

CAN SUICIDE BOMBERS BE RATIONAL?

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1. Introduction

One of the most striking facts about the tragedy of September 11 is that the perpetrators were willing to die for their cause. It is this apparent readiness to sacrifice oneself, perhaps more than any other fact, which makes the threat of terrorism so large and so incomprehensible. Perhaps more than anything else, this marks off *Athem* from *Aus* as most of us cannot imagine ourselves committing any such act. In this paper, I argue that it is possible to explain such acts in rational choice terms, and that, while such acts are indeed extreme, they are merely an extreme example of a general class of behavior in which all of us engage.

One reason such acts are committed is to obtain *Asolidarity* (or social cohesion or *Abelonging-ness*). Solidarity is typically acquired through group-directed activity, especially in gangs, cults, unions, political parties or movements, and religious sects. I analyse the production of solidarity as a trade involving *beliefs*-- the individual adopts the beliefs sanctioned by the group and receives the benefit of social cohesion in exchange. I construct a simple formal model to illustrate this process, and then develop the conditions under which rational suicide is possible. The paper thus combines work on social interactions and religion, and therefore is most closely related to work by Sacerdote and Glaeser (2001), who argue that religious behaviour is often motivated by the desire for social interaction, and provide a great deal of evidence that this is an important motive behind religious attendance. The paper is also more generally related to work on social interactions, (especially Akerlof (1991 and 2000) and Becker (1996)) conformity (Bernheim (1994), social capital (e.g., Putnam (2000) and to the economics of religion

(Iannaccone (1992, 1998) and Raskovich (1996)).

The outline of the paper is as follows. The next section outlines the process in which beliefs are traded for solidarity. Section 3 argues that a corner solution has a peculiar attraction in this case, and also indicates why a solution at or near the corner indicates a willingness to sacrifice oneself for the group. Section 4 develops some simple comparative statics. Section 5 discusses the relevance of this model to religious belief, and considers and rejects the alternative hypothesis that suicide bombing can be understood as a rational sacrifice in exchange for the rewards of heaven. Section 6 concludes the paper.

2. The Production of Solidarity: Trade in beliefs

The essence of solidarity, as defined in the Shorter Oxford Dictionary, is:

The fact or quality, on the part of communities, etc., of being perfectly united or at one in some respect, esp., in interests, sympathies or aspirations.

Other definitions all emphasize union, unity, or oneness: The Random House Dictionary defines it as A unity or unanimity of attitude or purpose, as between members of a group or class. Some antonyms are divisiveness, factiousness, or discord. There is also a sense of the word solidarity which indicates empathy, as in the example given by the Random House Thesaurus in which A A national emergency evokes solidarity among a nation's citizens: closeness, unity, unification, union; harmony; cooperation; consolidation of interests and responsibilities.

How is solidarity produced? If solidarity is a form of social capital or trust, and social capital is like other forms of capital, one should be able to describe the investment process by which it is produced, and the conditions under which it depreciates. However, In the work of many social scientists on trust or social capital, the investment process is mysterious and typically the amount available is described as the amount inherited (see e.g. Fukuyama (2000), Knack and Keefer (1997), Putnam (1993, 2000)). Putnam appears to believe that trust is produced (or at least maintained) through participation in group activities but does not analyze the process of creation. However, it seems unlikely that participation alone can create solidarity: for example, if there were serious disagreement among the participants, it is not obvious that social capital wouldn't be destroyed rather than created. Disagreement often ends in a stalemate of opposing viewpoints, outright conflict, or the breakup of a group into factions and does not create solidarity. One clue to trust formation is provided in recent work by Alesina and La Ferrara (2000) and Glaeser, et. al (2000). Alesina and Ferrara describe a model and provide some evidence that participation in groups is more likely when the population is homogeneous in income and in race and ethnicity. Glaeser, et. al. also find a correlation between trusting behavior and racial and ethnic homogeneity in their experiments on trust and trustworthiness.

Perhaps one way to go further in this direction is to look at extreme situations where solidarity is particularly intense. In Marc Galanter's (1989) book on cults, which sums up 15 years of his research on the psychology of charismatic groups, the power of group solidarity is described in the following manner by a heroin user who joined the Divine Light Mission:

Once I got to know them, I realized they loved me.....When I wanted to take

heroin, or even to smoke [marijuana], I knew they were with me to help me stay away from it, even if I was alone. And their strength was there for me.....I could rely on their *invisible hand*, moved by Maharaj Ji's wisdom, to help me gain control. (Galanter (1989), p. 27, italics added)

Another, fictional, account of intense solidarity is provided by Arthur Koestler. In his famous novel *Darkness at Noon* (1941), the hero ends by sacrificing the truth and ultimately his life for the good of the Party.

The other remarkable feature about many situations where solidarity is particularly intense is the nature of the beliefs that people sometimes hold. To take an example, how is it, for example, that a number of Americans, mostly members of paramilitary groups, could come to believe the view expounded in Mark Koernke's 1993 video, *America in Peril*, that "elements within the US government are working with foreign leaders to turn the United States into a dictatorship under the leadership of the United Nations." (Karl, 1995, p. 69)?

To summarize, two remarkable features in many extremist groups are the extremity of their beliefs and the depth of solidarity. I contend that neither of these two phenomena are necessarily irrational, and indeed that the key to understanding both of them is that they are related to each other. More precisely, they are the outcome of a process whereby beliefs are traded in exchange for solidarity or social cohesion. Thus, Galanter notes that many subjects experienced a decline in symptoms of psychological distress upon joining the group, and that, in his statistical analysis of the reasons for this, 37% of this overall decline could be attributed to an increase in social cohesion (p. 32). While Galanter, a psychiatrist, does not model this

process, the basic elements involved seem straightforward. The person who gives up his beliefs loses something, which could be called his or her true *identity* or *independence of thought* or *autonomy*. On the other hand, he or she gains the experience of greater solidarity or social cohesion or *belongingness*. Evidence of the importance of social cohesion in the formation of cults is described in many sources.¹

To sketch a model of how this process operates, assume that an individual is endowed with a certain set of beliefs, and, corresponding to this, a certain identity. If the person agrees to join a cult, the price of admission is, in part, that he adopt certain beliefs which are sanctioned by the cult. Additional requirements might be that he participates in cult activities or in some other way demonstrate that he shares in the beliefs and goals of the cult.

The organization, in turn, supplies the individual with the sense of belonging to a community, by organizing events or activities which individuals can attend and participate in, meet and get to know others in the organization, and by providing a framework of beliefs which the individual can adopt and identify with. The set of beliefs is common to all members to a greater or lesser degree. The more united the membership is in its beliefs, the greater the willingness of the members to sacrifice their time and energy and other resources in support of

¹See for example, Dawson=s (1996) collection on cults, especially the articles by Lofland and Stark, pp. 172-3, and 176-7, and Hall, pp. 386.

the goals of the organization, and the greater the organization's capacity for action or power².

