Extremism: Root Causes and Strategic Use in Conflicts

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Abstract

This paper examines the interaction between root causes, domestic policy considerations and the use of extremism as a strategic tool in an external conflict. Within a two-country three-stage game, we show that, in general, domestic policies will be used strategically to achieve the desired level of extremism. We also show that the level of extremism decreases and social/economic conditions improve when a country becomes wealthier, more powerful, more socially concerned, less nationalistic, relatively less concerned with external considerations and when the value of the contested asset decreases. These effects are due to external strategic considerations, rather than domestic ones.

KEYWORDS: Extremism, Root Causes, Credible Threats, Bargaining, Power, Social/Economic Conditions.

1 Introduction

In the aftermath of 9/11, the problem of extremism has become the subject of endless debates, as well as numerous articles in the academic literature.[1] Some people argue that extremism is rooted in cultural, historical, or religious factors, others suggest that the focus should be on "root causes",[2] whereas a third approach views extremism as a strategic tool in politics and conflicts.[3]

Often the discussion of root causes focuses on underlying economic conditions. The standard argument is that "difficult economic conditions" tend to provide breeding grounds for extremism. There is, indeed, some empirical evidence to support the correlation between economic well-being measures and the level of extremism. For example, Muller & Weede (1990), Blomberg, Hess & Weerapana (2004b) and Drakos & Gofas (2004) find that high levels of economic well-being measures (e.g., high rates of economic growth), reduce the incidence of terrorism and political violence. Honaker (2004) reports that increases in Catholic unemployment lead to increases in Republican violence and increases in Protestant unemployment lead to increases in Loyalist violence. Similarly, Santos Bravo & Mendes Dias (2006), use 1997-2004 data for two large regions of Eurasia to show that the number of terrorist incidents is negatively associated with the level of development, but positively related to mineral reserves and non-democratic political regimes. Piazza (2006), on the other hand, finds that it is "social cleavage", rather than economics variables that can better explain terrorism.

The purpose of this paper is to provide a model in which both underlying root causes and strategic considerations play a role in determining the level of extremism.[4] Specifically, the paper focuses on the interaction between root causes, domestic social/economic policy considerations and the use of extremism as a strategic tool in an external conflict. Extremism is viewed here as the product of underlying root causes, which reflect both domestic and external conditions; for example, social/economic conditions (SEC) and the outcome of the external conflict. At the same time, we also recognize that extremism is strategically useful because it provides a credible threat. Consequently, given the strategic usefulness of extremism and since extremism is determined by underlying root causes, there is an incentive to manipulate internal policies in order to achieve the desired level of extremism. In other words, there will be an incentive to "create the strategically desirable" root causes. This means that empirical findings on the correlation between economic well-being and extremism, may simply reflect strategic policy choices.

The paper examines the interaction between root causes and the strategic use of extremism within a two-country three-stage game. Assuming that only one country acts strategically, we show that in general, an equilibrium exists in which domestic policies are used strategically to achieve the required root causes and

consequently the desired level of extremism. We use the model to study the determinants of social/economic conditions and extremism. We find that when a country becomes wealthier, more powerful, or more socially concerned, its level of extremism decreases and its social/economic conditions improve. These effects, including the effects on SEC, are due to *external strategic considerations*, rather than domestic ones. On the other hand, when the value of the contested asset, nationalism, or the relative weight given to external considerations increase, a country's level of extremism increases and its social/economic conditions deteriorate (again, due to external strategic considerations, rather than domestic ones).

2 The Model

We consider two rival countries (governments, leaders, etc.), in a conflict over a contested asset. The value of the contested asset is b and the countries' initial assets are a_1 and a_2, respectively. We assume that country 2 chooses its internal policy, s, by taking into account both internal and external considerations. Its internal considerations are the usual ones and will be discussed below only briefly. External considerations take into account the fact that internal policy choices affect the country's level of extremism and that extremism, in turn, is a strategic tool in the conflict. For simplicity, we assume that country 1 does not pursue the same strategy. Namely, country 1 chooses its internal policy, s_1, based on internal considerations alone and does not use it as a strategic tool in the external conflict. We, therefore, assume that country 1's internal policy is given.

Extremism is strategically useful because it provides a credible threat, thus enhancing country 2's bargaining position in the conflict. At the same time, extremism also involves a risk: it can cause direct damage to assets. Greater extremism is, therefore, a double-edged sword and consequently, its usefulness as a strategic tool is determined by the balance of these two considerations.

Given the strategic usefulness of extremism, and since extremism is determined by underlying root causes, it follows that, in general, there will be an incentive to manipulate internal policies, and hence root causes, in order to achieve the desired level of extremism. In other words, there will be an incentive to "create the strategically desirable" root causes. Paraphrasing Noam Chomsky; there will be a tendency to "Manufacture *Dissent*" (See Herman & Chomsky (1988)).[5]

When we consider the role of extremism, it is useful to separate between its supply and demand. A credible threat, regardless of who provides it, or why it is provided, is beneficial because it improves one's bargaining position. This means that, in general, there will be demand for credibility, hence extremism. The existence

of extremists and the explanation for their behaviour, on the other hand, is a question of supply. Clearly, to be able to use extremism as a strategic tool, someone has to be able and willing to supply it. The question of why extremists behave the way they do, is most interesting and has, indeed, been discussed extensively in the economic, political historical and psychological literature.[6] Moreover, regardless of why extremists behave the way they do, their existence is a fact of life. In this paper we, therefore, focus on the demand for, rather than the supply of, extremism. Instead of modeling the precise behaviour of extremists (the supply question), we focus on the use of extremism as a strategic tool in the conflict (the demand question).

Extremism is characterized by the fact that its existence can, with some probability, result in an "extremist episode", whose consequence is that a fraction of assets will be destroyed. In the following we refer to such an event as an "explosion". The attractiveness of using extremism as a strategic tool is that it provides a credible threat: the mere existence of extremism implies that there is a chance that an explosion will occur; and if and when it occurs, some assets will be damaged. Since we assumed that only country 2 uses extremism as a strategic tool in the conflict, we also assume that an explosion can be caused only by country 2's extremists.[7]

2.1 Root Causes:

Although we do not try to explain the behaviour of extremists precisely, we do capture the root causes behind extremists' explosions, at least partially. Since country 1 is assumed not to pursue strategic extremism, we focus on the root causes of extremism in country 2.

