Once again, the United States is in the midst of a debate over whether to deploy defenses designed to protect U.S. cities and population from Soviet missile attack. This debate is, most immediately, the result of President Reagan’s “star wars” speech, in which he asked the rhetorical question: “wouldn’t it be better to save lives than to avenge them?” He offered a future vision of “truly lasting stability” based upon the “ability to counter the awesome Soviet missile threat with measures that are defensive.”1 Just six months later a senior interagency group recommended to the President that the “U.S. embark on early demonstrations of credible ballistic missile defense technologies to its allies and the Soviet Union.”2

There is, in addition to this most recent catalyst, a deep-seated, enduring reason why the possibility of defending the United States from Soviet nuclear attack is a recurrent issue. Put most simply, it is quite natural for the United States to want to remove itself from a situation in which the Soviet Union has the capability to virtually destroy it. The United States cannot, today, physically prevent the Soviet Union from wreaking such destruction. U.S. security therefore depends upon its ability to deter Soviet nuclear attack. If deterrence works, then the United States will be able to avoid nuclear war with the Soviet Union. Unfortunately, the possibility that deterrence could fail cannot be easily dismissed. Deterrence will have to work for decades and centuries—that is, unless the current situation, in which the United States is vulnerable to Soviet nuclear attack, is dramatically altered. While one cannot

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specify with confidence the way in which the superpowers’ nuclear arsenals might come to be used, knowing that deterrence could fail in a variety of ways is sufficient to create a feeling that, given enough time, deterrence will fail. Consequently, as long as the United States remains vulnerable to Soviet nuclear attack, the possibility of nuclear attack will create an interest in defense against it.

The current debate over the deployment of ballistic missile defense (BMD), like the one in the late 1960s, is highly polarized. Defense, according to its opponents, is undesirable on all scores. They argue that defense will not work effectively, will increase the probability of war, and will cause arms races. Proponents, on the other hand, see few, if any, disadvantages with defense. They argue that defense will reduce the damage the Soviet Union could inflict on the United States, will not increase the probability of war and might decrease it, and might even improve the prospects for achieving arms control agreements which limit offensive nuclear forces.3

The vast majority of the debate has pivoted on the technological feasibility of effective BMD. The implicit assumption is that if effective BMD could be developed and deployed, then the United States should pursue the BMD route and the associated change in its nuclear strategy.4 The principal argu-

3. A ballistic missile defense is a system capable of destroying Soviet missiles (or warheads) in flight. The terms “ballistic missile defense” (BMD) and “anti-ballistic missile” (ABM) are usually used interchangeably. BMD programs which might contribute to the goals described in President Reagan’s so-called “star wars” speech are also referred to as the Strategic Defense Initiative (SDI).


4. For an explicit statement of this belief from strong opponents of BMD, see Space-Based Missile Defense, in which the Union of Concerned Scientists states, “If it were possible to put in place overnight a fully effective, invulnerable defense against nuclear weapons, there could hardly be serious objections to doing this” (p. 71).
ment against defenses is that they will not work. Opponents of defense, presumably because they believe that effective defense is infeasible, tend not to examine carefully either the advantages or the disadvantages of effective defense. As a result, examination of a world in which the superpowers have deployed effective defense has been left to the advocates of defense, and a question of fundamental importance continues to be overlooked by the debate:

Could the deployment of effective defenses by both superpowers create a nuclear situation preferable to our current one, in which both countries maintain redundant assured destruction capabilities?

I am using the term “defense” to refer only to area defense, i.e., systems designed to protect cities and other value targets. BMD that would protect the United States by reducing the Soviet Union’s ability to inflict damage is an area defense. By contrast, a point defense is designed principally to protect nuclear force capabilities.5

By “effective defenses,” I have in mind systems that are capable of denying one’s adversary an assured destruction capability. Defense which cannot eliminate assured destruction capabilities are far less interesting because they would not significantly reduce the damage the United States would suffer in an all-out nuclear war.6 Another way, then, of stating the above question is:

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5. This distinction is important because these two types of defense have fundamentally different strategic implications: a country’s area defense, if sufficiently effective, could reduce the size of the adversary’s deterrent threat; a country’s point defense, by increasing the size of its offensive force that would survive a counterforce attack, could increase the size of the country’s deterrent threat.

6. An assured destruction capability is generally understood to be the capability, following a full scale counterforce attack against one’s forces, to inflict an extremely high level of damage upon one’s adversary. The levels of potential damage which analysts believe assured destruction requires are usually similar to those prescribed by Robert McNamara, U.S. Secretary of Defense from 1960 to 1968. McNamara’s criteria for assured destruction, which were influenced by the diminishing marginal damage potential of increasing the size of the U.S. force, required that the United States be able to destroy, in a retaliatory attack, approximately 25 percent of the Soviet population and 50 percent of Soviet industry. He judged that such a level of destruction would be intolerable to the Soviet Union and, therefore, that the capability to inflict this level of damage would be sufficient to deter deliberate Soviet nuclear attacks on the United States. See Alain C. Enthoven and K. Wayne Smith, How Much Is Enough? Shaping the Defense Program 1961–1969 (New York: Harper and Row, 1971), pp. 172–184, 207–210.

A related, but conceptually distinct, interpretation of assured destruction focuses on the relationship between the costs a decision-maker associates with the nuclear attack and the damage that would result from such an attack. Assured destruction in this interpretation requires that the potential damage in one’s retaliatory capability should be sufficiently high that increasing the potential damage would not result in significantly higher costs to the adversary. In this article, assured destruction is intended to have this second meaning. Clearly, any evaluation of
Could the United States be more secure than it is today if, as a result of mutual deployment of defenses, neither the United States nor the Soviet Union had assured destruction capabilities?

My objective in this essay is to analyze this question.

A country with an assured destruction capability can inflict extremely high levels of damage. Nuclear situations in which the Soviet Union lacks an assured destruction capability, therefore, range from those in which the United States is invulnerable to attack to those in which the Soviet Union could destroy a sizable fraction of the U.S. population. The most interesting alternatives to mutual assured destruction situations are, of course, those in which the U.S. defense reduces the potential damage the Soviet Union could inflict far below the level required by assured destruction. Analytically, however, there are important similarities that cross the full range of nuclear situations in which assured destruction capabilities do not exist. As a result, this analysis applies equally well to all such situations. In fact, a distinguishing feature of this analysis is that it examines the requirements of strategic nuclear deterrence in situations in which defenses have eliminated assured destruction capabilities. In contrast, most analyses of strategic nuclear deterrence require that the United States possess an assured destruction capability, almost as if this were a prerequisite for deterrence.

There is general agreement that defenses capable of eliminating assured destruction capabilities do not exist today, and are extremely unlikely to be developed in the foreseeable future. However, to facilitate examination of

the costs associated with such unprecedented damage is highly subjective. Many people believe that the United States would have to be able to reduce damage to itself far below the levels specified by McNamara before it could significantly improve the outcome of an all-out war; others believe that any reduction in damage, even if damage remained well above these levels, would be significant. The two different understandings of assured destruction are often not distinguished because McNamara said that an assured destruction capability would be sufficiently large to annihilate one's adversary in retaliation and because analysts tend to assume that costs to one's adversary could not be increased if the adversary could already be annihilated.

