Protecting the Military*

DEBORAH A. BIELING
Air University
Montgomery, Alabama

MICHELLE R. GARFINKEL
University of California-Irvine
Irvine, California

I. Introduction

Analyses of the strategic considerations of international conflict identify a major obstacle to cooperation. Suppose, for example, that cooperation between two nations takes the form of disarmament. Although cooperation is by design the ex ante optimal policy, when the two nations make their arming decisions simultaneously given the policy of the other nation each has an incentive to deviate from the cooperative policy by arming. Since cooperation is not incentive compatible, it is not credible.\(^1\) The lack of credibility, in turn, calls into question the feasibility of cooperation in equilibrium.\(^2\) This paper analyzes a complementary incentive compatibility problem which arises from a conflict within the nation—specifically, between the citizens of each nation and their respective governments—reinforcing the conflict which arises between two nations.

Building on a simple two-sector model—a military sector (consisting of military bases) which produces security and a civilian sector which produces consumption goods,—the analysis studies the equilibrium adjustment of labor resources following a favorable shock that lowers the marginal benefits of security provided by military personnel. A key feature of the model is that the reallocation of labor resources from one sector to another is costly. Given costly adjustment, military base employees will prepare for relocation only when there is a sufficiently high probability that the government will reduce military employment. Making a credible commitment to scale down military operations would permit the government to achieve a second-best solution which balances benefits of reducing the tax burden for all workers while increasing aggregate consumption against the distributional effects that arise from the adjustment costs. However, such a commitment need not be credible—specifically, if policy is set under discretion. In this case, the expectation that the actual level military employment will exceed that which the government announces in advance reduces the incentive of military employees to relocate. In equilibrium, the

*We thank, without implicating, an anonymous referee for helpful comments on previous versions of this paper.

1. This incentive compatibility problem is sometimes referred to as “dynamic inconsistency.” The seminal paper on the dynamic inconsistency of policy is Kydland and Prescott [6]. See Rodrik and Zeckhauser [10] for a nontechnical discussion of this problem in public policy.

2. See, however, Garfinkel [3] who shows how threats and punishments can reduce the severity of this problem and thus promote a more efficient outcome. Nonetheless, threats and punishments cannot generally support a disarmament outcome.
government fulfills that expectation providing a socially excessive level of protection to military employees.\(^3\)

This result would seem to be similar to the positive bias in government expenditures relative to that considered socially efficient identified by a number of analyses in the public choice literature. One strand of this literature, with its roots in Niskanen \(^8\) \(9\), emphasizes bureaucratic objectives. The other strand, stemming from Stigler \(^12\) and developed by Weingast, Shepsle, and Johnson \(^16\) and Weingast and Moran \(^15\), places emphasis on legislative objectives.\(^4\) Though different in emphasis, these analyses share the same basic logic which builds on existing political institutions and conflict among the decision makers: from the decision maker's perspective, the benefits from government expenditures extend beyond the standard economic benefits and/or the decision maker fails to fully internalize the costs of such spending.\(^3\)

However, in abstracting from political considerations, our positive theory identifies an alternative source of inefficiency in the allocation of resources: it is the inability of the (benevolent) government to precommit, which forces the adoption of an overly protective policy. We do not deny the importance of political institutions and conflict among decision makers. We suspect that the distortions created by existing political arrangements and those driven by the government's inability to precommit are both relevant.\(^6\) Rather, our analysis abstracts from political considerations only to highlight the distortions created by the government's inability to precommit.

The obvious normative implication of our analysis is that institutional arrangements which permit the government to make binding commitments are desirable. But, even if the government cannot make binding commitments in this way, it can make arrangements to enhance the credibility of its base closure policy, thereby reducing the equilibrium bias in the protection of the military. Empirically, our results are suggestive of at least two government initiatives related to base closure policy in the United States. Both appear to have strengthened policy credibility.

The first is the creation of the independent Defense Base Realignment and Closure Commission (BRAC). The BRAC Commission was established (by P.L.101–510 and its predecessor by P.L.100–526) to deliver a list of final base-closing recommendations to both the administrative and legislative branches of government. Upon acceptance of the list by both branches, the Department of Defense (DoD) is charged with the responsibility for implementing the closure actions. The BRAC Commission was originally formed to facilitate some cooperation among governmental divisions. As suggested by the results of this paper, the BRAC Commission also facilitates coordination between the government and the base employees who should relocate. The credibility of policy is strengthened because the visibility of BRAC Commission and its recommendations increase the costs of reneging on the announced policy. Thus, employees' expectations of moving and their incentive to voluntarily move are increased.\(^7\)

---

3. The basic logic underlying this prediction of excessive protection is similar to that of Staiger and Tabellini \(^11\), Matsuyama \(^7\), and Tornell \(^13\) who study trade policy.

4. See Carroll \(^1\) who integrates these two approaches into a single framework, including both legislative and bureaucratic objectives.

5. By contrast, Garfinkel \(^4\) finds that disagreement within a nation governed by elected officials produces a negative bias in military spending relative to that governed by a benevolent dictator. The key assumption underlying this prediction is that the costs of such spending are realized fully in the current period, whereas the benefits are realized into the future. Though subject to some problems of interpretation, the data are consistent with the theory.