Individuals in country 2 may care about many issues, but for simplicity we assume that there are only two issues that can act as root causes of extremism: one internal and one external. The external issue is captured by the share of the contested asset (z) that country 2 receives in the conflict. The internal issue is related to social/economic conditions, such as: income distribution, social/economic justice, living conditions, economic opportunities etc., which have traditionally been associated with social "discontent", or "anger". In the following, we refer to theses as "social/economic conditions" (SEC) , denoted by $0 \leq s \leq 1$.

We assume that each individual, in country 2, has an "acceptable" share of the contested asset, denoted by η. Each individual also has an acceptable level of a measure of SEC, denoted by r. Individuals are, therefore, characterized by their acceptable levels, (η, r). For simplicity, we assume that η and r are distributed according to the uniform distribution function:

$$f(\eta, r) = \begin{cases} 1 & if \;\; 0 \leq \eta \leq 1, \; 0 \leq r \leq 1 \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

The distribution $f(\eta, r)$ enables us to construct simple measures of social discontent, frustration, or anger.

For any given share, z, and a measure of social conditions, s, let the "external and internal related" measures of anger of individual η, r be given by: $\gamma(\eta - z)$, if $\eta \geq z$ but 0 otherwise, and $\mu(r - s)$, if $r \geq s_2$, but 0 otherwise, respectively, where $0 \leq \gamma \leq 1$ and $0 \leq \mu \leq 1$.[8] In other words, unacceptable outcomes are costly, but acceptable outcomes have zero costs. The parameters γ and μ reflect the costs per "unit of distance" and can, thus, be viewed a measuring the importance of nationalistic and social/economic concerns, respectively. For simplicity, we take γ and μ to be the same for all individuals. In this example, we simply take the measure of total anger as the sum of the nationalistic and social/economic measures of anger. For any given share, z, and social conditions, s, the measure of total anger in Country 2, denoted by x, can be written as:[9]

$$x(z,s) \equiv \int_z^1 \int_s^1 [\gamma(\eta - z) + \mu(r - s)] d\eta \; dr \tag{2}$$

From (2), it follows that the measure of total anger in Country 2 is decreasing and convex in z and s, but because of the additivity, $\partial^2 x / \partial z \partial s = 0$.

In the following, we use the measure of total anger, x, to capture (define) the level of extremism in Country 2. Thus, extremism in this model is determined by underlying root causes; both internal and external.

The probability of an explosion, denoted as $1 - q$, is related to total anger in country 2. For example, it can be captured by a standard cost function, which is increasing and convex in total anger. For simplicity, we take it as:

$$1 - q(z,s) = x^{\beta}(z,s) \tag{3}$$

where $\beta \geq 1$. Alternatively, the probability that there would be no explosion, q, is given by:

$$q(z,s) = 1 - x^{\beta}(z,s) \tag{4}$$

This can be viewed as a "production function", the "output" being no explosion, that is, you produce "political peace and quiet".

What are the root causes here? Extremism is determines by the share and social conditions: z and s. We can think of z and s as the external and internal root causes, respectively. However, while s is a policy instrument, z is determined in the bargaining process, so it depends on s. It is, therefore, clear that if extremism is useful in the external conflict, and if root causes lead to extremism, the government will choose s, to manipulate root causes. In this sense, it is the usefulness of extremism that "creates the root causes."

2.2 Internal Policy Considerations

When choosing its domestic policy, s, country 2 also has internal, in addition to external, considerations. Since the focus of the paper is not on internal policy considerations, we do not discuss this part in detail, but

simply assume that government 2's domestic net benefits from its policy choice are given by the concave net benefits function $D_2(s;\rho)$, where ρ represents the parameters of the domestic benefits function (an example of a net domestic benefits function is given in section 4). This benefits function may include internal direct costs, opportunity costs, direct benefits, and ideological benefits/costs of s. Country 1's internal benefits function is given by $D_1(s_1)$, where s_1 is taken as given.

2.3 Time Line

The conflict between the two countries has the following time line:

1. In stage 1, country 2 chooses (non-cooperatively) its internal SEC policy: it chooses s.

2. In stage 2, given county 2's choice of SEC and the two countries' disagreement utilities (discussed immediately below), the two countries engage in bargaining over the division of the contested asset. The shares, $z,\ (1-z)$ are determined in this stage.

3. We assume that in case of disagreement, the contested asset "disappears" and a fraction, k, of the initial assets is lost. Furthermore, the countries' total net domestic benefits are then given by: $D_1,\ D_2$.[10]

4. No actions by the governments are taken beyond these two stages. Given the choice of policy by country 2 and the outcome of the bargaining game, an explosion occurs with probability $1-q(z,s)$. If an explosion occurs, a fraction λ of b and a fraction k of the initial assets are lost.

3 The Solution of the Game

3.1 Last stage: An Extremist Explosion

At this stage, given the shares, $z,(1-z)$ and the policy choice of country 2, an explosion occurs with probability $1-q(z,s)$. The two governments' expected payoffs, u_i, $i=1,2$, are given by:

$$u_1 \equiv \theta_1 F_1(z,s) + (1-\theta_1)D_1(s_1) + a_1 \tag{5}$$

$$u_2 \equiv \theta_2 F_2(z,s) + (1-\theta_2)D_2(s) + a_2 \tag{6}$$

where $\{\theta_1,(1-\theta_1)\},\ \{\theta_2,(1-\theta_2)\}$ are the weights that the two governments attach to their foreign and domestic considerations, and where their foreign (expected) benefits are given by:

$$F_1(z,s) \equiv [q(z,s_2)b(1-z) + (1-q(z,s_2))b(1-z)(1-\lambda)] - k(1-q)a_1 \tag{7}$$

$$F_2(z,s) \equiv [q(z,s_2)bz + (1-q(z,s_2))bz(1-\lambda)] - k(1-q)a_2 \tag{8}$$

3.2 Second Stage: Determination of Bargaining Shares

Since the bargaining process itself is not the focus of the paper, we choose a particular bargaining solution as an illustration; specifically, we use the Generalized Nash Bargaining solution.[11] This solution can be obtained by solving the problem:

$$Max_z\{(u_2 - u_2^0)^\alpha (u_1 - u_1^0)^{(1-\alpha)}, \tag{9}$$
$$0 \leq z \leq 1, \quad u_i \geq u_i^0\} \quad i = 1, 2$$

where the two countries' disagreement utilities, u_i^0, are given by:

$$u_i^0 = a_i - \theta_i \, [k(1-q)a_i] + (1-\theta_i) D_i(s_i) \tag{10}$$

and where the parameter $0 < \alpha < 1$ capture County 2's bargaining power. In the standard Nash bargaining solution, rivals have equal power so that $\alpha = 1/2$.