The arguments in this article do not depend upon a specific assessment of the level of retaliatory damage required for assured destruction. Instead, the arguments view the level of damage required for assured destruction as an imprecise boundary, above which additional damage does not significantly increase the costs of an attack, and below which reductions in damage would significantly reduce the costs. People disagree on the location of this boundary, but the arguments apply in all cases.

7. For an authoritative analysis of the technical feasibility of BMD, see Ashton B. Carter, Directed Energy Missile Defense in Space (Washington, D.C.: U.S. Government Printing Office, 1984). Carter judges as "extremely remote the prospect that directed-energy BMD (in concert with other layers if necessary) will succeed in reducing the vulnerability of U.S. population and society to the neighborhood of 100 megatons or less" (p. 68). See also: Space-based Missile Defense;
the issues that lie beyond the technical feasibility of BMD, I hypothesize in this article that highly effective defenses are available. Although effective defenses are, at best, a distant prospect, their presumed advantages have a significant influence on the BMD debate. Assuming, for the sake of analysis, that effective defenses are available makes possible a closer examination of the desirability of defensive situations. (I will use the term "defensive situation" to refer to nuclear situations in which defenses have eliminated assured destruction capabilities.)

The article focuses on situations in which both the United States and the Soviet Union deploy defenses. This case is important because it is the most probable outcome of U.S. deployment of defense. The Soviet Union is extremely likely to deploy defenses in response to a U.S. deployment. There is little reason to assume that in the long run the United States could maintain a technological advantage that enabled only the United States to have effective defense. Furthermore, the case of symmetric deployment is especially interesting due to the intuitive appeal of reducing U.S. vulnerability to attack without creating an advantage that threatens Soviet security. 8

This analysis of how mutual deployment of effective defense would affect U.S. security proceeds through a number of stages. I identify three features of the nuclear situation that affect the United States' ability to avoid nuclear war with the Soviet Union: 1) the United States' ability to deter premeditated Soviet attack; 2) the crisis stability of the nuclear situation; and 3) the robustness of the U.S. deterrent to changes in Soviet forces. Next, I compare the probability of nuclear war in defensive and assured destruction situations by examining these three features for both types of nuclear situations. The final stage of the analysis compares U.S. security in defensive and assured destruction situations based upon expected costs. This requires considering

Spurgeon M. Keeny and Wolfgang K.H. Panofsky, "MAD Versus NUTS," Foreign Affairs, Vol. 60, No. 2 (Winter 1981–82), pp. 297–303; and Carter and Schwartz, Ballistic Missile Defense, in which Carter concludes: "the prospect that BMD will thwart the mutual hostage relationship—if this is taken literally to mean the ability of each superpower to do socially mortal damage to the other with nuclear weapons—is so remote as to be of no practical interest" (p. 11).

8. It should not go unmentioned that many of the advocates of BMD favor asymmetric deployment—that is, situations in which the United States can gain a strategic advantage by deploying BMD which is superior to Soviet BMD. See, for example, Colin S. Gray, "Nuclear Strategy: The Case for a Theory of Victory," International Security, Vol. 4, No. 1 (Summer 1979), pp. 54–87; and Colin S. Gray and Keith Payne, "Victory Is Possible," Foreign Policy, No. 39 (Summer 1980), pp. 14–27. In contrast to these earlier articles, in the recent "Nuclear Policy and the Defensive Transition," Gray and Payne argue as though the defensive situation they advocate would be symmetric. They do not explain the origins of this apparent inconsistency.
the damage that would result if nuclear war occurred as well as the probability of its occurrence.

The conclusion of this analysis is that defensive situations, even those in which defenses were perfect, are not clearly preferable to assured destruction situations. This conclusion is indeterminate because in defensive situations the probability of certain types of wars would increase, but the damage of other types of wars would decrease.

The indeterminacy of this conclusion should not obscure its policy significance. The assumptions used in the analysis have made a best case for defense: effective defense is assumed to be technically achievable; the enormous economic costs required to deploy any effective defense are overlooked; and the deployment of defenses is assumed to avoid the creation of asymmetries in the superpowers' capabilities that could create incentives for preventive attack and could encourage adventurous, crisis-provoking behavior. Even in this best case, defensive situations are not clearly preferable to the current assured destruction situation. In addition, many of the nuclear situations that could result from starting down the BMD route are far less desirable than our current mutual assured destruction situation. Without the possibility of a best outcome that is clearly preferable to our current situation, there is now no good reason to invest enormous resources in strategic defense and to risk creating a more dangerous world. The arguments for not dramatically altering the nuclear status quo are much stronger than those that call for U.S. deployment of an area defense.

Perfect Defense

It is important to begin with an examination of the strategic implications of perfect defenses, however distant they may seem, because that is the goal towards which many advocates of strategic defense, including President Reagan, wish to move. Despite the widespread presumption that perfect defenses are desirable if feasible, there are two major shortcomings of a world of perfect defenses that draw into question whether it would be safer than our current nuclear situation.9

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9. The following discussion assumes that both countries would know the effectiveness of both their own defense and the adversary's defense. This is admittedly unrealistic, since there would always be uncertainties about the effectiveness of the defenses, and because the implications of these uncertainties could be significant. The reason for assuming that the effectiveness of the defenses would be known, however, is to focus the examination of perfect defenses on other
First, there could be no guarantee that perfect defenses would remain perfect. The technical challenge of developing and deploying a defense that would make the U.S. invulnerable to nuclear attack is enormous. Such a defense is commonly referred to as “perfect.” The difficulty of maintaining a perfect defense indefinitely is likely to be far greater than developing it in the first place. Consequently, so-called perfect defenses should not be envisioned as a permanent technological solution to the dangers posed by nuclear weapons. The far more likely course of events is that a world of perfect defenses would decay into a world of imperfect defenses.  

A nuclear situation in which both superpowers were invulnerable to nuclear attack would be extremely sensitive to even small improvements in the ability of one country’s offense to penetrate the adversary’s defense. For example, the ability to penetrate the adversary’s defense with ten warheads would provide the potential for enormous destruction when compared to no destruction. The country that first acquired even a small capability to penetrate the adversary’s defense would have attained an important coercive advantage: nuclear attack could be threatened with impunity since effective retaliation would be impossible given the adversary’s inability to penetrate one’s own defense. Recognizing that the adversary is likely to acquire a similar capability—that is, that one’s defense will not remain impenetrable—could create pressure to reap the benefits of the strategic advantage quickly. This time pressure would be especially strong if one’s advantage could be used to prevent the adversary from acquiring the capability to penetrate one’s defense.

By contrast, when both superpowers possess redundant assured destruction capabilities, as is the situation today, the addition of tens or hundreds or even thousands of warheads would not significantly change the nuclear

issues. This assumption of certain information strengthens the arguments for perfect defense and therefore reinforces the best case assumptions used in this analysis. Some of the complications that would likely result from uncertainties about effectiveness are discussed later in this article.