6. Twight's \(^14\) discussion of how U.S. military base closure and realignment policy was influenced by changes in legislation that affected the decision making process supports the notion that politics matter. But, provided that some importance is attached to economic considerations and the welfare of military base employees in the decision making process, the government's inability to precommit will matter as well.

7. Staiger and Tabellini \(^11\) make a similar argument for GATT and its commitment to a policy of free trade.
The second initiative, used during downsizing of military operations, are training programs or subsidies to base employees for participation in other educational programs to prepare for employment in the civilian sector. For example, with the major base closure announcements of November 1964, a nation-wide priority placement program for displaced DoD personnel was established, guaranteeing career DoD employees, who lost their job due to a base closure, assistance in finding employment elsewhere. Another example is Project Transition, a DoD program designed to ease the move of military personnel to civilian life during the Vietnam drawdown. This program offered job counseling, vocational training, educational opportunities, and job placement services. More recently, in conjunction with current base closure announcements, DoD has made several relocation programs available for its employees, including the Defense Outplacement Referral System to help employees find jobs off the base and the Defense Conversion Assistance which gives displaced employees grant money for college tuition and retraining assistance. By reducing the costs borne by military base employees who relocate, such programs can increase the credibility of the government's general policy to scale down military operations.\(^8\)

In what follows, the next section presents the basic model, and as a point of reference characterizes the equilibrium when labor resources are perfectly mobile. Section III studies the government's optimization problem in the presence of adjustment costs following a favorable shock to national security, and identifies the bias in protection of the military sector which emerges in the discretionary regime. That section also includes a discussion of the implications for the use of a military draft in the case of an unfavorable shock to national security. Finally, section IV offers some concluding remarks.

II. Analytical Framework

Consider a closed economy populated by a continuum of individuals, \(i \in [0, 1]\). Each individual chooses the allocation of his labor endowment (normalized to one) to either the military sector or the civilian sector.\(^9\) The military sector produces "security" denoted by \(s\), subject to an external threat to national security denoted by \(x\). In a more fully articulated model, this threat to national security and the nation's allocation of resources would be jointly determined in a general equilibrium [3]. However, since our focus is on the conflict within a nation, we treat \(x\) here as exogenously given without much loss of generality. The civilian sector produces consumption goods denoted by \(c\). The only factor of production in both sectors is labor. Let \(\mu\) denote the mass of labor employed on military bases and \(\eta \equiv 1 - \mu\) denote the mass of labor employed in the civilian sector. Though this allocation may change over time, we suppress an index to time for notational convenience.

---

\(^8\) Tornell's [13] analysis (in the context of trade policy) suggests that subsidies can serve only as an imperfect substitute for the ability to make commitments.

\(^9\) Historically, as predicted by Garfinkel [2] among others, when the threat to a nation's security is high (e.g., war-times), the government often employs a military draft; and, in response to changes in the external threat, the government often adjusts the draft. However, like Harford and Marcus [5], the present analysis assumes a volunteer military. Harford and Marcus study the workings of a volunteer military with an emphasis on the (exogenous) risks of danger to civilians and soldiers, assumed to be decreasing in the number of soldiers employed. By contrast, our analysis emphasizes the costs involved with relocating from the military sector to the civilian sector during a relatively peaceful time. As such costs are ostensibly lower for those who had been drafted than for those who volunteer to serve, the analysis would seem to have less relevance for downsizing after a war in which labor is conscripted. But, as discussed below, our simple model does have some implications for the use of a military draft.
In both sectors, the production technology exhibits constant returns to scale. Imposing the labor constraint, these technologies are given by

\[ c = a(1 - \mu), \quad a > 0 \]  
\[ s = \mu - x, \quad 0 \leq x < 1. \]  

Individuals employed in civilian production are compensated according to their own productivity: \( W_i = a \) in terms of consumption goods. Workers located in the military sector are paid \( W_i = W_M \) chosen by the government.

Workers in both sectors have identical preferences defined over security, \( s \), their own consumption, \( c_i \), and the length of uninterrupted time they have not relocated, \( e_i \). Specifically, the preferences of individual \( i \in [0, 1] \), \( U_i \), are given by

\[ U_i = u(c_i) + v(s) - \lambda(e_i)Z, \quad Z > 0 \]  

for each period, where \( u'(\cdot) > 0, u''(\cdot) < 0, v'(\cdot) > 0 \) for \( s < 0, v''(\cdot) < 0 \), and as described in more detail below, \( \lambda(\cdot) \in [0, 1] \) depends negatively on \( e_i \). With this specification, the costs of adjustment are modeled as the disutility of additional effort required by the individual to adapt to a new work environment and yet be equally productive as other workers who have been employed in a given sector for some time \((a)\).\(^{10}\)

Assuming no borrowing or lending, individual \( i \)'s budget constraint is simply

\[ c_i = W_i(1 - \tau) \]  

where \( \tau \) is the proportional income tax imposed on all workers by the government to finance military operations. Given \( s, \tau \) and location of employment, each individual's consumption choice is determined by the constraint in (4). Their location decision is studied in the next section. Henceforth, we let \( U[W_i(1 - \tau), s] - \lambda(e_i)Z \) denote individual \( i \)'s indirect utility.