There are three further aspects of the process that seem important:

(1) Presumably, in order to be accepted for membership, a certain minimum sacrifice of beliefs and a certain minimum level of participation will be required.

(2) An important question which so far has been left unanswered is the problem of how trades are enforced. One cannot make a binding contract stating that person *A* will receive *x* amount of social cohesion in exchange for his agreement to subscribe to beliefs *y* and *z*. The reason is not only the issue of enforceability, i.e., determining whether the social cohesion supplied was deficient, or whether *A* really changed his mind in the ways agreed to. The very making of the contract would imply that neither party was sincere, and deprive *A* of his social cohesion and the group of knowing that *A* subscribed to the requisite beliefs. However, this doesn't imply that the trade cannot take place, only that the mechanism of enforcement is more subtle: some proof is required on both sides of sincerity.

Thus, for admission to a youth gang (see Jankowski (1991), or to the mafia (Gambetta (1993), Hess (1973)), some demonstrations that the person has given up some of his autonomy and identified with the organization may be required. For example, entry to a youth gang may require *A* jumping in-- for a male, that he participate in the commission of a crime, for a female that she sleep with one or more members of the gang. Admittance to the mafia is governed by

² Howitt and Wintrobe (1996) or Wintrobe (1998), chapter 11, provide a formal model of the proposition that a government's capacity for action is related to the similarity of beliefs of the groups within it. Here we are simply extending this idea to any organization.

complex rituals which have a similar purpose. Churches have rituals of conversion and complex and sometimes arduous demonstrations of faith.

(3) Finally there is the vital element of *leadership*. Who is it that determines the beliefs of the group? Who is that decides when these beliefs have to be changed? How is the minimum level of participation decided? Who decides whether cohesion is given out or withheld? The point is vital, because it suggests that in all groups with some degree of solidarity, there is always some, in fact usually a strong element of hierarchy.

In so-called *Acharismatic* groups such as the Branch Davidians, the Scientologists, Divine Light Mission and the Aum Shinrikyu, Galanter found that social cohesiveness was tied to a charismatic leader whose flock revered him (p. 12). In the Branch Davidian cult, for example, compliance with the leader (David Koresh)'s expectations was promoted by a series of reinforcements. According to Galanter, these produced a relief in depression and anxiety to the degree that a believer accepted the group's creed and its rules of behaviour. By virtue of this relief effect, a member's mood became dependent on the degree of his or her commitment in the group. The consequence was that, as Galanter notes, 'This emotional dependence on the group and its beliefs left the sect members fully responsive to Koresh's demands, which escalated to include beating young boys and engaging young girls in sexual activity' (Galanter (1989), p. 170).

Indeed the group often acted like an emotional pincer, promoting distress while providing relief. Even a group like Alcoholics Anonymous shares this trait to some extent: typically, the group insists that the individual acknowledge his drinking problem openly at the group's meetings, and possibly cures people of their addiction to alcohol by replacing the individual's

dependence on alcohol with dependence on the emotional support of the group. Note that this way of thinking also explains the famous "Stockholm Syndrome" wherein kidnapped individuals, the most notorious example of which was Patricia Herst, come to identify with and to support the goals of their captors.

To sum up, there appear to be 3 elements involved in the formation of cult membership:

(1) leadership; (2) conformity and (3) solidarity.

To the extent that this process of trade takes place, the person who holds a belief which appears on the surface to be irrational is not behaving irrationally: the rationality consists not in the content of the belief, but in the reason for holding it. On this reading, the person who believes there is a UN plot to take over the US government is no more irrational (in principle, if not in degree) than the professor who states to the officials in the administration of his university that his department, more than any other in the faculty, deserves more resources: in both cases, the reason for the belief may be solidarity or social cohesion, not the coherence of the belief itself.

It is simple to formalize the basic proposition of the model, i.e., that social cohesion (solidarity) and conformity (unity of belief) are positively related. To do so, assume, that individuals have utility functions in which both autonomy and solidarity are positive arguments:

$$(1) \quad U=U (A,S)$$

where the functions have the usual properties: $U_a > 0, U_s > 0, U_{aa} < 0, U_{ss} < 0$, and $U_{as} > 0$

Individuals are willing to trade autonomy for solidarity, and the way they do this is by

adopting the beliefs demanded by one or more suppliers of solidarity. These suppliers may include religious organizations (organized religions and cults), gangs, political parties and movements, unions and business firms, and other organizations. The Aindustrial organization@ of solidarity is complex because solidarity since it tends to be produced in the process of working towards some goal or participating in some activity and thus is usually supplied together with the that activity.

An initial depiction of the tradeoff between solidarity and autonomy for an individual is provided in Figure 1. The indifference curves correspond to the equation $U=U(A,S)$ above. The individual maximizes utility subject to a constraint in the form of a production function

$$(2) \quad f(A,S) = 0$$

depicted as the production possibility curve between solidarity and autonomy ES in Fig. 1. The production possibility curve is depicted as having the usual shape, implying diminishing returns to the conversion of autonomy into solidarity and vice versa.

A typical individual will have an endowment point like e_0 , and will trade autonomy for solidarity by giving up his own beliefs in the manner discussed, ending up at an equilibrium like e_1 . The rate at which he can trade off autonomy for solidarity depends on the technology available for doing this, as summarized in the production function. Thus churches have a Atechnology@ for conversion involving rituals, dogmas, and ceremonies by which individuals are assisted in becoming believers. Other organizations may have 12 step programs, identification rituals such as Ajumping in@ to a gang (as discussed above), and so on.

In turn this helps to explain why public goods are often supplied by small groups even

though their benefits may be non-excludable. It is more difficult for an individual in a relatively small group to free ride because it is easier for the small group to give or deny solidarity according to an individual's contribution. So the small group, unlike the large one, has a way of enforcing contributions through the provision of the excludable private service of solidarity.

3 The Attraction of the Corner

Further reflection suggests that the analysis summarized in Figure 1 leaves out something important: once an individual i has made the choice of giving up some of his autonomy A in exchange for solidarity S , he has given up some of his autonomy and therefore his capacity to choose. For small changes this might not matter but for large ones it obviously does. To some extent he has given up the control of the choices he might make to the leader of the group L . Now, i can obtain S only by trading away his own beliefs and accepting those of L . So we can substitute the leader's utility function for i 's utility function to the extent that i choose solidarity S over autonomy A .