10. Many advocates of pursuing highly effective defense argue that even if the prospects for effective defense do not look extremely promising today, history suggests that major technological changes should be expected. For example, Payne and Gray observe in “Nuclear Policy and the Defensive Transition” that: “All of recorded history has shown swings in the pendulum of technical advantage between offense and defense. For the strategic defense to achieve a very marked superiority . . . would be an extraordinary trend in the light of the last 30 years, but not of the last hundred or thousand years. Military history is replete with examples of defensive technology and tactics dominating the offense” (p. 826). This argument would, however, apply at least as well to the maintenance of the defensive world they advocate and points to the major problems that would exist in defensive situations.
As a result, the probability of gaining a strategic advantage is extremely low, especially when both superpowers are aware of and react to changes in the other's nuclear force.

The dangers, in a world of impenetrable defenses, that result from this sensitivity to small offensive improvements would be increased by the strong incentives the superpowers would have to defeat each other's defense. Each country could be expected to make the acquisition of a strategic advantage a priority. Moreover, because there would be no guarantee that perfect defenses would remain perfect, even a country that did not want to acquire an advantage would feel compelled to acquire additional strategic capabilities. Such a country would want to improve its defense to offset anticipated improvements in the adversary's offense. In addition, there would probably be a strong instinct to improve one's offense as well as a hedge against the possibility of not being able to offset, with improvements in one's defense, the adversary's enhanced offense. One's adversary, however, would not be able to know with confidence that these strategic programs were intended only to maintain a situation of equal capability. Consequently, even if both countries preferred to remain in a world of perfect defense, an interactive competition which threatened to reduce the effectiveness of the defenses would be likely to ensue. (Nuclear situations would continue to be sensitive to relatively small changes when the defenses were imperfect. This lack of "robustness" to changes is examined in detail below.)

The second problem with perfect defenses is that they could increase the probability of superpower conventional wars. Today's nuclear forces greatly increase the potential costs of any direct U.S.-Soviet military confrontation. As a result, nuclear weapons increase the risk of starting a conventional war, and therefore contribute to the deterrence of conventional war. Impenetrable defenses would eliminate this contribution. There is disagreement among strategic analysts about which features of the superpowers' extensive survivable strategic arsenals are most critical for deterrence of conventional war. Few, if any, commentators however believe that the existing arsenals do not contribute at all to the deterrence of conventional war.11

11. For an insightful discussion of why large nuclear arsenals reduce the probability of superpower conventional wars, even when neither superpower has an advantage in purely military terms, see Robert Jervis, "Why Nuclear Superiority Doesn't Matter," Political Science Quarterly, Vol. 94, No. 4 (Winter 1979–80), pp. 617–633. At the other end of the spectrum, Gray and Payne in "Victory Is Possible" find the U.S. strategic force inadequate to meet its extended deterrence commitments, but admit that U.S. strategic nuclear forces do contribute to deterrence of Soviet conventional attack in Europe (p. 16).
Perfect defenses might be in the U.S. security interest despite the increased probability of conventional war. That conventional war would be more likely does mean, however, that there is an important trade-off to consider. As World Wars I and II demonstrated, global conventional wars can be extremely destructive. The net effect of increasing the probability of major conventional war, while eliminating the possibility of more destructive but extremely unlikely nuclear war, might not be positive. The evaluation of this trade-off would involve many factors, including estimates of the probability of nuclear and conventional wars with and without perfect defenses, estimates of the size and costs of these wars, and the availability of options for reducing the probability and costs of conventional war. The objective of this short discussion is to call attention to this trade-off, not to resolve it.

In short, then, what are commonly called perfect defenses would have two shortcomings. First, they would probably not be truly perfect, but instead only temporarily impenetrable. The undermining of one country’s defense would create a situation in which the incentives to initiate a nuclear war would be greater than today. Second, even if the temporary nature of impenetrable defenses is ignored, the net effect of both superpowers’ deploying impenetrable defenses remains unclear because major conventional wars could become more likely.

**Imperfect Defense and the Probability of Nuclear War**

Understanding security in a world of perfect defense is relatively easy because as long as the defenses remain impenetrable, there is no possibility of a strategic nuclear war. Assessing security in a nuclear situation in which imperfect defenses have been deployed is more difficult. Since, in this case, the United States would be vulnerable to Soviet strategic nuclear attack, we need to evaluate the United States’ ability to reduce the probability of these attacks.

The following analysis considers nuclear situations in which both countries have imperfect defenses, but each is capable of denying the other an assured destruction capability. Implicit in this formulation is a relationship between one country’s offensive force and the adversary’s defensive force. When

12. This assertion depends on the assumption made above that both countries know that the defenses are perfect. If defenses were not known to be perfect, although in fact they were, then nuclear attack might be carried out (but would not result in damage) and nuclear threats might be used coercively.
defenses are imperfect there will always be, at least in theory, an offense which is sufficiently large to have an assured destruction capability. Therefore, for one country’s imperfect defense to deny the adversary an assured destruction capability, either the size of the adversary’s offense must be limited or the defense must be able to expand and improve to offset increases in the size of the offense. This analysis does not examine the feasibility of achieving these conditions. It assumes the establishment of a nuclear situation in which neither the United States nor the Soviet Union has assured destruction capabilities.

The probability that the United States will avoid war with the Soviet Union depends upon the following three features of the nuclear situation:

1) The United States’ ability to deter Soviet nuclear attack during periods when war does not appear to be imminent, that is, when there is not a severe crisis. Deterrence of this type of attack requires that the Soviet Union believe that the net effect of starting a nuclear war would be negative, that is, that the Soviet Union would be worse off after the war than before it. I will term these “premeditated attacks.” Surprise attacks, including the infamous “bolt from the blue,” fall within this category.

2) The crisis stability of the nuclear situation. In a crisis, one or both superpowers might fear a nuclear attack by the other. If striking first is believed to be preferable to being struck first, and if a country believes the probability that the adversary will strike first is sufficiently high, then launching a first strike would be preferable to taking a chance on being struck first. This type of first strike is commonly termed a “preemptive attack.” Unlike the case of premeditated attack, the country launching a preemptive attack would expect to be less well off after the war than before it. The crisis stability of the nuclear situation is a measure of how severe a crisis must be (or how high one’s estimate that the adversary will strike first must be) before striking first becomes one’s best option.13

13. The probability of preemptive nuclear war depends on the probability of crises, as well as the crisis stability of the nuclear situation. For example, a change in the nuclear situation which increases crisis stability but also increases the probability and severity of crises could increase the probability of preemptive nuclear war. The following comparison of the probability of nuclear war in defensive and assured destruction situations does not take into consideration the relative probability of crises. Because defensive situations are likely to increase tensions between the superpowers and because superpower cooperation will be more difficult than in assured destruction situations, the effect of not including the probability of crises in this analysis probably favors defensive situations. Therefore, this simplification tends to reinforce the best case which this analysis makes for defensive situations.
3) The robustness of the nuclear situation. The adequacy of U.S. forces depends not only on their ability to reduce the probability of preemptive and premeditated attacks, but also on how sensitive this ability is to potential changes in the Soviet forces. The more easily the Soviet Union could build forces that either would make a premeditated attack attractive or would significantly increase the incentives for preemptive attack, the greater the probability of a nuclear war. The robustness of the U.S. nuclear force is a measure of the difficulty the Soviet Union would encounter in trying to reduce U.S. security.