We assume that the government is a “benevolent” social planner attaching an equal weight to each individual. Specifically, the government’s preferences, denoted by \( V \), are given by:

\[ V = \int U[W_i(1 - \tau), s] - \lambda(e_i)Z \]  

for each period. In addition, we assume that, like workers, the government does not have access to financial markets. Thus, the (benevolent) government’s budget constraint implies that its current tax revenues be equal to its current expenditures or, equivalently,

\[ \tau = \mu W_M / [\mu W_M + (1 - \mu)a]. \]  

Given \( W_i \) for \( i \in \eta \) and the external threat to national security \( x \), the government chooses the allocation of labor resources to the military sector and \( W_M \) to maximize equation (5), subject to this constraint, the production technology for security (2), and individuals’ location decision.

---

10. Even when \( v'(s) > 0 \) for \( s \geq 0 \), this specification does not rule out \( \mu = 0 \) as a solution.
11. An alternative, but more complicated, specification that leaves our results unchanged qualitatively assumes that workers who move are simply less productive as others and, thus, receive a lower wage. Learning by doing would imply that this adjustment cost similarly falls over time.
To proceed in our analysis of this optimization problem in light of a favorable shock to national security, we briefly characterize the allocation of resources when there are no adjustment costs \((Z = 0)\). This equilibrium serves as a useful reference point to study the importance of commitment in policymaking when resources are not perfectly mobile \((Z > 0)\).

When \(Z = 0\), equilibrium requires that there be no incentive for workers to move from one sector to the other. Thus, the government must compensate military workers with the wage received by workers in the civilian sector: \(W_M = a\). In this case, aside from their employment location, military workers are indistinguishable from workers in the civilian sector. In addition, the government’s budget constraint implies \(r = \mu\). Hence, each individual consumes \(c = a(1 - \mu)\). In turn, these results imply the following necessary condition for optimality of the allocation of resources for any \(x \in [0, 1)\):

\[
H(\mu, x) \equiv -au'\{a(1 - \mu)\} + v'\{\mu - x\} \leq 0. \tag{7}
\]

Under our assumptions about \(u(\cdot)\) and \(v(\cdot)\), the second-order condition, given by \(\partial H(\mu, x)/\partial \mu \equiv H_\mu \leq 0\), is satisfied as a strict inequality. For an interior solution, the condition in equation (7) met as a strict equality implicitly defines the equilibrium allocation of resources as an increasing function of \(x \in [0, 1)\). Let that hypothetical solution be indicated by \(\mu^*(x)\).

III. Adjustment Costs and the Reallocation of Resources

In this section with a focus on the one-shot game, we study the effects of a one-time (unanticipated) fall in the threat to the nation’s security on the equilibrium allocation of resources when resources are not perfectly mobile.\(^{12}\) Though our focus on the one-shot game implies an essentially static analysis, the results to follow will hold qualitatively in a more general multi-period framework as discussed below. Furthermore, while limited to the case of a negative shock to the external threat, the analysis has some implications for the use of a military draft in the case of a positive shock. These implications are discussed at the end of this section.

Suppose that by the end of the initial period, the government learns that the threat to national security will fall (permanently) from some \(x_0 > 0\) to \(x = 0\). The initial allocation of labor to the military sector is given by any \(\mu_0 > 0\) strictly greater than the (hypothetical) allocation in the absence of adjustment costs \((Z = 0)\), \(\mu^*(x)\) as implicitly defined by equation (7) with \(x = 0\). For analytical convenience, assume further that the condition in equation (7) with \(x = 0\) is met as a strict equality when evaluated at \(\mu^*(0)\).\(^{13}\) Finally, for future reference, given the initial allocation \(\mu_0\), denote the displacement of military employees following the favorable shock to national security when resources are perfectly mobile by \(n^* \equiv \mu_0 - \mu^*(0)\).

\(^{12}\) To be sure, we have not explicitly modeled uncertainty about \(x\). However, our strategy is analogous to starting with the assumption that the stochastic process governing \(x\) is stationary, and supposing that the government makes its choices without knowing the current realization of \(x\); as long as the distribution of \(x\) does not change, the government’s choice of military employment would remain a constant. The shock to \(x\) in our simple setup would be similar to a one-time shift in the distribution due to an unanticipated (but permanent) change in the nation’s institutions and/or international arrangements.

\(^{13}\) Note that this restriction does not preclude the solution \(\mu^*(0) = 0\). For example, in the case of quadratic utility, \(u(c) = -\alpha(c - a)^2\) and \(v(x) = - (1 - \alpha)s^2\); the first-order condition is met as a strict equality for \(\mu = 0\) when \(x = 0\).
Costly Adjustment and the Location Decision

Upon learning about the lower external threat at the end of the initial period, the government notifies a fraction of military employees that they will not be employed by the government in the next period. Let $n_A \leq \mu_0$ denote the mass of these employees. Notified workers have two options: (i) move into the civilian sector immediately or (ii) wait until the next period when the government’s base closure policy is actually implemented. When a worker moves immediately, he acquires some human capital (or training in preparation) for employment in the civilian sector. Though the move is not costless, the transition is smoother. To be more precise, we assume that $\lambda(1) = \lambda_1 < 1$ for notified military workers who exercise this option.