The leader L provides a feeling of belonging-ness to the members of the group i and in exchange she gets their unity of belief or purpose in pursuing the goals of the group. Now, S measures both the level of social cohesion in the group (which enters i 's utility function) and its unity or conformity. The extent to which the members of the group subscribe to the beliefs which are prescribed by L . Presumably the leader also has a utility function U^L where the choices of the members enter as arguments³. Perhaps the simplest assumption to make about the

³In general it seems reasonable to assume simply that the group has some objective Z and that the group leader receives utility from the extent to which the goal is realized, as in

utility function of the leader is that she cares only about the aggregate level of solidarity of the members:

$$(3) \quad U^L = U^L(S) \text{ where } S = \sum s^i$$

Presumably the only dimension of the leader's utility function that is relevant to member i 's decision-making is the level of i 's solidarity s^i . So far as each member i is concerned, he can contribute to group solidarity only by choosing more S . It follows that we can substitute the relevant portion of the leader's utility function

$$(4) \quad U^L = U^L(s^i)$$

for that of the member $U^i(a^i, s^i)$ to the extent that i chooses S . This gives a new utility function

$$(4)N \quad U_L = U_L(Z)$$

$$(4)O \quad Z = Z(3a_i, 3s_i, K, L) = Z(A, S, K, L)$$

In this formulation, A and S of the members are productive inputs to the goal of the organization along with capital (K) and labour (L). If we assume K and L are fixed for simplicity then the only dimension of choice is the proportions of A or S to use in the production of Z . Thus S might be expected to raise productivity relatively more where the co-ordination of activities is important, as in Alchian and Demsetz (1972) = *team* production. On the other hand, A might be most important when the output of the team implies creative thinking. Thus it seems reasonable to suppose that for a university MZ/MA would be relatively high and MZ/MS low, and vice versa for a mass organization. For cults, we assumed above simply that

$$(4) \quad Z = Z(S)$$

U for i where his choices are now only partly his own (to the extent that he chooses autonomy A).

The other part of his choices are governed by the leader. Thus:

$$(5) \quad U = (s/a+s) U^L(s) + (a/a+s) U^i(a, s)$$

where the superscript i on s and a has been dropped for simplicity, and $s/a+s$ is the fraction of his choices (utility function) which are solidary, and therefore identical to the leader= s choices.

Again this utility function may be assumed to have the usual properties: diminishing marginal rates of substitution and so forth. However, the leader is interested in the level of solidarity of the *group* and in that of individual members only to the extent that it contributes to group solidarity. Consequently, an increase in the level of solidarity of only one member will not have much effect on the aggregate, and therefore MU^L/Ms^i does not decline as rapidly with an increase in s^i as MU^i/Ms^i . Indeed if the group is not too small it is not unreasonable to assume that the leader= s indifference curves in this space are vertical lines, as shown in Figure 2⁴.

Moreover, as i chooses more solidarity, that is a^i falls and s^i rises, the increase in s^i increases the weight of the leader= s utility function in i = s utility function. Consequently the decline in the MRS of s for a is less, and the slope of the indifference curve does not fall as much

⁴It could also be assumed that the leader dislikes individual values which may conflict with those he wishes the group to follow, i.e., $MU^L/Ma^i < 0$. In that case the leader= s indifference curves in a^i, s^i space are positively sloping upward lines, reflecting the idea that for him s^i is a *Agood@* and a^i a *Abad@*. In this case, as s^i continues to increase and the weight of the leader= s utility function becomes sufficiently large, i = s preference for S over A does not decline but actually increases as S increases, leading to an increase rather than a decrease in the slope $dA/dS = -MU^S/MU^A$. Ultimately, i = s indifference curves would become positively sloped as they get close to the S -axis.

as it would if i were totally in control of his own decision-making. At very high levels of S , i 's utility function more and more becomes simply that of the leader, and his values are his leader's values.

With indifference curves shaped like those of Figure 2, the tendency for the indifference curve to flatten out due to a diminishing rate of substitution of S for A is compensated for by its tendency to steepen as i adopts his leader's values. A corner solution will be reached if the slope of the indifference curve is everywhere steeper than that of the production possibility curve:

$$(6) \quad MU_s/MU_a > f_s/f_a$$

i.e., that

$$(6') \quad \frac{s(U^L_s) + aU_s + (a/(a+s))(U^L - U)}{aU_a + (s/(a+s))(U - U^L)} > \frac{f_s}{f_a}$$

The first term on the top of the left hand side is the marginal utility of i 's solidarity to the leader, weighted by the portion of i 's utility function which is identical to the leader's, and the second term is the marginal utility of solidarity to i , weighted by the autonomous portion of his utility function. The third term on the top shows the marginal gains and losses from the fact that that as s rises, U^L replaces U^i . Similarly, the first term on the bottom of the left hand side is the marginal utility of a to i , and the second is the increased weight in the utility function of the leader as a falls. The term on the right hand side is the slope of the production possibility curve.

At an interior solution, of course, the left and right hand sides of (6') will be equal.

Of course, at the corner $a = 0$, and we can substitute this into (6') to get

$$(7) \quad \frac{s(U^L s)}{(U - U^L)} > \frac{f_s}{f_a}$$

As the individual approaches the corner where $a = 0$, his utility function becomes increasingly identical with that of his leader. The denominator of the left hand side of (7) approaches zero, and the indifference curves become vertical, like those of the leader.

If condition (7) holds, individual i rationally chooses an equilibrium with all S , zero A . His utility function is simply the utility function of the leader $U^L(s^i)$. So the bottom of the left hand side approaches 0 as the difference between U and U^L vanishes, and the slope of $i=s$ indifference curve approaches infinity, which is the slope of U^L if it is a vertical line. The individual has no independent thought but is completely under the leader= s control⁵. His values are completely those of his leader and he will do whatever maximizes his leader= s utility. If the leader wishes him to commit suicide for the goals of the group, he will do so. Moreover, being at

⁵Note that the *leader* does not have an equilibrium at the corner E_0 . Indifference curves like U^L do describe his preferences, but the autonomy and solidarity in Figures 1 or 2 is that of a member, not the leader, and the constraint describes the choices available to a subordinate or member, and is not the constraint facing the leader. So the leader= s equilibrium cannot be described with this apparatus. His or her problem is formalized briefly in footnote 4 and discussed informally in section 5.

a corner, the individual will be resistant to change. In particular he will be resistant to pressure from outside sources such as threats or increases in the likelihood of prosecution or the size of the punishment for being a member of such a group. And he will also be resistant to outside information which is critical of the group, unless that information comes from the leader. But although small changes will not cause any change in his behavior, very large changes will cause a substantial movement, as is usual for corner solutions⁶. This provides a key to policy, as discussed below.

⁶External changes which raise the price of solidarity would make the production possibility curve steeper in figures 1 or 2 (not shown).