These three measures of the quality of the nuclear situation (the United States’ ability to deter premeditated attacks, the degree of crisis stability, and the robustness of U.S. forces to change) are frequently used to assess the adequacy of U.S. nuclear forces. What distinguishes the following analysis from standard analyses of the nuclear situation is the assumption that assured destruction capabilities do not exist. Past analyses have asked the question: what capabilities are required to minimize the probability of war? The answers all include the need for an assured destruction capability (or at least a large retaliatory capability). This analysis, by examining the effect on these three measures of the nuclear situation, explores how the elimination of assured destruction capabilities by mutual deployment of defenses would affect the probability of nuclear war.

PREMEDITATED ATTACKS: IS ASSURED DESTRUCTION NECESSARY FOR DETERRENCE?

Consider a nuclear situation in which Soviet defenses could deny the United States an assured destruction capability. In this situation, the most basic and generally accepted U.S. deterrent requirement (that is, possession of an assured destruction capability) would not be satisfied. A natural conclusion is that the U.S. deterrent would be inadequate. This belief fueled opposition to strategic defense during the earlier BMD debate. But closer examination of nuclear situations in which both superpowers deploy defenses shows that U.S. deterrent requirements could be satisfied without U.S. possession of an assured destruction capability.

14. That deterrence requires assured destruction capabilities was rarely made as a separate argument. It was, however, an integral part of the argument that BMD would necessarily result in an arms race. The inevitability of this arms race was based in part on the assertion that each superpower, to maintain an effective deterrent, would have to possess an enormous retaliatory capability. See, for example, Chayes and Wiesner, eds., ABM, pp. 49-54.
The requirement that the United States have an assured destruction capability implicitly assumes that the Soviet Union can annihilate the United States: the standard argument is that to deter an annihilating attack, the United States should be able to threaten credibly to annihilate the Soviet Union in retaliation. But if the United States could, by deploying defenses, eliminate the Soviet Union’s annihilation capability, then deterrence of this attack would not be necessary. Furthermore, it is difficult to imagine any other Soviet actions the deterrence of which requires the United States to threaten the annihilation of the Soviet Union. So, if the Soviet Union did not have the ability to annihilate the United States, then the United States would not need to be able to annihilate the Soviet Union in retaliation. Consequently, a mutual deployment of defenses that eliminated both U.S. and Soviet annihilation capabilities need not result in an inadequate U.S. deterrent. The United States would, of course, still need a nuclear retaliatory capability to deter other Soviet nuclear attacks.

What capability would the United States need to deter attacks against its homeland when defenses had denied the Soviet Union an annihilation capability? Deterrence requires that the United States have the ability following any Soviet attack to inflict costs greater than the benefits the Soviet Union would achieve by attacking. To determine the U.S. retaliatory requirement, we must estimate the value the Soviet leaders would place on attacking the United States. We need to consider why the Soviet Union might attack the United States and what it would hope to gain by doing so. In the most general terms, the Soviet Union could use its nuclear force to damage or weaken the United States and to coerce the United States. The U.S. forces required to deter these actions are examined briefly below.

For all of the concern about attacks against U.S. cities, it is not clear why the Soviet Union would ever launch an all-out countervalue attack. Still such an attack is not impossible, so we need to estimate the value the Soviet Union might place on attacking U.S. cities. One possible reason for attacking U.S. cities would be to weaken the United States, thereby reducing the U.S. ability to oppose the Soviet Union’s pursuit of its foreign policy objectives. Presumably people believe the Soviet Union is interested in annihilating the United States because this would make it the dominant world power. The analogy, if U.S. defenses had eliminated the Soviet ability to annihilate the United States, would be a countervalue attack designed to weaken the United States.

To deter this type of attack, the United States would need a retaliatory capability that could weaken the Soviet Union as much as the Soviet coun-
tervalue attack could weaken the United States. A countervalue capability roughly equivalent to the Soviet countervalue capability should be sufficiently large to satisfy this requirement. In fact, this is a very conservative requirement because U.S. retaliation would not only deny the Soviet Union the desired increase in relative world power, but would also inflict direct costs by destroying Soviet value targets. Because the Soviet Union could first attack U.S. forces, and then attack U.S. cities, the United States should have forces that provide a countervalue capability essentially equal to the Soviets’ both before and after a Soviet counterforce attack. I will call this an “equal countervalue capability.”

The second way in which the Soviet Union might use its nuclear capability is to coerce the United States. While the benefits to the Soviet Union of attacking U.S. cities can be questioned, the potential benefits of coercing the United States are far more obvious. If the Soviet Union could inflict enormous damage on the United States and the United States lacked the ability to deter these attacks, then the Soviet Union might be able to compel the United States to compromise its security and vital interests.

As in other cases, deterrence would require that the United States be able to threaten the Soviet Union with expected costs greater than expected benefits. In the case of coercion, however, the United States could deny the Soviet Union any benefit simply by refusing to perform the action the Soviet Union demanded. The costs threatened by the United States need not be greater than the benefits the Soviet Union hopes to gain through its coercive demand because any U.S. attack combined with refusal of the Soviet demand would result in a net Soviet loss. If faced with a coercive threat, the United States could refuse the Soviet demand and tell the Soviet Union that attacks against value targets would be reciprocated. To adopt this strategy, the

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Including in this analysis uncertainty and imperfect information about the level of vulnerability to countervalue attack would weaken this argument. Redundant assured destruction capabilities are extremely large by any reasonable evaluation. There is little opportunity to misjudge this destructive potential, and assessments of damage are therefore not sensitive to relatively small differences in force size. In contrast, in a defensive situation in which each country’s ability to inflict damage has been greatly reduced, relative force capabilities would be harder to evaluate, and uncertainties, miscalculations, and miscalculations would be more likely to result in a perceived advantage that could result in a failure of deterrence.
United States would have to be confident that it could deter the Soviet Union. This would require that the United States believe that the Soviet Union finds the U.S. retaliatory threats credible.

A large disparity in U.S. and Soviet countervalue capabilities could undermine U.S. credibility. So, a reasonable force requirement for denying the Soviet Union the coercive use of its nuclear forces is that the Soviet Union not have an advantage in countervalue capabilities: an advantage should not exist in the deployed forces, nor should the Soviet Union be able to gain a countervalue advantage in surviving forces by launching a counterforce attack. Therefore, U.S. forces which satisfy the equal countervalue requirement should be sufficient to deny the Soviet Union a capability which enables it to coerce the United States. 16

In summary, a reasonable requirement for deterrence of Soviet attacks on the United States is possession of an equal countervalue capability. 17 Requiring that the United States possess an equal countervalue capability is significantly different from requiring an assured destruction capability. The equal countervalue requirement explicitly couples U.S. and Soviet capabilities to inflict countervalue damage. The equal countervalue requirement could be

16. This does not mean, however, that the Soviet Union would necessarily be unable to coerce the United States. As in a situation of mutual assured destruction capabilities, if the Soviet Union were able to convince the United States that it would carry out a threat to attack U.S. cities, then the Soviet Union might be able to coerce the United States. The U.S. possession of an equal countervalue capability, by making possible a highly credible retaliatory threat comparable to the Soviet threat, would make it difficult for the Soviet Union to make its coercive threat convincing. If the Soviet Union were able to coerce the United States, the key to its success would be greater resolve and willingness to take risks than the United States, and not an advantage in nuclear forces.

