumption could be relaxed without changing the model's qualitative results (provided that costs do not become prohibitive).

Another reason that the government will always take a sufficient strong military measure is that government preferences only account for the preferences of the community insofar as they alter the support for the rebellion.[6] Instead, it might be that the government cares directly about R. For example, the government might seek to maximize

$$V^1 = gb - \gamma R \tag{10}$$

This nests the current model, but admits a distaste for insurrection *per se*. Drawing figures like those above is difficult when $\gamma > 0$, but the simulations can be easily modified to account for it. This leads to the unsurprising result when R is undesirable, the government is more reluctant to spend on project b.

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[6] Notice that the government preferences might be derived from those of some segment of the community. That is, the total population might select the government, and have a median "voter" with preferences (1). The "community" here represent a fringe group who have an extreme dislike for good b.

Conclusion

A simple expository model of insurgency and counterinsurgency is developed. A government constrained from following its preferred budget allocation due to the possibility of an insurgency can undertake military measures to reduce the effectiveness of resistance. In some circumstances, a larger capacity for counterinsurgency to more rather than less conflict. When the government is highly politically constrained by a *potential* insurrection, a more capable military may allow for policies that induce community members to resist. This might describe the decision of one country to send troops to another: if the occupation is sufficiently forceful it may make space for policy change favorable to the preferences of the occupier; if it is not sufficient, it may be better off simply staying out and living with the less than ideal policy mix in the host country.

By allowing military measures to affect community preferences, "hearts", as well as the efficacy of insurgent action, "minds", can be accounted for in the model. In general, instead of mounting a limited counterinsurgency, the government would be better off reallocating public good expenditure to reduce support for the insurgency. If military capacity is large enough to render the resistance ineffective, the mix of projects can be chosen to satisfy the ideals of the government. But unless these measures are carefully designed and undertaken to reinforce community support they may lead to more not less unhappiness in the community, and a long slow war of attrition. When military measures are integrated with political measures and designed to align the community and government preferences a lasting solution can be found.

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