To be sure, such an individual is extreme, but it is vital to note that *he is not irrational*. He possesses a well behaved ordinal utility function, and is perfectly capable of making choices that maximize his utility in the usual sense. Indeed, his behavior is merely an extreme version of a form of behavior which is extremely common, namely that, in part, he internalizes his values from the values of others, especially from those in a position of power over him. To obtain solidarity with the group of which he is a member, he adopts the group's values and beliefs. This is precisely what members of religious groups do when they agree to or internalize the values and beliefs of their religion, or what members of ethnic groups do when they subscribe to the belief that they belong together in some sense because they have as ancestors people who held similar beliefs, or what economists do when they write papers based on a certain set of assumptions that they share about human nature. The only difference in the behavior of the individual who is in equilibrium at a corner is the *extent* to which he behaves in this fashion. The behavior itself is perfectly normal and rational. Of course, that an individual could completely internalize someone else's utility function and become completely under his control is still bizarre. How can this take place? In general, the easier it is to convert A into S B that is, the better the technology or production process with which a group enables an individual to convert A into S -- the more its members will choose high solidarity. Some features of the technology for converting A into S which are worth mentioning are: First, the individual is typically grouped with other, like - minded individuals, who are also involved in the transformation and subject to the same group pressures. Other individuals may also be screened out⁷ through the sacrifices demanded of the group, as discussed by Iannaccone (1992). In these

⁷Thus S_{\min} in Figure 2 could be the minimum level of sacrifice demanded of a group

contexts even bizarre beliefs or practices may appear normal;

Secondly, usually there is some technological discontinuity or concavity in the production function. Thus for example, most organizations where solidarity is important have some ritual which requires the individual to commit to it, i.e. religious conversions or jumping in in the case of gangs or mafiosi. This makes the loss of A at the initial level of S discontinuous. At the other extreme, where A is initially zero, one can imagine that children brought up by their parents and initially lacking an identity of their own have to make a dramatic (discontinuous rather than marginal) change in order to get one. Thus they cannot move from A = 0 in small steps, but need to revolt against their parents in order for this to happen. This point implies that from the point S = 0, the production possibility curve has an increasing rather than the usual decreasing slope, i.e., initially $M^2a/Ms^2 > 0$, as also depicted in Figure 2. In turn, this also increases the likelihood that an individual who demands high solidarity will end up at a corner. This struggle for identity is a well known feature of adolescence. In a similar way, individuals who come under the spell of a charismatic leader may need to be de-programmed in some way in order to return to normal society.

member.

A third reason why high solidarity might be chosen which is not captured in equation (7) or Figure 2 is that solidarity may be like other forms of social capital, religious beliefs, and computer software in that the more others exhibit it, believe in it or use it the easier or more attractive it becomes to any individual to do the same. That is, solidarity is like other network or joint effects in that it is contagious (Katz and Shapiro (1986), Becker (1996)): the greater the increase in s_i , the more likely it is that s_j will also increase. So this network effect or what Iannaccone in the context of sects refers to as a participation externality (Iannaccone (1992)), if incorporated into the model⁸, would also raise the likelihood of a corner, as initial moves in that direction are amplified in a process of positive feedback. So if there is a change which impacts all of the members of the group simultaneously, each of them is more likely to move to the corner.

Another important feature of the production process which affects the level of solidarity chosen is that it often takes place slowly or in small steps, as in Stanley Milgram's famous obedience experiments, and as Galanter observes for many cult groups. Thus, initially, recruits are usually exposed to relatively innocuous ideas and only as their involvement deepens are they treated to the full panoply of ideas, paranoid conceptions and philosophical notions which characterize the group's ideology.⁹

⁸The participation externality is not incorporated into the production function in (5) but it would be simple to do so. See Becker (1996), who provides many examples of how this process works with social capital.

⁹Akerlof (1991) models Milgram's experiments with a near-rational model of obedience. The subjects in Milgram's experiments were indeed often horrified, *ex post*, at what they did (Milgram (1974)). Galanter provides evidence that cults and other groups where solidarity is high typically brainwash individuals in a series of steps, by initially coupling social cohesion with relatively innocuous ideas and only slowly introducing more radical ones.

All of this suggests that individuals with accurate *ex ante* knowledge or expectations that in joining a group they will end up giving their life for it might decide not to join. On the other hand, the equilibrium in Figure 2 does not rely on any form of biased expectations or irrationality. Suicide martyrdom is widely reported today, and for people joining certain groups it must be obvious that there is a good chance that that is how they are going to end up. So it seems unwise to deny the possibility of completely rational suicide, fully expected prior to joining the group, while acknowledging that A near-rationality[@] of the type suggested by Akerlof might make suicide martyrdom more likely for a larger class of people.

Finally, more solidarity will typically be chosen in the presence unifying force of an external threat. Moreover, under certain conditions a spiral can be set in motion because the well-known Asecurity dilemma@ can arise with cohesion or solidarity instead of armaments as the operative variable: cohesion within group j stimulates cohesion within group i , which stimulates further cohesion within j in turn, and so on. The reason is that, as Posen (1993) showed for ethnic groups, an increase in cohesion among one possibly threatening ethnic group can make the threatened group more afraid, and this fear stimulates cohesion among the members of the threatened group in turn. When this threat is or can be made present, therefore, initial moves in the direction of larger solidarity could be amplified in a process of positive feedback.

4. Comparative Statics

The analysis so far identifies people who might rationally get their identity almost entirely from membership in the group, including the possibility of committing suicide in the cause, as a rational choice. The basic fact that might lead someone in that direction is a desire for a very high level of social cohesion or solidarity. So the first question one might want to ask is, who is particularly likely to want very high levels of solidarity? Perhaps the most important category of such people is those who do not have much S from other sources, i.e., people who are lonely and isolated and who therefore turn to the group for friendship and belonging-ness. One implication

of this is that young people who are looking for solidarity from a gang would possibly be willing to join and participate in gang activities even though monetary returns are low. This might possibly explain the extremely low values of life estimated for gang members by Levitt and Venkatesh (2000).

The analysis also points to a second characteristic: those for whom, at the margin, autonomy has low value. Presumably this would include people whose autonomy hasn't worked for them, i.e., people who see themselves as losers or failures¹⁰. Another, related characteristic is a lack of a solid identity: those who lack one have relatively less to sacrifice in giving up their beliefs for those of the group. Thus young people without an established identity would be expected to be particularly vulnerable.

Are the poor particularly likely to be among those who especially seek high S, i.e., is there some reason to think that solidarity is income- inelastic? *A priori*, this issue appears complicated. One need not be rich to enjoy solidarity, which is not market produced. And one could also argue that there are numerous substitutes for solidarity to be found in the market; on these grounds, it might even be an example of an inferior good. These two factors would provide the connection between poverty and the propensity for suicide martyrdom which is often speculated about in discussions of 9/11. On the other hand, network connections might be particularly useful in earning income at higher income levels: this might make solidarity, viewed instrumentally, income - elastic. Sacerdote and Glaeser (2001) find that the demand for high

¹⁰Some causes of low self - esteem are discussed in R. Baumeister, *The Self* chapter 15 of Gilbert, Fiske and Lindzey's *The Handbook of Social Psychology*.

attendance@ religious denominations (which presumably provide highest solidarity) is negatively related to education while that for social interactions in general is positively related to it.