When a notified worker waits, he faces two possibilities. Either the government employs him (despite the previous announcement) or forces him off the base. All individuals who remain employed in the military sector receive a wage, $W_M$, chosen by the government, while those forced off the base receive the civilian wage rate, $a$. But, without any previous preparation, a worker forced to relocate in the civilian sector finds the move more costly than if he had moved immediately in the first period: $\lambda(0) = 1$. Utility obtained in this case, $U[a(1 - \tau), s] - Z$, is clearly less than that obtained if the worker had relocated immediately, $U[a(1 - \tau), s] - \lambda_1 Z$.

Let $n_1 \leq n_A$ denote the mass of workers who immediately relocate from the military sector to the civilian sector and $n_2 \leq n_A - n_1$ denote the mass of workers, chosen by the government, who are forced to relocate in the next period. Then, the total mass of workers who move from the military sector to the civilian sector by the end of the next period, denoted by $n$, satisfies

$$n \equiv n_1 + n_2 \leq n_A. \quad (8)$$

Since a delayed move is more costly than an immediate one, the government would prefer that all notified workers move immediately ($n_1 = n_A$). However, their location decision will depend on their expectation of how many military base workers the government will actually retain.

Now, let the fraction of notified workers who wait but are not offered a job on any of the military bases in the next period be denoted by $p \in [0, 1]$. Using the notation introduced above, this fraction is given by

$$p = n_2 / (n_A - n_1). \quad (9)$$

If the government retains $1 - p$ of the previously notified workers who wait and randomly chooses among them, then $1 - p$ is the probability that a notified worker who waits can remain on the base in the next period. As such, given the location decision of others, each notified base employee will wait if and only if

$$D(n_1, n_2, n_A) \equiv p \left[ U[a(1 - \tau), s] - Z \right] + (1 - p) U[W_M(1 - \tau), s] - \left[ U[a(1 - \tau), s] - \lambda_1 Z \right] \geq 0. \quad (10)$$

Without any loss of generality, we assume that the worker waits at the point of indifference.

14. Admittedly, this specification is somewhat incomplete in that it applies only to the one-shot game (the one period following the shock). However, it can easily be extended for a more general multi-period framework. Let $e_i^t$ denote the accumulation of consecutive periods of work by individual $i$ by the end of period $t - 1$. Then, one possibility is that, in time period $t$, $\lambda(e_i^t) = (e_i^t - \bar{e}) / \bar{e}$ for $e_i^t \leq \bar{e} \leq \sigma$ and $\lambda(e_i^t) = 0$ otherwise. With this specification, $\lambda_1 = \lambda(1) = (\bar{e} - 1) / \bar{e}$ for notified workers who move immediately and, as assumed above, $\lambda(0) = 1$. 


As will become apparent below, this condition depends on \( n_1 \) and \( n_2 \) only through \( p \). For now, observe that when the government can precommit to \( n_2 = n_A - n_1, p = 1 \) and \( n_A \) is perfectly credible. In this case, all notified workers will relocate to the civilian sector immediately, since \( \lambda_1 < 1 \). But, as we illustrate below, the government’s announcement made with the ability to precommit need not be credible in the discretionary regime.

**The Military Wage and Taxes**

Regardless of whether the government can precommit to its announced military base policy or not, its choice of how many military base workers to let go and the wage to pay those who continue to work on the military base maximizes equation (5). Taking as given the initial allocation \( \mu_0 \) and the new external threat \( x = 0 \), this optimization problem is subject to the security technology (2) and the budget constraint (6) both with \( \mu = \mu_0 - n \).\(^{15}\) If the government could make binding commitments, it would effectively choose both \( n_1 \) and \( n_2 \) along with its announcement, \( n_A = n_1 + n_2 \), and the military wage, \( W_M \), in the initial period. In the more realistic case where policy is set under discretion, the government can only choose \( n_2 \) and \( W_M \) given the notified workers’ relocation decision, \( n_1 \). In this case, \( n \equiv n_1 + n_2 \) need not equal \( n_A \). In either case, given the choices of \( n_1 \) and \( n_2 \), aggregate consumption is given by \( c = a(1 - \mu_0 + n) \).

Our analysis of the equilibrium military base policy and the relocation strategy of notified military base workers under the regimes of precommitment and discretion proceeds in two steps. First, we characterize the government’s choice of \( W_M \) as a function of the employment decisions \( n_1 \) and \( n_2 \). With (6), this choice pins down the tax rate, \( \tau \). Then, in the next two subsections, we study the equilibrium choices of \( n_1 \) and \( n_2 \).\(^{16}\)

For both regimes given the choices of \( n_1 \) and \( n_2 \), the first-order condition relative to the wage paid to military workers implies

\[
W_M(n_1, n_2) = W_M = a. \tag{11}
\]

The government simply pays the remaining military base employees the wage received by workers in the civilian sector.\(^{17}\)

From (6) given \( W_M = a \), the tax rate equals the proportion of the labor force who remain in the military sector:

\[
\tau = \mu_0 - n. \tag{12}
\]

As (12) reveals, regardless of its timing, a reduction in the scale of military operations permits a one-for-one reduction in the tax rate for all workers.

Furthermore, the optimal military wage policy can be used to simplify the notified workers condition for waiting in equation (10) as

\(^{15}\) Assuming that \( \mu_0 > \mu^*(0) \), the constraint that \( n_1 + n_2 \leq \mu_0 \) is not binding and so not explicitly stated here.