Using equations (5)-(8) and (10), the bargaining problem can be written as:

$$Max_z\{(\theta_2 bz[1 - \lambda + \lambda q])^\alpha (\theta_1 b(1-z)[1 - \lambda + \lambda q])^{(1-\alpha)}, \; 0 \leq z \leq 1\} \tag{11}$$

and it is easy to show that the objective function in (11) is concave in z (see Appendix A.1). Let the bargaining solution be given by: $z^*(s; \gamma, \mu, \alpha, \lambda, \beta)$. Note that problem (11) can be written as:

$$Max_z \; \pi(z; \alpha) \; J(z; s) \tag{12}$$

where $J(\cdot) \equiv [1 - \lambda + \lambda q]$ and $\pi(z; \alpha) \equiv b\{[\theta_2 z]^\alpha [\theta_1 (1-z)]^{(1-\alpha)}$. Now, let us compare the solution to problem (11) to the solution in the case without extremism, which is obtained from the problem:

$$Max_z = \pi(z; \alpha) \tag{13}$$

Let the solution to problem (13) be given by $z^0(\alpha)$. It can be easily verified that $z^0(\alpha)$ is simply given by the bargaining power of country 2, namely,

$$z^0(\alpha) = \alpha \tag{14}$$

If both parties have the same bargaining power we get an equal division: $z^0(1/2) = 1/2$.

How does the strategic use of extremism change this result? Clearly, the optimal shares will now reflect the two countries' relative powers and country 2's strategic use of extremism. To isolate the effects of extremism,

let us first assume that both countries have equal powers: $\alpha = 1 - \alpha = .5$. It is easy to verify that in this case, $\frac{\partial J(z^0(.5))}{\partial z} > 0$, which implies that:

$$z^* > 1/2 \tag{15}$$

In other words, if both countries have equal power, but country 2 uses extremism strategically, county 2 will obtain a higher bargaining share. In this sense, the use of extremism is indeed attractive.

More generally, even if country 2 is weaker, it is still true that (see Appendix A.1. for proof):

$$z^* > z^0(\alpha) = \alpha \tag{16}$$

That is, a weaker country will increase its share if it uses extremism strategically. Country 2's share may now be larger, or smaller than country 1's share, depending on whether the extremism advantage outweighs the power disadvantage. In any case, it seems that a weaker country may be able to use extremism to overcome its power disadvantage. This point will be pursued further once we determine the equilibrium levels of the shares and extremism.

In the next section we examine the choice of s and the consequent level of extremism. But, before we do that, it is necessary to determine the effects of SEC on the countries' bargaining shares. Furthermore, to be able to examine the determinants of SEC and extremism, we first have to know how the various parameters affect the bargaining shares. We now look at these effects.

From the first order conditions for problem (11) we can obtain the following comparative statics results (for proofs see Appendix A.2.):

$$\begin{array}{rcl} \frac{\partial z^*(\cdot)}{\partial s} & < & 0, \quad \frac{\partial z^*(\cdot)}{\partial \alpha} > 0, \quad \frac{\partial z^*(\cdot)}{\partial \lambda} > 0 \\ \frac{\partial z^*(\cdot)}{\partial b} & = & 0, \quad \frac{\partial z^*(\cdot)}{\partial \gamma} > 0, \quad \frac{\partial z^*(\cdot)}{\partial \mu} > 0 \\ \frac{\partial z^*(\cdot)}{\partial \theta_i} & = & 0, \ \frac{\partial z^*(\cdot)}{\partial a_i} = 0, \quad i = 1, 2 \end{array} \tag{17}$$

In other words:

1. Country 2's bargaining share increases when its social/economic conditions deteriorate. This effect captures the essence of the strategic advantage of using the SEC policy as a tool in the external conflict.

2. Country 2's bargaining share increases (decreases) with its power (country 1's power).

3. Country 2's bargaining share increases with the destructiveness of extremism.

4. A change in the value of the contested asset does not affect s.

5. An increase in country 2's nationalism (captured by γ) increases its bargaining share.

6. An increase in the importance of social concerns in country 2 (captured by μ) increases its bargaining share.

7. An increase in the initial wealth (a_i), or the weights that the two governments attach to their foreign (or domestic) benefits (θ_i) does not affect the bargaining share.

Finally, it should be noted that results 2-7 in equations (17) are only *partial effects.* That is, they do not take into account the fact that a change in a parameter (other than s, of course) will also affect s. The total effects (which also account for changes in s) will be obtained below, after we examine the determinants of s.

3.3 First Stage: Optimal SEC Policy and the Equilibrium Level of Extremism

The optimal SEC policy in country 2 is determined in this stage. Using equations (6) and (8), the expected payoff for country 2 can be written as:

$$V_2(s;\varphi) \equiv u_2(z^*, s) = \ \theta_2 F_2[z^*(s;\cdot), s] + \ (1-\theta_2) D_2(s;\cdot) + a_2 \tag{18}$$

where the vector $\varphi = (\gamma, \mu, \alpha, \lambda, b, k, \beta, \theta_2, a_2, \rho)$ represents all the underlying parameters.

Country 2 chooses its SEC policy to maximize its payoff, V_2, taking into account the optimal bargaining share $z^*(s;\cdot)$. Its problem is, therefore, given by:

$$Max_s \ V_2(s;\varphi) \tag{19}$$

Let the corresponding optimal solution be denoted by $s^*(\varphi)$.[12] The corresponding equilibrium level of extremism is, therefore, given by: $x^*[z^*(s^*), s^*] \equiv x^*(\varphi)$.

To understand the nature of the solution it is useful to consider first what happens in the two extreme cases, when $\theta_2 = 0$ and when $\theta_2 = 1$, that is: when country 2 has only domestic, or only foreign considerations.