With respect to price elasticity, if the equilibrium is at a corner, small changes in the cost of solidarity (in terms of autonomy) would not change behavior. But note that a sufficiently large change in price will have a truly dramatic change in the level of solidarity demanded, producing an interior equilibrium and reducing the demand for solidarity considerably. This would happen if the curvature of the production function were to remain as shown in Figure 2, and the change in price simply tilted it to the left from the point E_0 (not shown).

The other set of variables determining solidarity are those concerning the Atechnology@ of converting autonomy into solidarity discussed in the last section : the extent to which the process can be broken down into small, easy steps, the capacity of the organization to obtain homogeneity by grouping and screening, to devise rituals and rites which generate positive participation externalities, and to take advantage of, manufacture or persuade the members of the validity of external threats. Perhaps one important force underlying many of these is the capacity of the leadership to control information, to get the membership to distrust information coming from outside sources and in other ways to limit competition from other groups. Of course the greater the homogeneity of the group members to begin with, the smaller the sacrifice of autonomy necessary to obtain any given level of solidarity, and the more the members may spontaneously agree on reliable sources of information and other matters even without aggressive leadership.

The dilemma for public policy towards groups which threaten public welfare is posed starkly if we consider those members of the group for whom the corner solution (7) holds. Such

individuals are resistant to change, and no policy is likely to be very effective. Thus, threatening, attacking, assassinating, bombing, and other policies which can be interpreted as changing the price of the group activity will often produce no change in the position of the individual within it at all. However, if the change in price were sufficiently large, it might produce the desired movement. Alternatively, attacks from outsiders may engender *more* solidarity within the group by the security dilemma mechanism: thus they may be counterproductive. But this problem does not arise for group members at the corner, whose solidarity is already maximal.

5. Religious Solidarity and Suicide

One possibility about 9/11 is that it was a form of extremist religious act. This interpretation is given credence by the evidence presented by Kanin Makiya and Hassan Mneimneh (2002), who describe a manual apparently used by the hijackers, parts of which were found in the wreckage of one of the planes involved, and as well in a piece of Muhammad Atta's luggage which, by accident, did not get on the plane at Logan airport. The manual consists of instructions to the would-be-martyrs and describes the act they are to undertake entirely as if it is to be done to please God (Makiya and Mneimneh, (2002) p. 20). There is no mention of any other motive or issue such as Palestine, Iraq, or U.S. global domination. Of course the manuals might have been deliberately planted. But if the motives of the hijackers were more secular, what would be the point of planting such a manual?

Indeed religious exchange would appear to provide a simple explanation of the events

of 9/11. Religion promises an afterlife, so the individual, to the extent that he is convinced by this, may not be making a sacrifice at all in martyring himself (this is the famous A72 virgins@ explanation). A related line of thought, in which people make contractual exchanges with God, has been pursued in economic theory by Raskovich (1996)¹¹. He interprets the Jewish Covenant, which committed the ancient Jewish people to belief in the one God as an example of Aexclusive dealing.@ Essentially, the Jews agreed to believe in only one God in exchange for being the Chosen people.

Can the theory of exchange be extended to cover contracts with the Supreme Being? No one can deny the centrality of the Covenant to Jewish history. As Finer put it in his *A History of Government From the Earliest Times* (1997), AThe entire community had covenanted itself to God at Mount Sinai. This is the central event in Jewish history. Everything else was elaboration and commentary@ (Finer (1997) p. 238).

Other monotheistic religions can be understood the same way, though the contractual aspect of religion is less stressed in their founding myths. The early Christians modified the contract to one of belief. To put it simply, in the early Christian religion, if one believed, one was saved in return. The decisive turning point, according to the historian Thomas Bokenkotter, was in the controversy over whether the pagan Gentiles could be admitted to the church simply if they believed in Christ, or whether they also had to obey the Jewish Law, and in particular become circumcised.

¹¹Miller (1993) originated the idea of using the economics of law to understand contractual relationships in the Bible.

For [Paul] the very essence of the Gospel was at stake in the controversy over circumcision; to require Gentiles to practice the Jewish Law would be tantamount to saying that faith in the risen Lord Jesus was not enough for salvation; observance of the Law was also necessary.....So when Paul heard the traditionalists saying the Gentiles must be circumcised, Paul insisted Awhat makes a man righteous is not obedience to the Law, but faith in Jesus Christ.....if the Law can justify us, there is no point in the death of Christ@ (Ph 3:8-9).@ (Bokenkotter (1990, p. 20)

Paul=s views were ultimately decisive and as a result the Church shed its exclusively Jewish character and was enabled to spread the Gospel rapidly to the pagan Gentiles. Belief was sufficient and circumcision was not to be required of them (Bokenkotter (1990), pp. 21ff).

The fundamental nature of Islam can also be interpreted as a contract. The obligations of a Muslim can be understood using the three central concepts of *islam*, *jihad*, and *ummah*. *Islam* denotes the duty of a Muslim is to surrender (which is what the word *Aislam@* means) himself completely to the Supreme Being; *jihad* the duty to struggle, sometimes vs a common enemy, and *ummah* the concept of the just community. While all religions preach social justice, it is perhaps not unfair to assert that the concept of a just *community* to which one devotes oneself is more associated with Islam than with the other monotheisms (Armstrong (2000), p.5.

Islamic punishments for transgression can be earthly and sometimes meted out to whole groups (some examples are given in Ruthven, p. 112) but, as in the other monotheistic religions, there is also a Day of Judgement which, as Ruthven puts it Afills in the gaps in the ethical doctrines@ (Ruthven, p. 116). The horrors of hell are graphically painted, but what is more

unusual is that and the joys of heaven are given an extended treatment (Ruthven , p. 117). Thus, again, there is, or there may be interpreted to be, exchange, and any outstanding obligations are resolved on the Day of Judgement¹².

However, there is just one problem-- *all of these contracts are unenforceable*. First of all, there is no third party to adjudicate and enforce the contract. And there are special problems: The Christian and the Muslim religions especially dwells on the rewards of the afterlife, but how do you lodge a complaint that you were promised an afterlife but didn't receive it? Now, in ordinary contracts with other mortals, there are various ways in which this problem of making a credible commitment in the absence of third -party enforceability can be solved. But if some way were to be found which the Supreme Being could bind Himself to a contract, and if He did so bind Himself, He would no longer be supreme. All of the three monotheistic religions would

¹²To fix ideas it is worth mentioning one set of religious beliefs where clearly there is *no* contract. This is Calvinist Protestantism. As interpreted by Weber in *The Protestant Ethic and the Spirit of Capitalism* (1904-5/1930), this branch of Christianity does *not* involve a contract or an exchange. The doctrine of predestination implies that one is either one of the elect or one is not. One carries out disciplined activities, hoping to prove to oneself that one is one of the elect. But either one is or one is not, and there is nothing to be done about itB it has already been decided. Thus there is no exchange between the individual and God. It is distinctly odd, and deserves further study, that the religion most famously associated with the rise of capitalist exchange is the only one of the major monotheisms which cannot be interpreted as involving a contractual exchange with the Supreme Being.

seem to be faced with this problem and indeed un-enforceability would seem inherent whenever you are making a contract with a Supreme Being.