\(^{16}\) This approach implicitly assumes that the government sets its wage policy under discretion in both regimes. While this assumption is reasonable for the analysis of the discretionary regime, it is innocuous for the analysis of the precommitment regime. Nonetheless, below we briefly consider the possibility of committing to a military wage policy in advance even when committing to a military employment policy is not possible.

\(^{17}\) Under an alternative specification where the adjustment cost is reflected explicitly in the productivity of displaced workers and thus their wage, \( W_M \) would be a function of all the wages received by workers in the civilian sector. For example, when \( a(c) = c \ln c \) and \( v(s) = (1 - \alpha) \ln s \), the government would pay the remaining military workers the average wage in the economy. However, the implied tax rate in this case is identical to that derived below.
\[ D(n_1, n_2, n_A) = [\lambda_1 - n_2/(n_A - n_1)]Z \geq 0. \]  

(13)

By calculating the partial derivatives of that condition, one can easily verify that the notified worker's incentive to wait is decreasing in (i) the mass of military workers who will be forced to relocate in the next period and (ii) the mass of workers who immediately relocate; but this incentive is increasing in the announcement, \( n_A \). The condition in (13) implies the following relocation decision by notified workers, \( \hat{n}_1 \), as a function of \( n_A \) and \( n_1 \):

\[ \hat{n}_1 = \begin{cases} 0 & \text{if } n_2 \leq \lambda_1 n_A \\ n_A & \text{otherwise} \end{cases} \]  

(14)

To verify this solution, note that a necessary and sufficient condition for equation (13) to be satisfied is that \( n_2 \leq \lambda_1(n_A - n_1) \). Suppose that this condition is not satisfied for \( n_1 = 0 \). Then each notified worker will have an incentive to move since \( D(n_1, n_2, n_A) \) is decreasing in \( n_1 \). Conversely, if this condition is satisfied for \( n_1 = 0 \) given \( n_2 \), then none of the notified workers will have such an incentive.

With these preliminary results, we now turn our focus to the equilibrium in the commitment regime and then we study the equilibrium outcome in the discretionary regime.

**Equilibrium With Precommitment**

As mentioned previously, the ability to precommit effectively permits the government to choose \( n_1 \) as well as \( n_2 \). Its choice, which implies an announcement of \( n_A = n = n_1 + n_2 \), maximizes (5) subject to (2) with \( \mu = \mu_0 - n \) and \( x = 0 \) and (12) given \( \mu_0 \) and (11). Substituting in these constraints, the first-order conditions relative to \( n_1 \) and \( n_2 \) respectively are

\[ F(n) \equiv -H(\mu_0 - n, 0) - \lambda_1 Z \leq 0 \]  

(15)

\[ G(n) \equiv -H(\mu_0 - n, 0) - Z \leq 0 \]  

(16)

where \( H(\cdot, \cdot) \) is defined in (7) with \( \mu = \mu_0 - n \) and \( x = 0 \). The conditions in (15) and (16) hold as strict equalities for \( n_1 > 0 \) and \( n_2 > 0 \) respectively. Let \( F_j(n) \) denote the partial derivative of \( F(n) \) with respect to \( n_j \), \( j = 1, 2 \) and \( G_j(n) \) denote the partial derivative of \( G(n) \) with respect to \( n_j \), \( j = 1, 2 \). As one can easily verify, the second-order conditions, \( F_1(n) \leq 0 \) and \( G_2(n) \leq 0 \), are satisfied as strict inequalities.\(^{18}\)

The intuition underlying the optimality conditions in equations (15) and (16) is quite straightforward. The first term in equation (15) which is identical to that in equation (16) represents the marginal efficiency gain from displacing additional military base workers. Absent adjustment costs \( (Z = 0) \), the government would keep \( \mu^*(0) \geq 0 \) of all workers on the military base, while \( n^* = \mu_0 - \mu^*(0) > 0 \) would move into the civilian sector. By our definitions of \( \mu^*(0) \) and \( n^* \), \( H(\mu_0 - n^*, 0) = H(\mu^*(0), 0) = 0 \), implying that the marginal gain at \( n = n^* \) equals 0. Since \( H_{\mu_0} < 0 \), this marginal efficiency gain is strictly positive for \( \mu = \mu_0 - n > \mu^*(0) \) or equivalently \( n < n^* \).

The second term in each condition represents the distributional effects of additional military base workers moving into the civilian sector when adjustment costs are relevant \( (Z > 0) \). In contrast to the marginal efficiency gain, these effects depend on the timing of the relocation. Increasing \( n_2 \) imposes a cost, \( Z \), on the displaced workers as they are forced to move without any

\(^{18}\) From equation (15), we have \( F_1(n) = F_2(n) = H_{\mu}(\mu_0 - n, 0) = a^2\mu^*[a(1 - \mu_0 + n)] + v^*[\mu_0 - n] < 0 \). Since \( F(n) = G(n) + (1 - \lambda_1)Z \), it is clear that \( G_1(n) = G_2(n) = F_1(n) = F_2(n) < 0 \).
preparation. Increasing \( n_1 \) similarly imposes a cost equal to \( \lambda_1 Z \); but, since \( \lambda_1 < 1 \), the distributional effects generated by displacing additional military workers in the first period \( (n_1) \) are less costly than those from displacing additional workers in the second period \( (n_2) \).