When $\theta_2 = 0$, country 2 chooses it optimal policy by solving the problem:

$$\max_s D_2(s;\cdot) \tag{20}$$

Assuming that $D_2(s;\cdot)$ is concave for $0 \leq s \leq 1$, there exists an optimal policy, say $s^d(\rho)$, such that

$$\frac{\partial D_2[s^d;\cdot]}{\partial s} = 0 \tag{21}$$

On the other hand when $\theta_2 = 1$, country 2 chooses it optimal policy by solving the problem:

$$\max_s \ F_2[z^*(s); s] \tag{22}$$

Can this problem have an interior solution for s? To answer this question, note that the effect of a change in s on foreign benefits ($F_2[z^*(s);s]$) is given by:

$$\frac{\partial F_2[z^*(s);s]}{\partial s} = MB_2^F - MC_2^F \tag{23}$$

where MB_2^F and MC_2^F are Country 2's foreign marginal benefits and marginal costs of s, defined as:

$$\begin{aligned} MB_2^F &\equiv [b\lambda z^* + a_2 k]\frac{\partial q}{\partial s} > 0 \\ MC_2^F &\equiv [b(1-\lambda+\lambda q) + (b\lambda z^* + a_2 k)\frac{\partial q}{\partial z^*}]\frac{\partial z^*}{\partial s} > 0 \end{aligned} \tag{24}$$

Thus, unless $MB_2^F - MC_2^F$ is always strictly negative, or strictly positive , we can expect to have an interior solution for s. In other words (for a concave $F_2(s;\cdot)$ function with $0 \leq s \leq 1$), in general, there exists an optimal policy, say $s^f(\gamma, \mu, \alpha, \lambda, b, k, a_2, \beta)$, such that

$$\frac{\partial F_2[s^f;\cdot]}{\partial s} = MB(s^f;\cdot) - MC(s^f;\cdot) = 0 \tag{25}$$

Figure 1 shows the foreign benefits function for the parameter values: $\gamma = 1,\ \mu = 1,\quad \alpha = .5,\quad \lambda = .5,\ b = 1,$ $k = .1,\ a_2 = 1,\ \beta = 2$. As the figure shows, $F_2(s;\cdot)$ is concave and the solution, s^f, exists and is unique.

The values of s^d and s^f are determined by the domestic and foreign net benefits functions ($D_2[s;\cdot]$ and $F_2[z^*(s;\cdot), s;\cdot]$) and their parameters ($\rho$ and $\{\gamma, \mu, \alpha, \lambda, b, k, a_2, \beta\}$, respectively). We have two possible configurations to consider (we ignore the case where $s^d = s^f$.): Case 1: $s^d > s^f$, Case 2: $s^d < s^f$. In Case 1, we have

$$s^f < s^* < s^d \tag{26}$$

but, in Case 2 we have

$$s^d < s^* < s^f \tag{27}$$

Which of these two cases occurs depends on all the parameters of the problem. Specifically, parameter changes that shift the foreign net marginal benefits ($\frac{\partial F_2[s^f;\cdot]}{\partial s}$) upward, make it more likely for Case 1 to occur. On the other hand, parameter changes that shift the domestic net marginal benefits ($\frac{\partial D_2[s^d;\cdot]}{\partial s}$) upward, make it more likely for Case 2 to occur. The effects of the parameters on these two net marginal benefits and consequently on $s^*(\varphi)$ will be examined in the next section. For our purposes, however, Case 1 is more interesting. In this case, County 2 uses its SEC policy strategically, by lowering s (relative to its purely domestically desired level) in order to increase extremism, which in turn improves its bargaining outcome. In Case 2, Country 2's domestically driven level of SEC is low enough that even for foreign strategic reasons, s needs to be improved.

That is, the high level of extremism is now, actually, a strategic liability. In the following we, therefore, focus on Case 1 (but, we also point out how the results differ in Case 2).

4 The Determinants of Social/Economic Conditions and Extremism

In this section we explain what determines the optimal SEC policy and the consequent equilibrium levels of extremism. We consider the effects of changes that effect external and internal considerations and a change in the weights of internal and external benefits in country 2's choice of policy.[13]

From the first order condition for problem (19) we obtain the following results (see Appendix A.3 for derivations):

1. **The Effects of a Change in Initial Wealth:**

An increase in Country 2's initial wealth decreases the attractiveness of extremism as an external strategic tool in the conflict ($\partial F_2[s,\cdot]/\partial s$ shifts upward). A higher initial wealth, therefore, increases s^* and decreases the level of extremism:

$$\frac{ds^*}{da_2} > 0, \ \frac{dx^*}{da_2} < 0 \tag{28}$$

Thus, as country 2 becomes wealthier, its SEC improve. This, however, does not reflect an improvement in SEC due to greater affluence (which could occur, for example, if initial wealth affected the domestic marginal benefits function). Instead, it reflects an improvement in SEC which is due to external strategic considerations. As a result of the increase in s, the equilibrium level of extremism decreases. In this sense, the often heard claim that extremism is a "poor man's F16" is, in fact, confirmed. This result is consistent with the empirical findings that were cited in the introduction.

2. **Effects of a Change in The Size of the Contested Asset:**

An increase in b raises the stakes in the conflict, thus making extremism more attractive as a strategic tool ($\partial F_2[s,\cdot]/\partial s$ shifts down). Consequently, SEC in country 2 deteriorate and extremism increases (the opposite results occur in case (2)):

$$\frac{ds^*}{db} < 0, \ \ \frac{dx^*}{db} > 0 \tag{29}$$

3. **Effects of a Change in Power:**

A stronger country gets a higher share of the contested asset anyway. Using the risky strategic tool of extremism is, therefore, less attractive when Country 2 becomes more powerful ($\partial F_2[s,\cdot]/\partial s$ shifts upward). Consequently, an increase in Country 2's power increases s^* and decreases the level of extremism:

$$\frac{ds^*}{d\alpha} > 0,\ \frac{dx^*}{d\alpha} < 0 \tag{30}$$

In this sense, as it is often argued, extremism is, indeed, a weak country's weapon of choice.[14]

4. **Effects of a Change in Destructiveness:**

I. An increase in extremism's destructiveness vis-à-vis the contested asset (a higher λ) makes extremism strategically more useful ($\partial F_2[s,\cdot]/\partial s$ shifts downward); as a result s^* decreases and the level of extremism increases:

$$\frac{ds^*}{d\lambda} < 0,\ \frac{dx^*}{d\lambda} > 0 \tag{31}$$

II. An increase in extremism's destructiveness vis-à-vis the initial asset (a higher k) makes extremism strategically less attractive ($\partial F_2[s,\cdot]/\partial s$ shifts upwards), thus increasing s^* and decreasing the level of extremism:

$$\frac{ds^*}{dk} > 0,\ \frac{dx^*}{dk} < 0 \tag{32}$$

5. **Effects of a Change in Nationalistic Feelings:**

As Country 2 becomes more nationalistic (γ increases), extremism becomes strategically more attractive ($\partial F_2[s,\cdot]/\partial s$ shifts downward), thus decreasing s^* and increasing the level of extremism:

$$\frac{ds^*}{d\gamma} < 0,\ \frac{dx^*}{d\gamma} > 0 \tag{33}$$

6. **Effects of a Change in the Importance of Social Concerns:**

An increase in the importance of social concerns in Country 2 (a higher μ) will shift its $\partial F_2[s,\cdot]/\partial s$ upwards, thus increasing s^* and decreasing the level of extremism:

$$\frac{ds^*}{d\mu} > 0,\ \frac{dx^*}{d\mu} < 0 \tag{34}$$

7. **Effects of a Change in the Weights of External considerations in country 2:**