The problem facing the Supreme Being is most similar to the problem of credible commitment by an autocrat, as discussed by North (1981), North and Weingast (1989) and Hilton Root (1994). Absolute power gave the King the capacity to repudiate debts, but the problem is that an absolute monarch can always renege on a contract and there is no obvious way in which the lender can force him to repay. The irony of Absolutism¹³ is that the more power the King has, the more difficult it is for him to get a loan¹³. North and Weingast suggest that this problem gave rise to the Glorious Revolution in England, in which power over the Treasury was devolved on Parliament. In this way the King could credibly commit to repay.

¹³The more general problem, which I labeled (1998) The Dictator's Dilemma,¹³ and which has been discussed in works on autocracy as old as the ancient Greek scholar Xenophon's dialogue *Hiero, or Tyrannicus* (1948), is that the more power a ruler has over his people, the more reason they have to fear him; this fear breeds a reluctance on the part of the citizenry to signal displeasure with the ruler's policies. This fear on their part in turn breeds fear *on the part of the dictator*, since, not knowing what the population thinks of his policies, he has no way of knowing what they are thinking and planning, and of course he suspects that what they are thinking and planning is his assassination. Consequently, long lasting dictatorships are typically those that do not rule through fear alone.

For earthly monarchs, then, this problem may be solved through the credible devolution of power. But I know of no way this problem can be solved by the Supreme Being¹⁴. The one God was, after all originally envisioned as the Absolute Monarch (Finer (1997)) and the Absolute Monarch, as He may still be envisioned, can always renege on a contract. So far as delegation of power is concerned, various people, agencies, and organizations have indeed claimed to be and may very well be His representatives on earth, but they are all stuck with the same problem: what makes this claim credible¹⁵?

Now let us return to the events of 9/11. Take the simplest exchange - based explanation: the suicide bombers committed the act because they believed that they will go to heaven as a result and that waiting there are 70-72 virgins. Of course, one can simply assert that these people

¹⁴ Thus Raskovich notes that, among the early Jewish people, exclusive belief in the one God Yahweh was held to be enforced by a curse. But those who didn't believe discounted the curse, and so ultimately it had no effect on them. So Raskovich resorts to the institution of the (earthly) group boycott for disbelief introduced under King David to explain why the contract was taken seriously. But while this may enforce behavior, it does not necessarily engender belief. Raskovich also says that the vivid depiction of Yahweh as jealous and frightening caused fear, and Afear changed heart to belief@ (Exodus 14:31, quoted in Raskovich p. 461). But clearly it need not have that consequence and could easily have had the opposite one. Does fear result in belief generally? Again, consider some illustrations from absolute rule on earth Many people feared Stalin (Pinochet) during his reign as dictator of Russia (Chile). Did that lead them to believe in Communism (free markets)? Would it have been rational for them to do so? And were those people who believed in Yahweh because they felt afraid after what they read rational to believe in Him?

¹⁵Sometimes it is suggested that Pascal=s justly celebrated Awager@ provides a rational foundation for religious belief.. Pascal reasoned that the probability of God=s existence may be small but the reward is infinite. Consequently belief is a rational gamble. This is a profound and justly celebrated idea. It would solve the God=s problem in compelling behavior because people would reason that the punishment for breaking the contract is so large and the possibility that God would honor his part of it may not be large but it is finite. But the problem with this idea is that it does not work at the margin: *how much* belief or religious practice is justified by a small probability of an infinite reward?

do believe in God, and that the Quran and perhaps other holy sources contain passages which can be interpreted as providing this information about the rewards of heaven. But the interesting question is, *Is this belief rational?* If God is omnipotent then while He may promise 72 virgins there is no reason for him to fulfill his part of the bargain. He may promise 72 white virgins but actually deliver 72 white *raisins*¹⁶. If the answer is, A God does not cheat@ then He is not omnipotent. The Supreme Being cannot be bound by a contract with a mere mortal.

It immediately follows that since the contract cannot bind the Supreme Being, there is no reason why the earthly party to the contract should fulfill his side of the bargain either. What is the point? The Supreme Being, being Supreme, may punish him even if he fulfills all of his obligations, just to show that He is Supreme, or for any other reason. So it would appear that *either* the suicide bombers of 9/11 did *not* commit suicide in exchange for the promise of heavenly rewards, or, if they did, *they were not rational*.

Does that mean religious exchange could not have played a role in motivating the suicide bombers of 9/11? Not necessarily. While there may be no direct way of motivating belief, there may be indirect ways. Here is one, related to the hypothesis advanced above that the bombers were motivated by solidarity. This motivation is not inconsistent with religious belief: on the contrary, solidarity provides a powerful motivation for religious participation, and some

¹⁶A new scholarly interpretation of the Quran, Christoph Luxenberg's *The Syro-Aramaic Reading of the Koran*, Berlin: Verlag Das Arabische Buch, does indeed suggest that *white raisins*, not virgins, are all that is promised Islamic martyrs in the Quran in the first place (as reported in the New York Herald Tribune, March 4, p. 2).

economists have indeed stressed that a primary motive behind religious attendance may be the desire for social interaction (Glaeser and Glendon (1997), Sacerdote and Glaeser (2001)).

Emil Durkheim famously emphasized the importance of solidarity in religious groups:

[A religious group] does not unite men by an exchange and reciprocity of services, a temporal bond of union which permits and even presupposes differences, but which a religious society cannot form. It socializes men only by attaching them completely to an identical body of doctrine and socializes them in proportion as this body of doctrine is extensive and firm. The more numerous the manners of action and thought of a religious character are, which are accordingly removed from free inquiry, the more the idea of God presents itself in all details of existence, and makes individual wills converge to one identical goal. (Durkheim (1897), 1951:159), quoted in Hechter (1987), p. 17)

In turn, the demand for solidarity provides the Supreme Being with an indirect mechanism to solve the Irony of Absolutism. Thus, suppose the Supreme Being simply endowed people with an innate human desire for solidarity or social cohesion. Suppose that, as discussed above, solidarity comes from common belief: that is, people are more united when they have the same belief, and they are more divided when they have different ones. Now suppose only one more assumption: the grander or more profound the belief which is shared, the greater the solidarity. Then people could be induced to believe in God in order to gain solidarity with others who have this belief. In this way, a Supreme Being could indeed solve the problem

of inducing people to follow His wishes¹⁷.