That this marginal loss due to adjustment costs depends on the timing of relocation while the marginal efficiency gain does not implies that the conditions in equations (15) and (16) cannot be satisfied simultaneously as equalities. Given the higher adjustment costs with delayed relocation, it should be clear that, when commitment is possible, \( n_2 = 0 \).

The condition in (15) with \( n_2 = 0 \) and \( n_1 = n \) requires that the distributional costs be balanced against the marginal efficiency gains. This condition implicitly defines the equilibrium value of \( n = n_A = n_1 \) as a function of \( \lambda_1 Z \), denoted by \( \bar{n} \):

**Proposition 1.** If \( \lambda_1 Z < -H(\mu_0, 0) \) and precommitments are possible, the government chooses a second best allocation of labor resources, \( \bar{n} > 0 \), such that (i) \( \bar{n} = n_1 < \mu_0 - \mu^*(0) \equiv n^* \), (ii) \( \partial \bar{n}/\partial Z < 0 \), and (iii) \( \partial \bar{n}/\partial \lambda_1 < 0 \).

**Proof.** If the adjustment costs are not too high—i.e., \( \lambda_1 Z < -H(\mu_0, 0) \)—then \( F(0) > 0 \), implying \( \bar{n} > 0 \). In this case, the government announces \( n_A = \bar{n} \) and commits to \( n_2 = \bar{n} - n_1 \) which, from equation (14), implies \( n_1 = \bar{n} \). By the condition in equation (7) with \( x = 0 \) which implicitly defines \( \mu^*(0) \) and our assumption that \( \mu_0 > \mu^*(0) \), the first term of \( F(n) \), \(-H(\mu_0 - n) \), when evaluated at \( n = n^* \equiv \mu_0 - \mu^*(0) > 0 \) equals zero. Thus, part (i) of the proposition follows immediately from the fact that \( F(n^*) < 0 \) and the second-order condition.\(^9\) Invoking the envelope theorem, differentiation of the expression in equation (15) with respect to \( Z \) and with respect to \( \lambda_1 \) show that \( \partial F(n)/\partial Z = -\lambda_1 < 0 \) and \( \partial F(n)/\partial \lambda_1 = -Z < 0 \). Parts (ii) and (iii) of the proposition, then, follow from repeated applications of the implicit function theorem with the second-order condition. \( \square \)

The ability to precommit to an announced policy, \( n_2 = \bar{n} - n_1 \), permits the government to induce the lower adjustment cost indicated by \( \lambda_1 Z \). Still, in the case that the government can precommit, adjustment costs reduce (if not remove) the government’s incentive to scale down military operations.

Even if we were to extend this model to include additional periods, we would find no subsequent adjustments. Rather, the adjustment is immediate by virtue of our assumption that the marginal adjustment cost is independent of the number of displaced workers and our assumption that constant marginal cost is lower with a quicker adjustment.\(^{20}\) However, as the time horizon following the shock \( (T \geq 1) \) lengthens, the marginal benefit from the immediate displacement of an additional military base employee increases faster than the marginal cost. To see this, note that by construction the number of periods following the realization of the shock \( (T) \) equals the time during which the relocated individuals acquire experience in the civilian sector \( (e) \). Then, in the final period, \( T, e = T \), and \( \lambda = \lambda(T) \) for notified military workers who relocated immediately. Under the simplifying assumption of no discounting, an increase in the time horizon by one period from \( T \) to \( T' = T + 1 \) increases the marginal cost by \( \lambda(T + 1)Z \). Since by assumption \( \lambda(\cdot) \) is decreasing in \( e \), this marginal cost is increasing at a decreasing rate. By contrast, the

---

\(^{19}\) In the case that \( H(0, 0) < 0 \), the first term in the expression for \( F(n) \), when evaluated at \( n = n^* = \mu_0 \) will be positive. This part of the proof, then, would not follow unless the costs of adjustment are sufficiently high—i.e., \( -H(0, 0) \equiv \alpha u'(a) - \nu'(0) < \lambda_1 I \). In any case, the propositions below which characterize the differences between the equilibrium adjustment under commitment and that under discretion remain intact.

\(^{20}\) Continued adjustments would emerge if either (i) the marginal cost were increasing in \( n \) or (ii) civilian production exhibited diminishing returns to scale.
marginal benefit increases at a constant rate, \(-H(\mu_0 - n, 0) > 0\). Hence, the magnitude of the immediate adjustment will be greater with a longer time horizon.\(^\text{21}\) Nevertheless, as shown in the next section, given a one-period time horizon following the realization of the shock \((T = 1)\), the lack of a precommitment technology lowers the equilibrium adjustment even further below \(n^*\) than indicated by Proposition 1.

**Equilibrium under Discretion**

Without the ability to make precommitments, the government can credibly announce only a base closure policy that is incentive compatible given the location choices made by military workers. Here we show that the policy under commitment, \(\bar{n} = n_1\) as implicitly defined by equation (15), is not incentive compatible. That is, once the notified workers have made their location decision, the government’s choice of how many workers to employ on the base will be greater than that under precommitment, \(\mu_0 - \bar{n}\).