17. There is a third reason, not discussed in the text, why the Soviet Union might attack the United States: to eliminate the U.S. ability to deter the Soviet Union from pursuing its foreign policy objectives. For example, consider a hypothetical case in which the United States deters Soviet attack on Western Europe entirely with threats of strategic nuclear retaliation. If a Soviet counterforce attack could sufficiently reduce the potential cost of U.S. retaliation, then the Soviet Union could judge that attacking the United States, incurring U.S. retaliation, and invading and acquiring Western Europe could result in a net benefit. This type of Soviet nuclear attack on the U.S. homeland, unlike the two discussed in the text, does not depend upon the Soviet Union’s ability to inflict countervalue damage on the United States. In contrast, it is a purely military attack, motivated entirely by the desire to reduce the damage the United States could inflict on the Soviet Union. The United States could eliminate the Soviet incentive for launching this type of attack by making its forces invulnerable. However, even with invulnerable forces, and with the equal countervalue requirement satisfied, there might be nuclear situations in which the U.S. countervalue threat would be insufficiently large to deter Soviet attack on Europe. This would be true for the same reason that perfect defenses could increase the probability of conventional war: U.S. escalation to the nuclear level would no longer be sufficiently costly to deter Soviet attack.
satisfied by both the United States and the Soviet Union at all levels of vulnerability to attack. In contrast, the assured destruction requirement demands that the United States have a retaliatory force capable of inflicting a specific level of countervalue damage independent of the size of the Soviet ability to inflict damage. According to the equal countervalue requirement, if the United States can reduce the Soviet Union’s ability to inflict countervalue damage, then the United States can afford to have its ability to inflict countervalue damage in retaliation reduced. Moreover, improvements in Soviet defenses which reduce the damage the United States could inflict on the Soviet Union could be compensated for by improvements in U.S. defenses. The assured destruction requirement, on the other hand, demands that improvements in Soviet defenses be offset either by an increase in the size of the U.S. offense or by an increase in the ability of the offense to penetrate the Soviet defense.

CRISIS STABILITY: WHAT WOULD BE THE EFFECT OF DEFENSES?
There is a common belief that defenses capable of eliminating an adversary’s assured destruction capability would decrease crisis stability: a country that can protect itself (that is, a country that can deny its adversary a second strike annihilation capability) is more likely to strike preemptively in a crisis. This belief is incorrect. The following analysis explores this proposition and identifies the conditions under which it is correct.

Crisis stability depends upon the decision-maker’s incentives to strike preemptively in a crisis, that is, during times when there is reason to believe one’s adversary is likely to launch a first strike. The decision to preempt in a crisis would depend upon how the costs of being struck first compare to the costs of being struck second. If the adversary has an assured destruction capability, then there would be little if any incentive for a rational decision-maker to preempt: a preemptive attack could not deny the adversary an annihilating retaliatory capability, so there would be little difference between

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the costs of being struck first and second. In an assured destruction situation, the vulnerability of the adversary’s forces does not create a preemptive incentive. The adversary’s force is sufficiently large and survivable that the fraction of the force that would survive a counterforce attack would still be able to inflict the damage required for annihilation.

For the same reason, the adversary would have little incentive to preempt if one’s own surviving force would be sufficiently large to annihilate the adversary. Since a leader’s decision to preempt would be fueled by anticipation of the adversary’s preemption, possession of an assured destruction capability by either country should be sufficient to create a highly crisis-stable nuclear situation.

If one’s own defense eliminates the adversary’s assured destruction capability and if the adversary’s retaliatory capability is partially vulnerable, then preemption would reduce the damage from an all-out countervalue attack. As a result, if the decision-maker anticipates a countervalue first strike, then there would be an incentive to preempt.\(^\text{20}\) Since without defenses there would be virtually no incentive to preempt (because the adversary could maintain his assured destruction capability), deploying defenses that eliminate assured destruction capabilities would decrease crisis stability.

But there is another important case, the one in which the adversary’s retaliatory capability is invulnerable to a first strike. In this case, there is nothing to be gained by striking first because the magnitude of the adversary’s retaliatory strike would be no less than if he had struck first—that is, the costs to one’s own country of suffering an all-out countervalue first strike or second strike would be equal. So, because the adversary’s forces were invulnerable, there would be no incentive to preempt. This would be true when defense had not been deployed, even if the adversary’s ability to inflict countervalue damage were far below the annihilation level. Deploying defenses would reduce the adversary’s ability to inflict damage, but would not

\(^{20}\) The assumption that decision-makers would anticipate a countervalue strike is implicit in many discussions of crisis stability. It underlies the logic that says if a counterforce attack could reduce the adversary’s countervalue potential, then there will be an incentive to strike first. A crisis, however, should provoke fears of a counterforce attack. If we assume the adversary’s first strike would be counterforce, then the nuclear situation is far more crisis-stable than if we assume the attack would be countervalue. For a good discussion of this argument see Snyder, Deterrence and Defense, pp. 104–109. If we assume that both countries anticipate counterforce first strikes, then the effect of defenses on crisis stability is likely to be minimal. Given this assumption, the incentives to preempt would be small, or nonexistent, with or without defenses.
create an incentive to preempt. This example shows, at least in principle, that defenses that reduce the adversary’s retaliatory capability below the annihilation level would not always decrease crisis stability.

The practical significance of this observation should not be overestimated. An invulnerable retaliatory capability requires not only that the forces be invulnerable, but also that attacks against the command and control system would not reduce the size of the possible retaliatory attack. These conditions might not be achievable. Submarines in port are vulnerable to attack and much of the command system is now highly vulnerable. The combination of one’s effective defenses with the adversary’s offensive force vulnerabilities would result in an incentive to preempt. Consequently, while in theory defenses that eliminated assured destruction capabilities need not decrease crisis stability, in practice they probably would.

The fundamental insight we can draw from this discussion is that defenses do not by themselves create incentives for preemption. The source of preemptive incentives is offensive force vulnerabilities. Therefore, the effect of defenses on crisis stability should not be evaluated without considering the vulnerabilities of the offensive force to a counterforce attack. By reducing retaliatory capabilities, defenses can increase the significance of offensive vulnerabilities.

Because reducing the degree of offensive force vulnerability would enhance crisis stability, one way to offset the decrease in crisis stability that would result from deploying effective defenses would be to accompany the deployment with programs to reduce offensive force vulnerabilities. One approach for reducing force vulnerability is to protect offensive forces with active defenses. Area defenses, although not designed specifically for this mission, could increase force survivability. In addition, there are many other ways to increase force survivability, including deploying point defenses. If effective area defense were feasible, then defenses that could provide a high degree of force survivability, including survivability of command and control, would also be feasible. In this case, the reduction in crisis stability that would result from deploying effective defenses could be small.