To summarize this argument: (i) If God is truly supreme, you can=t make a contract with Him; but (ii) He can get all the obedience He wishes on earth simply by instilling in humans a sufficiently large desire for solidarity; iii) Religious solidarity does provide a logically consistent Arational@ motive for sacrifices like those of 9/11. But although the exchange may be made in God=s name, it is with *other people* who may represent earthly organizations (an exchange of belief and practice for solidarity) not with God, though one of the obligations incurred in the exchange may be precisely to assume the belief that the exchange is with Him ; iv) Religious motivation is an important way of generating solidarity but there is nothing fundamentally different about religious solidarity compared to other forms of it such as ethnic or nationally -based movements.

One religion may generate greater social cohesion than another for a number of reasons. The three central aspects of Islam mentioned above would appear to imply a greater capacity to stimulate social cohesion than either Judaism or Christianity: 1) The all -embracing nature of the Muslim religion gives the Muslim more opportunities to sacrifice autonomy for solidarity; 2) Devotion to the just community (the *ummah*) is more characteristic of the Muslim faith than the other monotheisms (Armstrong (2000), p. 5). 3) As mentioned above, common belief is not the

¹⁷Of course, an alternative explanation of the existence of desire for solidarity might be that it is simply an evolutionarily stable strategy. Consequently the existence of a desire for solidarity is both consistent with the existence of God and with His non-existence. I leave it to the reader to decide whether God exists or not.

only mechanism for securing solidarity. The other method is struggle (*jihad*) against a common enemy. The Muslim religion was the first to unite these two prime sources of solidarity. As Finer puts it, Aif the foundation myth of the Jews is the Covenant, and that of the Christians is the Suffering Christ, that of Islam is the Armed Prophet@ (Finer (1997), p.).

For all these reasons it might appear that the Muslim religion is the most *potentially* socially cohesive of the three monotheistic religions. One piece of evidence which supports this idea was the spectacular early success of Muslim armies in conquering other areas with superior weapons. Although there are many theories to explain this (Finer for example cites 11 hypotheses) the idea of superior social cohesion has considerable prominence. Thus one noted scholar refers to Athe central importance of Islam in the conquests > in the work of even non-Muslim historians@ (Esposito (1999), p. 30)

However, neither the desire for social cohesion nor religiosity are sufficient conditions for terrorist activity. Indeed, many deeply religious people are obviously among the *least* likely candidates for this role. In other words, an equilibrium at or close to the corner in Figure 2 is not necessarily a terrorist equilibrium. To take only the most obvious examples, it could be a Sufi equilibrium of simple piety, a progressive Catholic or a missionary equilibrium of total commitment to spreading the Gospel, or a terrorist equilibrium. What differentiates the latter from these others? A high level of social cohesion may make the individual member of a group readily to sacrifice himself, but the leader of the group or some other individual with whom one identifies still has to order the individual to commit terrorist acts. None of the three major monotheistic religion orders their adherents to behave this way, and in particular while there are passages in the Quran that can be interpreted as advocating violent struggle against the enemies

of the religion, much more of it is concerned with justice, mercy and compassion.

In other words, in this paper we have dealt only with the supply side of rational suicide bombing. Why people are willing to obey instructions to commit suicide for the cause. There is still the demand side. What circumstances give rise to the kind of leaders who demand such destructive sacrifices? This is obviously an equally difficult problem, and I will only briefly sketch some ideas in the next section.

6. From Social Cohesion to Terrorism

One clue to demand is that a successful or powerful organization usually does not usually ask such sacrifices of its members: terrorism is, as is often acknowledged (Hoffman (1998), McCauley (2001) a weapon of the weak. This suggests that it is the *failure* of many Muslim states in the contemporary environment which generates terrorism. In turn, the current problems of many Muslim states may have historic roots. The great capacity of the Muslim religion to generate social cohesion was combined in the era of the Caliphates with a great weakness on the part of the state: the lack of a succession mechanism. The Dictator's Dilemma¹⁸ is obviously magnified when there is no succession mechanism. Moreover, legitimacy could only be conferred by the religious authorities, but there was no formal procedure for doing this. So we have events like the following, beginning shortly after the death of the Prophet: A Caliph after caliph tended to come under armed challenge from some group or groups somewhere or other in the empire.....(Finer, p. 699)@ And again, AThe state >was something which sat on top of society, not something that was rooted in it= (Crone and Hinds, *God=s Caliph*, quoted in Finer, p. 726).@

¹⁸See footnote 13 above.

These problems of governance continue to bedevil many Muslim states today (Ajami (1981), Lewis (1988), Finer (1997)). On the one hand, autocracies where there is no succession mechanism and no legitimacy tend to rely on repression to keep them in power. But as the Dictator=s Dilemma implies, this does not lead to effective governance. States which do not provide effective and responsive government to their citizens leave many in their populations searching for alternative sources of social cohesion B which can often best be provided by autonomous organizations like charismatic religious sects¹⁹. On the other hand, the Muslim religion itself has no organized leadership or central authority (Finer (p. 677) and this also makes it easier for cults to spring up within Islam and within those states as alternative sources of social cohesion. In short, in these failed states one expects to see pockets of extreme social cohesion, with charismatic leaders subject to no central control providing solidarity and social services, educating their members that their problems are caused by an external enemy and demanding that they take radical actions against that enemy to help their fellows.

7. Conclusion

¹⁹ The importance of charismatic leadership is also often emphasized in works on extremist political movements. In Appleby=s collection on Middle East extremism *ASpoken for the Despised* (1997), part of the University of Chicago=s Fundamentalism Project, the main theoretical message extracted is the presence of charismatic leadership.

In this paper I developed a simple model to explain how it is possible for a person to rationally commit suicide to further the goals of a group. In the model, an individual gives up autonomy for solidarity, that is he trades his beliefs for a feeling of belonging-ness to a group. Small trades of this type do not result in unusual behaviour and indeed, most of us engage in such behavior all of our lives. However, at large levels, such trades imply that a person is more and more giving up his identity for that of the group, perhaps as personified by its leader, and losing the capacity to make decisions based on values other than those of the leader. Consequently, the choice of larger levels of solidarity may drive a person close to or at a corner solution where her values are entirely those of the leader. Such a person is capable of rational suicide for the goals of the group. Some implications of this view are that small price effects will not change the behaviour of the individual in question, and even very fairly large ones might not cause the person to revert to her old identity since he has given it up in exchange for solidarity. However, very large changes will cause a very substantial change, as is typical in the analysis of corner solutions.