Suppose, as before, that the government announces that in the next period it will reduce the scale of military operations; at the same time, it notifies a set of workers, \(n_1\), that they will be asked to leave in the next period if they haven’t already done so. Given that announcement, \(n_1, \mu_0, x = 0\) and equation (11), the government chooses \(n_2\) to maximize equation (5) subject to equation (2) with \(\mu = \mu_0 - n\) and equation (12). The first order condition to this problem for \(n_2 > 0\), given by equation (16), implicitly defines the government’s optimal military base closure policy under discretion as a function of \(Z\) and \(n_1\).\(^\text{22}\) Let that policy be indicated by \(\hat{n}_2(n_1)\).

Using equations (14) and (16), we can characterize the equilibrium under discretion, \(\hat{n} \equiv \hat{n}_1(n_2) + \hat{n}_2(n_1)\), as it depends on the costs of delayed adjustment, \(Z\). One possibility is that the costs of delayed adjustment are too high to ensure an interior solution for \(\hat{n}\) even when the condition ensuring that \(\bar{n} > 0\), with \(n_2 = 0\), is satisfied:

**Proposition 2.** If \(Z > -H(\mu_0, 0)\), \(\bar{n} > 0\), but no adjustments will be made in the discretionary equilibrium: \(\hat{n} = 0\).

**Proof.** Observe that \(G(n) < 0\) for \(n_1 + n_2 = 0\) if \(Z > -H(\mu_0, 0)\)—a weaker condition than that for \(\bar{n} = 0\). Furthermore, since \(G_1(n) = G_2(n) < 0, \hat{n}_2 = 0\) for all feasible values of \(n_1 \geq 0\). In turn, equation (14) implies \(\hat{n}_1 = 0\) for any announcement \(n_1\), thereby completing the proof. \(\square\)

When the condition stated in the proposition holds, \(p = 0\) for all values of \(n_1\). Hence, each notified worker knows that, regardless of how many other workers relocate immediately, he will not be forced to move into the civilian sector if he waits; yet, if he were to relocate, the government would have no incentive to invite him back to the military base as long as the condition stated in Proposition 1 is satisfied. Since \(\lambda_1 Z > 0\), none of the notified workers, then, relocate immediately. Thus, when the adjustment costs associated with delayed relocation, \(Z\), are too high, the lack of a commitment technology precludes any reallocation of resources in response to the positive security shock. In this case, where the announcement \(n_1 = \bar{n} > 0\) as characterized in Proposition 1 is not credible, protection of the military is complete.

Now suppose that the condition in Proposition 2 is not satisfied, implying an interior solution for \(\hat{n}\). In this case, using equations (15) and (16), we have:

---

\(^{21}\) See footnote 14 for one simple specification of \(\lambda(e)\) in a multi-period setting. We conjecture that for a sufficiently long (but finite) time horizon assuming no (anticipation of) subsequent changes in \(x\), the immediate equilibrium adjustment approaches \(n^*\).

\(^{22}\) As noted earlier, the second-order condition, given by \(G_2(n) \leq 0\), is satisfied as a strict inequality.
PROPOSITION 3. Assuming $Z < -H(\mu_0, 0)$, $\hat{n} > 0$ in the discretionary regime, $\hat{n} < \bar{n}$ and $\partial \hat{n} / \partial Z < 0$.

Proof: If $Z < -H(\mu_0, 0)$, then $G(0) > 0$. Since $G_2(n) < 0$, there exists some value of $n_2$ given $n_1 = 0$, $\hat{n}_2(0)$, such that $G(\hat{n}_2(0)) = 0$. Furthermore, since $G_1(n) = G_2(n) < 0$, the government’s “reaction function” takes the form: $\hat{n}_2(n_1) = \hat{n} - n_1$, where $\hat{n} = \hat{n}_2(0)$ as previously defined [by (16)]. However, using equation (15) which implicitly defines $\bar{n}$ and (16), one can verify easily that $G(\bar{n}) < 0$ for all $n_1 \leq \bar{n}$. In turn, the second-order condition, $G_2(n) < 0$, implies that $\hat{n} < \bar{n}$. Differentiation of the expression in (16) with respect to $Z$, using the envelope theorem, shows that $\partial G(n) / \partial Z = -1$. Thus, the remainder of the proposition follows from an application of the implicit function theorem to equation (16) and the second-order condition. \[Q.E.D.\]

Proposition 3 simply states that, in the discretionary regime, the adjustment of resources is positive as long as the adjustment costs are not too high, but incomplete relative to the commitment case. Using equation (14) we can easily pin down the timing of the adjustment. As in the case of commitment, under discretion the government prefers that military workers relocate immediately upon notification. To induce that voluntary adjustment by the workers, the government simply announces $n_A = \hat{n}_2(0)$, the largest value of $n_2$ given $n_1 = 0$ that is incentive compatible. This announcement is perfectly credible and, from (14), implies that $\hat{n}_1 = \hat{n}_2(0) = n_A$. Nonetheless, from Proposition 3, this equilibrium adjustment is strictly less than that if the government could make precommitments. Since $\bar{n}$ is decreasing in $\lambda_1$ while $\hat{n}$ is independent of $\lambda_1$, it follows that the positive bias in protection is larger the smaller is $\lambda_1$.