An increase in θ_2 means that internal considerations become less important. As a result extremism becomes strategically more useful ($\partial F_2/\partial s - \partial D_2/\partial s$ shifts downward). Thus, not surprisingly, s^* decreases and the level of extremism increases (the opposite results occur in case (2)):

$$\frac{ds^*}{d\theta_2} < 0, \frac{dx^*}{d\theta_2} > 0 \tag{35}$$

8. A **Change in Parameters Affecting Internal Considerations:**

I. The parameters that affect the domestic net marginal benefits, are given by the vector ρ. Since the total marginal benefits of s are an average of external and internal marginal benefits ($\frac{\partial V^i(s_2;\varphi)}{\partial s} \equiv \theta_2 \frac{\partial F_2[z^*(s;\cdot),s,\cdot]}{\partial s}$ $+(1-\theta_2)\frac{\partial D_2[s,\cdot]}{\partial s}$), it is clear that any parameter change in the vector ρ that shifts $\frac{\partial D_2[s,\cdot]}{\partial s}$ upward, makes extremism less attractive, thus increasing s and decreasing extremism.

Consider a simple example. Suppose that one of the components of domestic benefits captures Country 2's government's ideological position. Specifically, let its "ideal" SEC policy, be given by v_2. Assuming that deviations from the ideal policy are costly, the net ideological benefits can be written, for example, as $I_2(s; v_2, g_2) = v_2 - g_2(v_2 - s)^2$, where g_2 is government 2's cost per "unit distance" from its ideal policy. An increase in v_2 indicates that the government becomes more "socially concerned". Not surprisingly, this implies that $\frac{\partial D_2[s,\cdot]}{\partial s}$ shifts upward and as a result extremism becomes less attractive strategically, thus increasing s and decreasing extremism. Similarly, an increase in the internal costs of the SEC policy will decrease s and increase extremism.

9. **Effects on Other Policies**:

We can use the results above to determine how changes in the environment affect other policies, by examining a simple, but more general framework. For example, let government 2's net domestic benefits from policies $s, s_1...s_n$, be given by the benefits function $W_2(s, s_{1n}; \rho)$, where $s_{1n} \equiv (s_1...s_n)$. For any given s, define the restricted indirect benefits function as $D_2(s;\rho) \equiv \max_{s_{1n}} W_2(s, s_{1n}; \rho)$. Define the optimal other policies as: $s^*_{1n} = s^*_{1n}(s;\rho) \equiv \arg\max_{s_{1n}} W_2(s, s_{1n}; \rho)$. The net benefits function that we use in the paper can, therefore, be viewed as a restricted indirect benefits function.

Once we explain how *strategic considerations* affect s and extremism, we can also show how they affect other policies. To see note that, when a parameter, say φ, changes, it may have both direct and indirect effects on other policies: $\frac{ds^*_i}{d\varphi} = \frac{\partial s^*_i}{\partial \varphi} + \frac{\partial s^*_i}{\partial s}\frac{\partial s}{\partial \varphi}$, $i = 1..n$. If φ does not appear in the domestic benefits function, the direct effect is zero, so that $\frac{ds^*_i}{d\varphi} = \frac{\partial s^*_i}{\partial s}\frac{\partial s}{\partial \varphi}$. Thus, for all parameters that are not in the domestic benefits function, a change that increases s will increases "complement policies" (those for which $ds_i/ds > 0$), but decreases "substitute policies" (those for which $ds_i/ds < 0$). For example, an increase in the power of Country 2 will increase s_i for all $i \in$ complement policies, but decrease s_i for all $i \in$ substitute policies. On the other hand, for parameters that are in the domestic benefits function, a change that increases s will have a positive indirect (but, not necessarily total) effect on complement policies, but a negative indirect effect on substitute policies.The overall effect, in this case, also depends on the direct effect of the parameter change.

10. **The Overall Effects on the Probability of an Explosion**

Given the effects on s and x it is now easy to calculate the overall effects of a change in the parameters on the probability of an extremist explosion. Consider a change in a parameter, say δ. Since $1-q(z,s) = x^{\beta}(z,s)$, we get that for all parameters, except for β:[15]

$$\frac{d(1-q^*)}{d\delta} = \beta x^{(\beta-1)} \frac{dx^*}{\partial\delta} \tag{36}$$

Hence, a change in a parameter affects extremism and the probability of an explosion in the same way.

11. **The Overall Effects on the Bargaining Share**

Finally, given the effects on s, we can now also calculate the total effects of parameter changes on the bargaining share, z. For example, the total effects of a change in the parameter δ is given by:

$$\frac{dz^*}{d\delta} = \frac{\partial z^*}{\partial\delta} + \frac{\partial z^*}{\partial s^*}\frac{ds^*}{\partial\delta} \tag{37}$$

It is easy to show (see Appendix A.4) that the total effects on the bargaining share are given by:

$$\frac{dz^*}{da_2} < 0, \frac{dz^*}{d\lambda} > 0, \frac{dz^*}{dk} < 0, \frac{dz^*}{d\gamma} > 0, \ \frac{dz^*}{db} > 0, \ \frac{dz^*}{d\theta_2} > 0 \tag{38}$$

The effects of a change in the α and μ, however, are ambiguous qualitatively, since the two effects in equation (37), have opposite signs. For example, as Country 2 becomes more powerful, the direct effect is to increase z^* ($\frac{\partial z^*}{\partial\alpha}$), but since greater power increases s^* (which decreases the share) the indirect effect is to decrease z^* ($\frac{\partial z^*}{\partial s^*}\frac{ds^*}{\partial\alpha}$). Using our numerical example, we are able to calculate these effects. We find that the overall effect of an increase in the importance social/economic concerns, or power (if α, or μ increase) is to increase Country 2's share.