In summary, effective defenses would be likely to decrease crisis stability. It would probably be possible, however, to keep this negative effect of defenses quite small. The source of preemptive incentive is offensive force vulnerability. Therefore, if offensive forces could be made highly survivable, then the effect on crisis stability of defenses that eliminate assured destruction capabilities would be small.
ROBUSTNESS: THE PRIMARY INADEQUACY OF DEFENSIVE SITUATIONS

We do not live in a static world. Consequently, in addition to evaluating U.S. security as if U.S. and Soviet forces could be held constant, we must also examine the effect of possible changes in Soviet forces on U.S. security and the probability of these changes. More specifically, we must evaluate not only the United States’ ability to deter premeditated Soviet attack and the degree of crisis stability, but also the probability of changes in Soviet forces that could reduce the United States’ ability to deter premeditated attacks or that could reduce crisis stability. The robustness of U.S. forces is a measure of the difficulty the Soviet Union would encounter in trying to reduce U.S. security.21

All other things being equal, the more easily U.S. security could be jeopardized by changes in Soviet forces, the less desirable the nuclear situation. A nuclear situation which would be highly desirable when the two countries’ forces could be held fixed, but which lacks robustness, might not be preferable to one which is less desirable when the forces are held fixed, but which is more robust.

I have already discussed the lack of robustness of nuclear situations in which perfect defenses have been deployed. This section extends that analysis by considering cases in which imperfect defenses have been deployed. The conclusion remains the same: nuclear situations in which defenses significantly reduce the vulnerability of value targets would lack robustness.

The following discussion compares the difficulty the Soviet Union would have undermining U.S. deterrence of premeditated attacks in defensive and

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21. Arms race stability is the standard measure of this characteristic of the nuclear situation. I have chosen to use the term "robustness" to avoid the confusion that surrounds the term "arms race stability." Arms race stability brings to mind at least two issues which are related to robustness, but which are conceptually distinct. First, arms race stability is often considered an indicator of the likelihood and/or intensity of arms races that will occur in a specific nuclear situation. Arms races, however, can occur for a variety of reasons which are only peripherally related to the effect of building nuclear forces on the adversary's security. Consequently, arms races can occur in highly robust nuclear situations, as has occurred in our current highly redundant and diversified assured destruction situation.

Second, use of the term "arms race stability" can connote a belief that arms races cause wars. Whether arms races actually cause wars is a theoretical issue on which there is substantial disagreement. But one can assert that the probability of war depends upon the robustness of the nuclear situation without believing that, in general, arms races cause wars. Robustness is a measure of how sensitive a country's security would be to the adversary's buildup of forces. It does not imply that the process of competitive armament itself leads to war. Rather, assuming a force buildup takes place either competitively or unilaterally, a war is more likely when the initial nuclear situation is less robust.
in assured destruction situations. It assumes that the requirement for deterrence of premeditated attacks, that is, the equal countervalue requirement, is satisfied in the initial nuclear situation. The United States’ deterrence of premeditated attacks could be undermined by two types of changes: improvements in Soviet defenses that reduce the United States’ ability to retaliate, and improvements in the penetration capability of Soviet offenses that increase the vulnerability of U.S. value targets to attack.

The robustness of U.S. nuclear forces to these changes depends upon two interdependent factors. The first is the magnitude of the change in potential countervalue damage required so that the Soviet Union would no longer be deterred from launching a premeditated attack. Specifically, how much must the Soviet Union reduce the U.S. countervalue threat to gain a strategic advantage? or how large an increase in Soviet countervalue capability is required to provide a significant advantage? The second factor is the technical difficulty of changing the threat to value targets by this amount. For example, assuming that in a specific nuclear situation the Soviet Union, to gain an advantage, must increase its countervalue capability by 50 warheads, how difficult would it be for the Soviet Union to achieve this change? The combination of these two factors determines the overall difficulty of acquiring a strategic advantage.

The discussion of perfect defenses focused on the first factor, the magnitude of the change, and argued that even small changes could have strategic significance. Situations in which imperfect defenses had been deployed would suffer, although less severely, from the same sensitivity. The following example illustrates this observation. Imagine three nuclear situations, one in which both superpowers have impenetrable defenses, one in which each superpower can penetrate the other’s defense with ten warheads, and one in which both superpowers have assured destruction capabilities. Now consider how a change in one country’s nuclear force that enabled it to penetrate the adversary’s defense with ten additional warheads would affect the adversary’s security in each situation. The addition of ten warheads of countervalue capability to one country’s force would be less significant when added to the nuclear situation in which both countries started with ten penetrating warheads than when added to a situation in which both countries had perfect defenses. The advantage in countervalue capability would be harder to use coercively when the adversary would be able to threaten retaliation against one’s own value targets.

In contrast, the addition of ten penetrating warheads to one force when both countries had assured destruction capabilities comprised of thousands
of warheads would be far less significant than when added to the nuclear situation in which both countries had ten penetrating warheads. The addition to the mutual assured destruction situation might not even change the country's ability to inflict damage; the addition in the ten warhead situation, while it might be difficult to use coercively, could result in a significant difference in the two countries' ability to inflict damage.

The general conclusion to be drawn from this specific example is that the lower the vulnerability of value targets in a given nuclear situation, the smaller the change in their vulnerability required to gain an advantage. This conclusion can be restated specifically in terms of defenses: the smaller the number of warheads that could penetrate a country's defense, the more sensitive that country's security would be to offensive changes that reduce the effectiveness of its defense.

The second factor affecting robustness, the technical difficulty of changing countervalue capability to gain an advantage, depends upon the type, size, and number of changes required to achieve a strategic advantage. The type of change is determined by whether the status quo is an assured destruction situation or a defensive situation. In assured destruction situations, it is the difficulty of reducing the adversary's offensive threat that affects robustness. In defensive situations, on the other hand, both the difficulty of further reducing the adversary's offensive threat and the difficulty of penetrating the adversary's defense would affect robustness.

Assessing the relative difficulty of penetrating a specific defensive system with an offensive system or of defeating a specific offensive system with a defensive system is beyond the scope of this paper. Moreover, such an assessment would necessarily be highly speculative because effective defensive systems have not yet been developed. Consequently, it is impossible to compare the difficulty of defeating those defensive systems with the difficulty of developing defensive systems to defeat today's offenses or the offenses of the future. One fact that bears upon this issue should, however, be mentioned. Even if defenses were developed that were perfect against currently deployed offenses, experts believe that the task of developing offensive countermeasures to defeat those defenses would be relatively easy. The defensive system would be understood by its adversary, enabling the development of countermeasures designed specifically with the defense in mind. The defense, by contrast, to remain effective, would have to be able to

overcome the full range of possible countermeasures. This asymmetry means that defenses may always be at a disadvantage, that is, the development of effective defenses against a competitive threat may always be more difficult than developing offenses that can penetrate defenses.