Implications for the Use of a Military Draft

Although the analysis has focused on the case of a positive shock to national security, it has some implications for the use of a military draft in the alternative case, which we briefly outline here. To fix ideas, suppose again that the initial allocation to the military sector is given by $\mu_0$, and that by the end of the initial period the government learns that $x$ will increase from $x_0$ to $x_1$. Assuming that $\mu_0$ is strictly less than that allocation which would emerge if labor resources were perfectly mobile, $\mu^*(x_1)$ as implicitly defined by (7), the government would have an incentive to expand military employment. Suppose that the government announces its intention to increase $\mu$ by $m_A > 0$ to $\mu_0 + m_A$. This announcement would have to contain some sort of threat to conscript labor in the next period if an insufficient number of civilian workers relocate immediately to the military sector (i.e., volunteer for military service). Otherwise, the adjustment costs of relocating imply that no worker initially employed in the civilian sector would have an incentive to relocate in the military sector.

To proceed, let $m_1$ denote the mass of workers who, in light of this threat, volunteer for service and relocate immediately to the military sector and $m_2$ denote the mass of workers who are conscripted in the second period. Then $q \equiv m_2 / (1 - \mu_0 - m_1)$ would represent the probability that a civilian worker who does not volunteer for service will be drafted. For $m_A < 1 - \mu_0$ this probability will be strictly less than one.\[23\] An analysis similar to that above would yield results analogous to the propositions above, suggesting that the threat of a draft will be sufficiently credible to induce some civilians to relocate voluntarily. But since the probability of being drafted ($q$) is strictly less than one even when $m_2 = m_A - m_1$ as long as $m_A < 1 - \mu_0$, the threat need not induce a sufficient number of civilian workers to volunteer; some workers may have to be drafted.

\[23\] Note that the threat would be more effective (reflected in an increase in $q$ for any given $m_A$) if the government’s draft were targeted on a certain subset of the civilian population.
Offering a sufficiently higher military wage, $W_M > a$, may induce more workers to relocate immediately. However, in the next period once those workers have relocated, the government’s optimal wage policy is once again $W_M = a$. Thus, unless commitment is possible, a promise to pay higher military wages is not credible and, thus, will not induce civilian workers to relocate. By the same token, the government could not induce more individuals to volunteer for military service by threatening to pay the drafted individuals a wage lower than that paid to volunteers, unless it could somehow make binding commitments to such a policy.

One could reasonably argue, however, that the government’s ability to make a commitment over shorter time horizons is greater. Specifically, consider a multi-period version of the model, and suppose that the positive shock to $x$ is seen as being temporary (i.e., during a war). In this case, the government might find it easier to make a binding commitment insofar as it applied only to the period during which the external threat was temporarly high. If the threat is expected to fall back to $x_0$ in the near future, the government might find it desirable to pay all drafted military workers a wage lower than $a$ for two reasons. First, as already mentioned, the threat of a draft, if credible, may induce some workers in the civilian sector to volunteer. Second, provided that the wage paid to draftees were sufficiently low, drafted military workers would have a greater incentive to relocate back to the civilian sector once the threat to the nation’s security returned to $x_0$ and, at the same time, the government would find the displacement less costly. Indeed, the credibility of the draft is enhanced by the expectation of the future costly adjustments.

However, when the change in the external threat (whether positive or negative) is seen as being permanent, binding commitments are more difficult to make as they would have to be in effect for a longer period of time. In this case, the analysis of the purely discretionary regime seems more relevant.

IV. Concluding Remarks

Abstracting from political institutions and conflict among policymakers, our analysis predicts a positive bias in military spending under the assumption that the reallocation of labor resources from one sector to another is not costless. Upon realizing a favorable shock to national security, the government faces a trade-off in shifting labor resources to civilian production activities: though the nation can enjoy both higher security and greater consumption, the displaced military personnel are forced to accept a lower utility than those who remain employed in that sector. If the adjustment costs are not too large, the ability to precommit would support a second-best policy that provides some protection to military personnel, while also realizing some of the increased consumption opportunities afforded by the favorable shock to national security. But, the government’s inability to precommit leads to excessive protection of military workers—further limiting the adjustment of resources and the increased consumption opportunities realized in equilibrium.

Though political considerations have not been formally introduced into the model, their effects should be fairly clear. Suppose, for example, that the government values security by more than do the nation’s citizens. Then, the equilibrium would generally exhibit a positive bias in spending on military bases relative to the allocation chosen by the benevolent social planner. Even in this case, an exogenous increase in national security would prompt some adjustment in labor resources, but the adjustment would be sluggish and, moreover, incomplete relative to that under a benevolent social planner. Similarly, the credibility issue discussed here should augment the
distortions identified in the public choice literature. Specifically, in the context of those analyses emphasizing legislative objectives, the policymaker would fully internalize the adjustment costs generated by closing a base in his district, but would fail to account for the benefits realized by all taxpayers fully. As such, the distributional loss receives more weight in that policymaker’s decision and he is less likely to follow through on an announced base closure action given that none of the base employees have prepared for that action.

One interesting and important extension of the analysis is to treat military spending by other nations as endogenous. We conjecture that, insofar as the incentive of each nation to arm depends positively on the level of spending by other nations, any program that enhances the credibility of one nation’s base closure policy would imply less military spending by the other nations as well in a non-cooperative equilibrium.

References