5 Conclusion

This paper examines the interaction between root causes, domestic policy considerations and the use of extremism as a strategic tool in an external conflict. Using a two-country three-stage game, we show that, in general, domestic policies will, indeed, be used strategically to achieve the required root causes and consequently the desired level of extremism. We examine the effects of changes in the environment and show that the level of extremism decreases and social/economic conditions improve when a country becomes wealthier, more powerful, more socially concerned, less nationalistic, less concerned with external versus internal considerations and when the value of the contested asset decreases. These effects, including the effects on social/economic conditions, are due to external strategic considerations, rather than domestic ones.

6 Appendix

A.1

We can write the log of the objective function in problem (11) as: $\log(J)+\log(\pi) \equiv \log(b)+\log(\theta_2^{\alpha}\theta_1^{(1-\alpha)})+ \log(1-\lambda+\lambda q) \ +[\alpha\log(z) \ +(1-\alpha)\log(1-z)]$. Assuming that we have an interior solution, the first order condition can, therefore, be written as:

$$H \equiv \frac{\lambda\partial q/\partial z}{(1-\lambda+\lambda q)} + \frac{\alpha - z}{z(1-z)} = 0 \tag{39}$$

But, since $\partial q/\partial z >$, we have $\frac{\lambda\partial q/\partial z}{(1-\lambda+\lambda q)} > 0$, so that we must have $\frac{\alpha - z^0}{z^0(1-z^0)} < 0$, or $\alpha < z^0$, which means that $z^* > z^0$.

Next, note that the second order condition is satisfied since:

$$\frac{\partial H}{\partial z} = \frac{\lambda\partial^2 q/\partial z^2(1-\lambda+\lambda q) - [\lambda\partial q/\partial z]^2}{(1-\lambda+\lambda q)^2} - [\frac{\alpha}{z^2} + \frac{1-\alpha}{(1-z)^2}] < 0 \tag{40}$$

A.2

From (39) we get:

1. $\frac{dz}{ds} = -\frac{\partial H/\partial s}{\partial H/\partial z} = -\frac{1}{\partial H/\partial z} \ \lambda[\frac{\partial^2 q}{\partial z \partial s}(1-\lambda+\lambda q) - \lambda\frac{\partial q}{\partial s}\frac{\partial q}{\partial z})]/(1-\lambda+\lambda q)^2 = -\lambda\beta\gamma(1-z)\mu(1-s)A^{\beta-2}[(\beta - 1)(1-\lambda+\lambda q) + \lambda\beta(1-q)] < 0.$

Since $\partial H/\partial z < 0$, from the second order condition.

2. $\frac{dz}{d\alpha} = -\frac{\partial H/\partial \alpha}{\partial H/\partial z} = -\frac{1}{\partial H/\partial z}\frac{\alpha}{z(1-z)} > 0.$

3. $\frac{dz}{d\gamma} = -\frac{\partial H/\partial \gamma}{\partial H/\partial z} = -\frac{1}{\partial H/\partial z}\lambda[\frac{\partial^2 q}{\partial z \partial \gamma}(1-\lambda+\lambda q) - \lambda\frac{\partial q}{\partial \gamma}\frac{\partial q}{\partial z})]/(1-\lambda+\lambda q)^2 > 0,$ since $\frac{\partial^2 q}{\partial z \partial \gamma} > 0$ and $\frac{\partial q}{\partial \gamma} > 0, \frac{\partial q}{\partial z} > 0.$

4. $\frac{dz}{d\mu} = -\frac{\partial H/\partial \mu}{\partial H/\partial z} = -\frac{1}{\partial H/\partial z}\lambda[\frac{\partial^2 q}{\partial z \partial \mu}(1-\lambda+\lambda q) - \lambda\frac{\partial q}{\partial \mu}\frac{\partial q}{\partial z})]/(1-\lambda+\lambda q)^2 > 0,$ since $\frac{\partial^2 q}{\partial z \partial \mu} > 0.$

5. $\frac{dz}{d\lambda} = -\frac{\partial H/\partial \lambda}{\partial H/\partial z} = -\frac{1}{\partial H/\partial z}\frac{\partial q}{\partial z}[(1-\lambda+\lambda q) - \lambda(q-1)] =$

$-\frac{1}{\partial H/\partial z}\frac{\partial q}{\partial z} > 0.$

6. Since b, θ_2 and θ_1 do not appear in the first order condition for z :

$H \equiv \frac{\lambda\partial q/\partial z}{(1-\lambda+\lambda q)} + \frac{\alpha - z}{z(1-z)} = 0$, we have $\frac{dz}{db}\frac{dz}{d\theta_2}\frac{dz}{d\theta_1} = 0.$

A.3

Effects On s :

The first order condition for s is given by:

$$\frac{\partial V^i(s_2;\varphi)}{\partial s} \equiv \ \theta_2\frac{\partial F_2[z^*(s;\cdot),s,\cdot]}{\partial s} + (1-\theta_2)\frac{\partial D_2[s,\cdot]}{\partial s} = 0 \tag{41}$$

The effects of parameter changes on s are therefore:

$$\frac{ds^*}{d\delta} = -\frac{\theta_2 \frac{\partial^2 F_2}{\partial s \partial \delta}}{T} \; for \; \delta = \gamma, \mu, \alpha, \lambda, b, k, a_2 \tag{42}$$

$$\frac{ds^*}{d\rho} = -\frac{(1-\theta_2)\frac{\partial^2 D_2}{\partial s \partial \rho}}{T} \tag{43}$$

$$\frac{ds^*}{d\theta_2} = -\frac{\frac{\partial F_2}{\partial s} - \frac{\partial D_2}{\partial s}}{T} \tag{44}$$

where $T \equiv [\theta_2 \frac{\partial^2 F_2}{\partial s^2} + (1-\theta_2)\frac{\partial^2 D_2}{\partial s^2}]$ is negative from the concavity of F_2 and D_2.

First, note that the total effect of an increase in s on q is given by: $\frac{dq}{ds} = \frac{\partial q}{\partial s} + \frac{\partial q}{\partial z}\frac{\partial z}{\partial s}$. It seems reasonable that this effect will be positive. It can be confirmed (very easily, by using the mathematics programme Maple) that, for all values of the parameters $0 \leq \gamma \leq 1, 0 \leq \mu \leq 1, 0 < \alpha < 1, 0 < \lambda \leq 1$, $\frac{dq}{ds}$ is indeed positive. This simply ensures "stability" in the effect of an increase in s on probability q. It makes sense, since it implies that as s goes up we cannot decrease the overall probability of the "good" outcome (no explosion).