Comparing religions, there are some reasons to believe Islam is more typically capable of generating the intense social cohesion involved in such sacrifices, compared to Judaism or Christianity. But while a solution at or near the corner involving a high levels of social cohesion may characterize a Arational@ suicide bomber in part, it is not sufficient. One also has to inquire into the forces which give rise to leaders who are capable of Aordering@ (demanding) such acts, something I have only speculated about in this paper, and which remains an important subject for future research.

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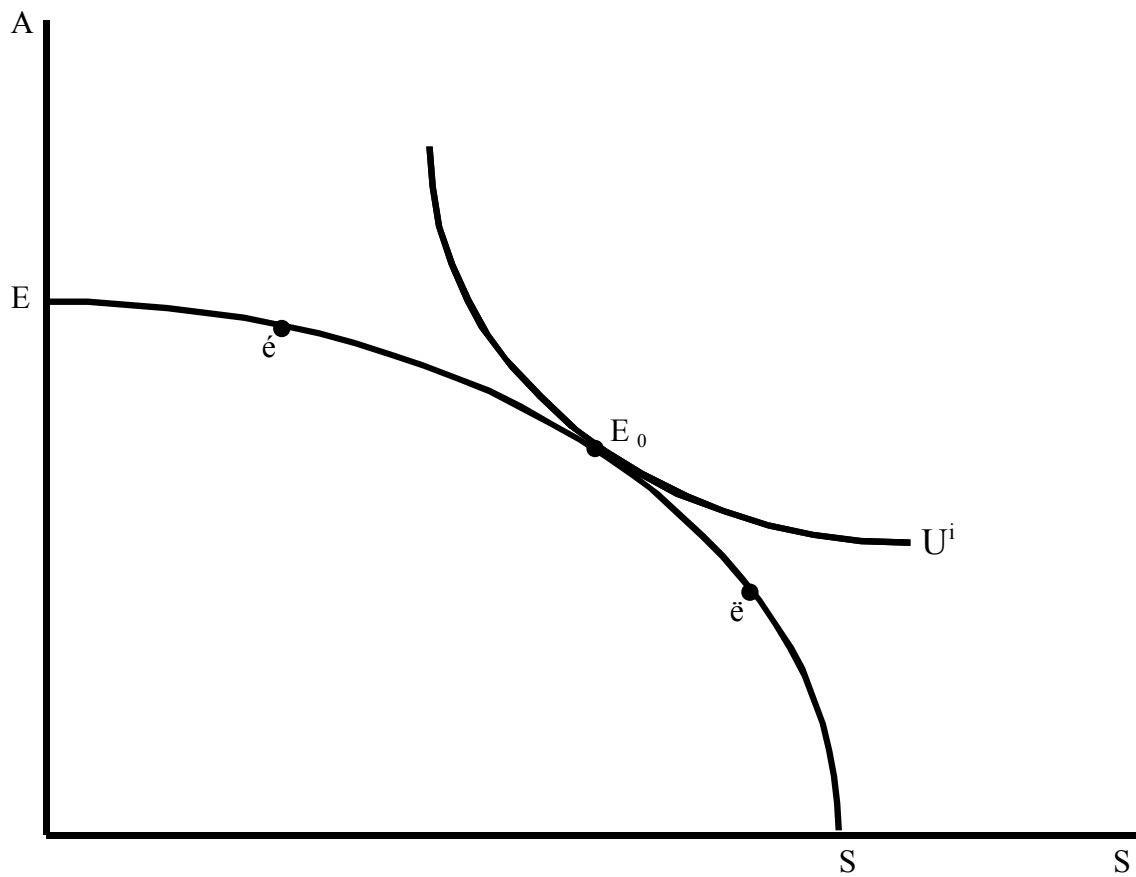


Figure 1

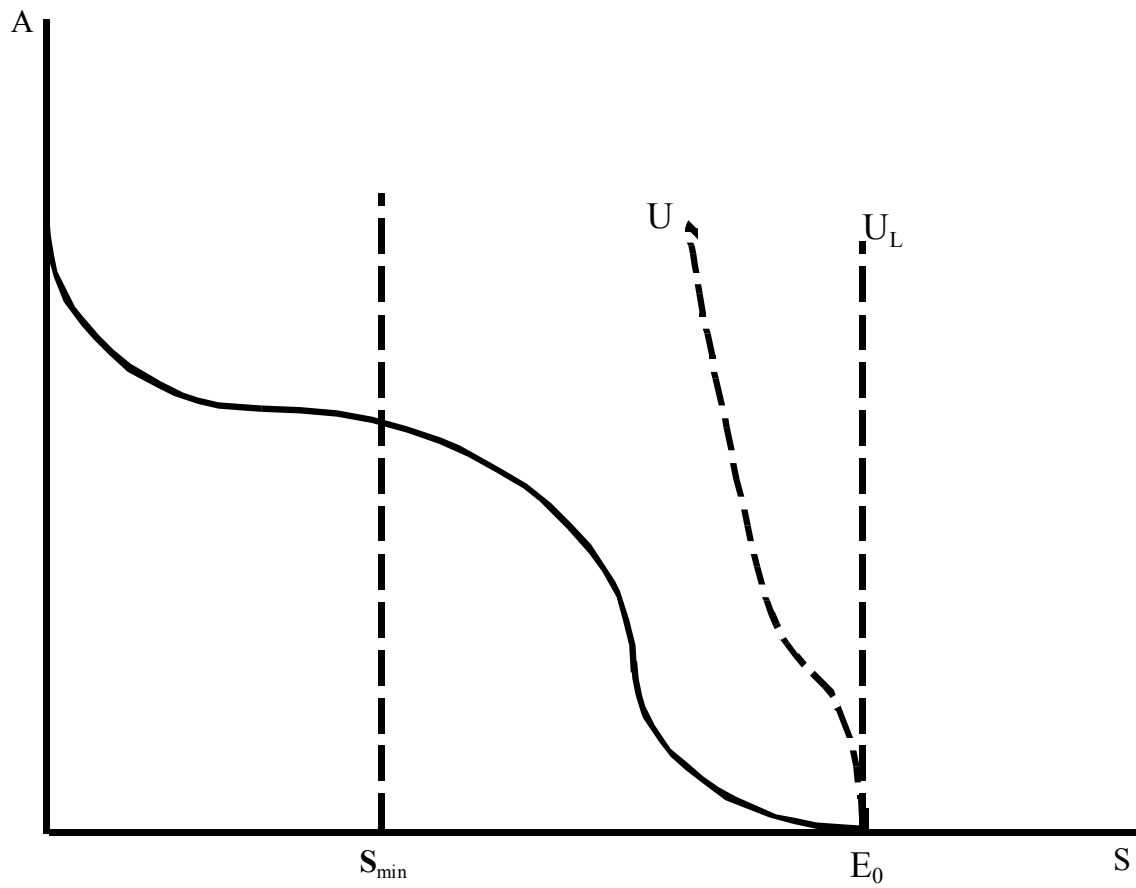


Figure 2