The size of the change required to gain a strategic advantage affects the technical difficulty of achieving the change. (This is why the two factors affecting robustness are interdependent.) A defense which must reduce the offensive threat by a large amount is harder to build than one that must reduce the same offensive threat by a small amount. Similarly, a new offensive system which must be able to penetrate the adversary’s defense with many weapons would be harder to build than one that had to penetrate the same defense with only a few weapons. Even taking into account the likely asymmetry between offense and defense mentioned above, it is not possible to say with certainty whether the changes required to gain an advantage in an assured destruction situation would be easier or harder to achieve than in a defensive situation. As discussed above, however, the size of the requisite change in assured destruction situations is larger than in defensive situations. Due to this difference, gaining an advantage will tend to be more difficult in assured destruction situations than in defensive situations.

The larger the number of changes in a country’s forces required to gain an advantage, all else being equal, the harder the advantage will be to obtain. The number of force changes required to achieve an advantage depends upon the diversity of the adversary’s forces. In assured destruction situations, ensuring one’s ability to destroy large numbers of the adversary’s value targets is the strategic requirement. Diversification of one’s offensive force helps to ensure the continuing achievement of this objective by increasing the number of defensive changes that are required before the adversary could eliminate one’s assured destruction capability. For example, an offensive force which could annihilate the adversary with either an air-breathing threat or a ballistic missile threat requires that the adversary develop two types of highly effective defense. Obviously, this is a harder task than developing an effective defense against a single threat.

This article has discussed defenses in general, not defenses against specific types of offensive threats. But when we think about the feasibility of defense, it is crucial to keep in mind the potential diversity of offensive threats. If BMD were technologically feasible, but defense against advanced technology bombers or cruise missiles were impossible, then the strategic significance of the BMD would be greatly reduced. The technological feasibility of defenses
that would reduce vulnerability to attack is determined by the difficulty of defending against all offensive threats.

By contrast, in a nuclear situation in which one’s own defenses have significantly reduced the vulnerability of value targets, the strategic requirement is the maintenance of a low level of vulnerability. In this case the adversary’s ability to diversify offensive forces makes maintaining low vulnerability more difficult. Each of these offensive threats must be defended against, and the adversary’s ability to defeat any of the defenses would be sufficient to make maintenance of low vulnerability impossible.

To make defensive situations more resistant to the adversary’s offensive improvements, a country could diversify its defenses against each offensive threat. It would be more difficult, however, to diversify one’s defenses to require the same number of force changes as in an assured destruction situation. Because the number of required offensive changes would be determined by the offense against which the defense was the least diversified, it would be necessary to diversify one’s defenses against each of the adversary’s offenses. So, for example, if the adversary had two offenses with different penetration modes, then to force him to have to make two changes would require a total of four defenses. By comparison, in an assured destruction situation, two offenses are sufficient to require the adversary to make two changes, that is, to deploy two effective defenses. Consequently, the relative difficulty of diversification would tend to make it more difficult to make a defensive situation resistant to the adversary’s offensive changes than to make an assured destruction situation resistant to the adversary’s defensive changes. For what could be termed “structural” reasons, defensive situations could not be made as resistant to change as assured destruction situations. In addition, a defensive situation which is not diversified is susceptible to catastrophic failure, because one offensive breakthrough by the adversary could render one’s country vulnerable to large attacks.

To summarize, nuclear situations in which defense significantly reduces the vulnerability of value targets would lack robustness for two reasons: relatively small changes in vulnerability could threaten one’s security; and the difficulty of achieving these changes would be relatively low due to the small change required and to the greater difficulty of making defensive situations resistant to offensive changes.

A lack of robustness would not be so dangerous if the United States and the Soviet Union would not have incentives to try to change the equal countervalue condition of the nuclear situation. If a political environment
could be created in which the superpowers chose not to attempt to gain a strategic advantage, then the need to make the nuclear situation resistant to change would be reduced. Moreover, superpower cooperation in structuring the nuclear situation could contribute to the situation’s robustness. But, in a world of imperfect defenses, as described for the case of perfect defense, countries would feel tremendous pressure to pursue, or at least to prepare to pursue, capabilities for defeating the adversary’s defense. Even in the unlikely event that a highly robust situation could be achieved (which would require making one’s defense highly resistant to the adversary’s offensive innovations), it would be hard to have high confidence in this robustness: a country could not know with certainty that offensive threats that would undermine the defense could not be developed. This uncertainty could not be overlooked because the change required to gain an advantage would still be small and the adversary’s incentive to try to alter the nuclear situation would be obvious.

These conditions would make establishing a political environment in which cooperation was possible far harder under conditions of reduced vulnerability than under assured destruction. And, given our limited success in negotiating strategic arms control treaties when both countries have redundant assured destruction capabilities, there is little reason to be optimistic about the prospects for cooperation.

In conclusion, situations in which defenses have eliminated countries’ large retaliatory capabilities would suffer a lack of robustness. The danger of this condition would be increased by the incentives and pressures that both the United States and the Soviet Union would feel not to cooperate and to increase the other’s vulnerability.

Could Defense Create a Preferable Nuclear Situation?

The preceding discussion of imperfect defenses capable of eliminating both superpowers’ assured destruction capabilities compared the probability of nuclear war in defensive and assured destruction situations. Specifically, it compared the United States’ ability to deter Soviet premeditated attack, the

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crisis stability, and the robustness of defensive and assured destruction situations. This analysis of the probability of nuclear war is, however, not by itself sufficient to determine in which type of nuclear situation the United States would be more secure. This is because U.S. security depends upon the cost if war were to occur, as well as the probability of war.

Comparison of nuclear situations requires a measure that combines these U.S. security objectives, that is, to minimize the probability of war and to minimize the costs if war occurs. These objectives should be evaluated simultaneously. For example, if a change in the nuclear situation would reduce the damage of a nuclear attack but would also increase the probability of the attack, then the change might not increase U.S. security. Examining only the probability of war or the costs if war were to occur is insufficient to understand the net effect of the change. The correct measure of security is the probability of the war multiplied by the costs if there were a war, which is the expected cost.

It is crucial to keep these two aspects of U.S. security in mind when analyzing defenses. Much of the debate over BMD tends to ignore the need for simultaneous evaluation. Proponents of defenses emphasize the reductions in damage that defenses could provide. Opponents of BMD argued during the 1960s that deployment would increase the probability of nuclear war by undermining deterrence and decreasing crisis stability. Neither of these arguments is sufficient to draw a conclusion about area defenses: each looks at only one aspect of U.S. security.

A complete analysis of the expected costs in a specific nuclear situation would describe the full spectrum of wars in which the United States might become involved, would evaluate the probability that they would occur, and would estimate the damage that would result if they did occur. This spectrum of wars would include conventional wars and limited nuclear wars in addition to all-out premeditated and preemptive wars. The preceding sections of this article do not focus on conventional and limited nuclear wars. However, the analysis is sufficient to draw the fundamental conclusion about nuclear

25. This formulation of objectives assumes that the United States is a strictly status quo power. This may not be entirely accurate, but is a reasonable assumption for this discussion of nuclear weapons policy. A further concern about this formulation is that it does not include the objective of minimizing losses that could result from nuclear coercion. While this is clearly an objective of U.S. policy, the nuclear capabilities required to achieve it closely resemble those required to minimize the probability of nuclear war. Consequently, not explicitly including this objective does not bias the analysis.