Second, also note that we have one two possible equilibria: case (1) where $s^f < s^* < s^d$ and case (2) where $s^d < s^* < s^f$. In case (1) we have $\frac{\partial F_2(s^*)}{\partial s} < 0$ and $\frac{\partial D_2(s^*)}{\partial s} > 0$, but in case (2) we have $\frac{\partial F_2(s^*)}{\partial s} > 0$ and $\frac{\partial D_2(s^*)}{\partial s} < 0$.

Given that $\frac{dq}{ds} > 0$ and that both F_2 and D_2 are concave, we then have the following:

1. $\frac{ds^*}{da_2} = -\frac{1}{T}\frac{dq}{ds}k > 0$.
2. $\frac{ds^*}{dk} = -\frac{1}{T}\frac{dq}{ds}a_2 > 0$.
3. $\frac{ds^*}{db} = -\frac{1}{T}[\frac{\partial z}{\partial s}(1-\lambda+\lambda q) + \frac{dq}{ds}z] \begin{cases} > 0 \text{ if } s^f > s^d \\ < 0 \text{ if } s^d > s^f \end{cases}$
4. $\frac{ds^*}{d\theta_2} = -\frac{1}{T}[\frac{\partial F_2}{\partial s} - \frac{\partial D_2}{\partial s}] \begin{cases} > 0 \text{ if } s^f > s^d \\ < 0 \text{ if } s^d > s^f \end{cases}$
5. Since a change in the parameters $\gamma, \mu, \alpha, \lambda$ affects the bargaining share, it is not easy to calculate the overall effect. These effects are easy to calculate using the mathematics programme Maple. We find that $\frac{\partial^2 F_2}{\partial s \partial \gamma} < 0$, $\frac{\partial^2 F_2}{\partial s \partial \mu} > 0$, $\frac{\partial^2 F_2}{\partial s \partial \alpha} > 0$, $\frac{\partial^2 F_2}{\partial s \partial \lambda} < 0$.

Effects on Extremism, x :

First note that $q = 1 - x^{2,}$ so that $x = (1-q)^{1/2}$. Hence, $\frac{dx}{ds} = -\frac{1}{2}\frac{dq}{ds} < 0$, since $\frac{dq}{ds} > 0$. Second, $x(z,s) \equiv \int_z^1 \int_s^1 [\gamma(\eta - z) + \mu(r-s)] d\eta \, dr = x(z,s) = \frac{\gamma}{2}(1-z)^2 + \frac{\mu}{2}(1-s)^2$. Thus, $\frac{\partial x}{\partial \gamma} > 0$, $\frac{\partial x}{\partial \mu} > 0$, $\frac{\partial x}{\partial s} < 0$, $\frac{\partial x}{\partial z} < 0$.

The effects on extremism are, therefore given by:

1. $\frac{dx^*}{da_2} = \frac{\partial x}{\partial s}\frac{ds}{da_2} < 0$.
2. $\frac{dx^*}{dk} = \frac{\partial x}{\partial s}\frac{ds}{dk} < 0$
3. $\frac{dx^*}{db} = \frac{\partial x}{\partial s}\frac{ds}{db} \begin{cases} < 0 \text{ if } s^f > s^d \\ > 0 \text{ if } s^d > s^f \end{cases}$

4. $\frac{dx^*}{d\theta_2} = \frac{\partial x}{\partial s}\frac{ds}{d\theta_2} \begin{cases} < 0 \text{ if } s^f > s^d \\ > \text{ if } s^d > s^f \end{cases}$

5. $\frac{dx^*}{d\alpha} = \frac{\partial x}{\partial s}\frac{ds}{d\alpha} + \frac{\partial x}{\partial z}\frac{\partial z}{\partial \alpha} < 0$

6. For the γ, μ, and λ we obtain the effects using Maple as:

(i) $\frac{dx^*}{d\lambda} = \frac{\partial x}{\partial s}\frac{ds}{d\lambda} + \frac{\partial x}{\partial z}\frac{\partial z}{\partial \lambda} > 0.$

(ii) $\frac{dx^*}{d\gamma} = \frac{\partial x}{\partial s}\frac{ds}{d\gamma} + \frac{\partial x}{\partial z}\frac{\partial z}{\partial \gamma} + \frac{\partial x}{\partial \gamma} > 0.$

(iii) $\frac{dx^*}{d\mu} = \frac{\partial x}{\partial s}\frac{ds}{d\mu} + \frac{\partial x}{\partial z}\frac{\partial z}{\partial \mu} + \frac{\partial x}{\partial \mu} < 0$

A.4. Total Effects on the Bargaining Share:

First, note that $\frac{\partial z^*}{\partial s^*} < 0$.

1. $\frac{dz^*}{da_2} = \frac{\partial z^*}{\partial s^*}\frac{ds^*}{da_2} < 0$, since $\frac{ds^*}{da_2} > 0$.

2. $\frac{dz^*}{d\lambda} = \frac{\partial z^*}{\partial \lambda} + \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\lambda} > 0$, since $\frac{\partial z^*}{\partial \lambda} < 0, \frac{ds^*}{d\lambda} < 0$.

3. $\frac{dz^*}{dk} = \frac{\partial z^*}{\partial s^*}\frac{ds^*}{dk} < 0$, since $\frac{ds^*}{dk} > 0$.

4. $\frac{dz^*}{d\gamma} = \frac{\partial z^*}{\partial \gamma} + \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\gamma} > 0$, since $\frac{\partial z^*}{\partial \gamma} > 0, \frac{ds^*}{d\gamma} < 0$.

5. $\frac{dz^*}{d\mu} = \frac{\partial z^*}{\partial \mu} + \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\mu}?$, since $\frac{\partial z^*}{\partial \mu} > 0, \frac{ds^*}{d\mu} > 0$.

6. $\frac{dz^*}{d\alpha} = \frac{\partial z^*}{\partial \alpha} + \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\alpha}?$, since $\frac{\partial z^*}{\partial \alpha} > 0, \frac{ds^*}{d\alpha} > 0$.

7. $\frac{dz^*}{db} = \frac{\partial z^*}{\partial s^*}\frac{ds^*}{db} \begin{cases} < 0 \text{ if } s^f > s^d \\ > \text{ if } s^d > s^f \end{cases} > 0.$

8. $\frac{dz^*}{d\theta_2} = \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\theta_2} > 0 \begin{cases} < 0 \text{ if } s^f > s^d \\ > \text{ if } s^d > s^f \end{cases} > 0.$

9. $\frac{dz^*}{d\rho} = \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\rho} > 0$ if ρ shifts $\frac{\partial D_2}{\partial s}$ up (for example, an increase in government 2's ideal s) and $\frac{dz^*}{d\rho} = \frac{\partial z^*}{\partial s^*}\frac{ds^*}{d\rho} < 0$ if ρ shifts $\frac{\partial D_2}{\partial s}$ down (for example, an increase in government 2's domestic marginal cost of s).

7 Footnotes

1. Two sources for a general discussion of political, economic and philosophical aspects of extremism are Nozick (1997) and Breton (2002).

2. For examples of discussions of the behaviour of extremists see Rubbelke (2005), Victoroff (2005), Ferrero (2005), (2006), Blomberg et al. (2004a) and Wintrobe (2006a), (2006b). Shughart (2006) examines the history of modern terrorism. Discussions of the "root causes" of extremism can be found, for example, in Blomberg et al. (2004b), Feldmann & Perala (2004), Bandarage (2004) and Sandler & Enders (2004).

3. For an early discussion of strategies and power in conflicts, see Schelling (1960). For example, extremism is viewed as a strategic tool in campaigning and elections in Glazer et al. (1998), Glazer (2002) and Glaeser, et al. (2004); as a signalling or reputation device in Lapan and Sandler (1993) and Berrebi & Klor (2004)) and

as a strategic tool in bargaining (Atkinson et al. (1987)) and in dealing with free rider problems (Appelbaum & Katz (2007a)). There are also examples of economic models that give rise to extremism, but in which it is not viewed as a strategic tool (for example, Roemer (2001) and Esteban & Ray (1999)). Esteban & Ray (2006) consider a model with class and ethnic group formation and conflict. They examine the relationships between of class and ethnic conflict and show that "ethnic conflict—as opposed to class conflict - may be focal, and precisely in the presence of economic inequality".

4. In a recent paper, Appelbaum (2007b) provided a similar model in which extremism is used as a strategic tool. The focus of that paper, however, was different: it studied "competition in extremism" between rival countries, but not the root causes of extremism. In this paper, on the other hand, the focus is on the root causes of extremism and in particular on the interaction between internal and external root causes.

5. In Collier (2000) a similar idea is used, where grievances are harnessed to instigate and succeed in rebellions.

6. See references in the introduction section. For a discussion of the supply and demand of extremism see Wintrobe (2006a).

7. It is, of course, possible to consider a model in which both countries pursue similar strategies and in which extremists in both countries can cause an explosion. Later we will show that certain conditions will lead to low levels of extremism. In this sense, assuming that Country 1's extremists do not cause an explosion is similar to the assumption that conditions in Country 1 are such that extremism is not likely to arise.

8. We assume here that the cost of deviations is linear. It is possible to take it as quadratic without affecting the results.

9. Alternatively, we aggregate the social and nationalistic frustrations by using multiplicative, or more complicated aggregator functions. In a numerical example we confirmed that the results remain the same with a multiplicative measure.

10. It is possible to model the disagreement payoffs in different ways. This assumption is not necessary for our results, but it simplifies the analysis, somewhat. Our assumption is equivalent to the assumption that, in case of a disagreement, an explosion that destroys the full value of the contested asset occurs with probability 1. Alternatively, we can assume that in disagreement only a fraction of the contested asset is damaged, and/or none of the initial assets are damaged. While these alternative assumption change the threat point they are not essential for our discussion.

11. There are other ways to model the allocation of the contested asset between the two rival, but in the

political arena it is reasonable that the allocation/partition of the asset is determined in a bargaining process. See Osborne & Rubinstien (1990) for a discussion of bargaining models and for justifications for the use of the Nash solution.

12. Given concavity of F_2 and D_2, which are defined over the closed interval $0 \leq s \leq 1$, there is an optimal solution for s. We verified concavity and uniqueness in our numerical example.

13. For simplicity, we assume that there is no overlap of the parameters of the domestic and foreign benefits functions, $D_2[s;\cdot]$ and $F_2[z^*(s;\cdot), s;\cdot]$. To the extent that there is such an overlap, our assumption implies that the comparative statics result provide the *net* effects of a change in the parameter. For example, if a_2 also appears in $D_2[\cdot]$, in addition to $F_2[\cdot]$, our results should be interpreted as providing the net effect of a_2. That is: over and above the effect that is due to the change in domestic marginal benefits.

14. There is some support for these results in Chenoweth (2004), (2005), where it is argued and shown that weakness, as captured by instability, can explain terrorism. Crenshaw (1981) also shows that terrorism is the tool of the weak which tends to emerge when the "power ratio" is high. The effect of power on extremism is reminiscent of the notion that weak "failed states" lead to terrorism (see for example, Rotberg (2002), Mallaby (2002) Fukuyama (2004), Eizenstat, Porter & Weinstein, (2005)). Shughart (2006) goes further, by suggesting that the root of some nation-states' weakness, which in turn tends to produce terrorism, is in their artificial nature, created during the interwar period.

15. For a change in β we have $d(1-q^*)/d\delta = \beta x^{(\beta-1)} \frac{dx^*}{\partial \delta} + \beta x^{\beta} \log(x)$.

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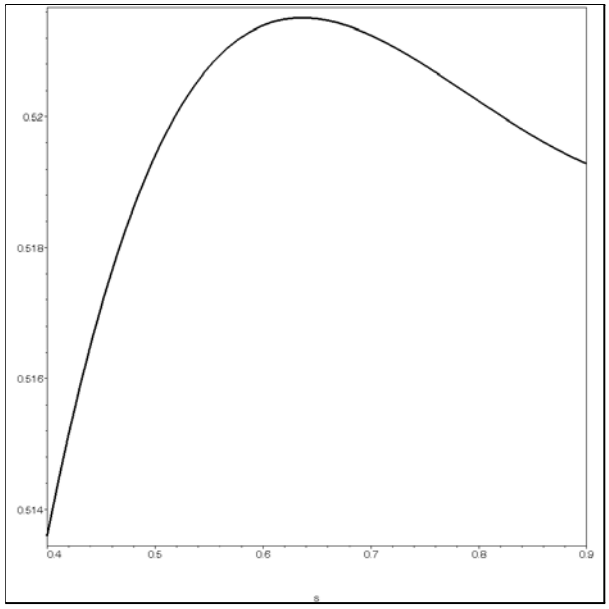

Figure 1: The Foreign Benefits Function: $F_2[z^*(s), s]$.