26. For a more complete analysis see Glaser, “The Implications of Reduced Vulnerability for Security in the Nuclear Age.”
situations in which effective defenses have been deployed: the probability of nuclear war would be higher in these situations than assured destruction situations, but the costs of certain types of nuclear wars would be lower. Therefore deciding whether these defensive situations are preferable to assured destruction situations requires making a trade-off. This trade-off is highly subjective. Analysts are likely to disagree about the level at which reducing the size of the adversary's potential attack begins to make a significant difference, about the relative probability of different types of nuclear war, and about how to balance a believed increase in the probability of war against a decrease in its potential costs. Because individuals will make these judgments differently, defensive situations cannot be said, in general, to be inferior or superior to assured destruction situations.

Before clarifying how the preceding analysis leads to this conclusion, I want to pause for a moment to stress its significance. Saying that defenses are neither clearly desirable nor clearly undesirable might appear to provide little policy insight. However, although indeterminate, this conclusion differs markedly from the conventional wisdom that effective defenses would be desirable, and weighs heavily against deploying defense to limit U.S. vulnerability to attack. Recall that the analysis has considered a best case for defense. Even making these optimistic assumptions, a defensive situation might not be preferable to our current assured destruction situation. More realistic, less optimistic assumptions about defenses result in nuclear situations which would be more dangerous than today's. Advocates of strategic defense are driven by the promise of a world far safer than the current one. If defenses could create such a world, then taking a chance on ending up in one of the more dangerous, and more likely, defensive situations might be justified. But to run great risks and to spend enormous resources in the hope of reaching a nuclear situation that might not be preferable to our current assured destruction situation, and might be worse, make little sense.

The remainder of this section explains how this conclusion follows from the preceding analysis. The analysis first identified three factors that influence the probability that the U.S. will be able to avoid nuclear war with the Soviet Union: 1) the U.S. ability to deter premeditated attacks; 2) the crisis stability of the nuclear situation; and 3) the robustness of the nuclear situation. I then evaluated how the deployment by both superpowers of effective defenses, that is, defenses sufficiently capable to deny the adversary an assured destruction capability, would affect these factors. The findings of this evaluation are:
1) Effective defenses need not undermine deterrence of premeditated attacks. Assured destruction is not necessary for deterrence; an equal countervalue capability (i.e., the possession of a countervalue capability equal to the Soviets’ both before and after a Soviet counterforce attack) is sufficient for deterrence of premeditated attacks. The equal countervalue requirement could be satisfied when defenses of any level of effectiveness had been deployed and at all levels of vulnerability of value targets to attack.

2) Crisis stability would be likely to decrease if assured destruction capabilities were eliminated by defense. It might, however, be possible to keep this negative effect of defense quite small. At least in principle, a defensive situation could be made as crisis-stable as an assured destruction situation by deploying invulnerable retaliatory capabilities. While making one’s retaliatory capability entirely invulnerable might not be possible, achieving a high level of invulnerability might be possible.

3) The Achilles heel of defensive situations is the tremendous difficulty of maintaining them. Defensive situations, unlike assured destruction situations, would be likely to lack robustness. This means that changes in the adversary’s forces that could undermine deterrence of premeditated attack and create incentives for preemptive and preventive attack would be far more likely in defensive situations. The lack of robustness would likely result in tense superpower relations, making security cooperation extremely difficult. Due to the difficulty of creating robust defensive situations, the probability of nuclear war would be higher than in assured destruction situations.

Overall, then, this evaluation concludes that the probability of nuclear war in defensive situations would be higher than in assured destruction situations. This increase in the probability would not be due primarily to a decrease in the United States’ ability to deter premeditated attacks or to maintain crisis stability; if the superpowers could not change their forces, then there might be defensive nuclear situations in which these wars would not be more likely than in assured destruction situations. This constraint, however, is unrealistic. The superpowers would be able to alter the status quo, that is, to change the offensive and defensive forces which are deployed at a given time. Due to the lack of robustness in defensive situations, this competitive armament would be more likely to result in a nuclear war in defensive situations than in assured destruction situations.

So, if security depended only on the probability of nuclear war, then defenses would unambiguously decrease security. But security depends also on the damage that would result if there were a war. Because defenses would
decrease the damage of certain wars, they would thus have some positive effects as well as negative ones.

To illustrate this in greater detail, I will examine briefly each path to nuclear war. Consider first a nuclear situation in which effective defenses have been deployed, the equal countervalue requirement is satisfied, and assume this situation characterized by offensive and defensive forces of a given size and capability is maintained, that is, neither country builds forces that increase its countervalue capability. Deterrence could fail even when the equal countervalue requirement was satisfied: this is true today when the assured destruction requirement is satisfied, and it would be true in a defensive situation in which the equal countervalue requirement was satisfied. The damage in an all-out countervalue war, however, would be lower in the nuclear situation with defenses. Since the probability of premeditated nuclear war might not be greater in the defensive situation, the expected costs along this path to nuclear war would be lower than in an assured destruction situation.

In this defensive situation, the damage from a preemptive attack would be lower than in an assured destruction situation. The probability of preemptive war, and therefore the expected costs of a preemptive attack, would depend upon the situation’s crisis stability. If the defensive situation were less crisis-stable than an assured destruction situation, then the probability of preemptive attack would be higher. In this case, the defensive situation would have a higher probability of preemptive attack and lower costs if the preemptive attack were to occur. Therefore the comparison of expected costs from preemptive attack in defensive and assured destruction situations would be indeterminate. If, on the other hand, the defensive situation were as crisis-stable as the assured destruction situation (which is possible if the retaliatory capability is invulnerable), then the expected cost along the preemptive path would be lower than in an assured destruction situation.

Now consider the case in which we drop the constraint that the status quo defensive situation would be maintained, that is, we include the possibility that countries might deploy forces that increase the adversary’s vulnerability or decrease their own. Unlike the preceding case, in this case the damage in defensive situations might not be lower than in assured destruction situations. The changes in the countries’ forces might return the defensive situation to an assured destruction situation. The potential damage would not be determined by the status quo forces. If a country could build its way out of the defensive situation (i.e., regain its assured destruction capability), then
the damage to the adversary could be the same as in a mutual assured destruction situation. The expected costs of nuclear wars resulting from changes in the status quo could be greater in defensive situations than in assured destruction situations: the damage in defensive situations is not constrained by the status quo forces and might not be lower than in assured destruction situations; and, due to the lack of robustness in defensive situations, the probability of nuclear war along this path is higher.

In summary, defenses could reduce the damage that could occur in certain types of wars. This positive effect would, however, tend to be offset by the increased probability of wars resulting from the lack of robustness of defensive situations. The net result, therefore, of both superpowers’ deploying effective defenses might not be to increase U.S. security.

As I stressed above, this indeterminancy is extremely significant. It undermines the commonly held belief that defensive situations, and so-called defense-dominance, would be preferable to assured destruction situations. Even after making the best case for defenses (that is, ignoring questions of technical and economic feasibility, the effect on the probability of superpower conventional wars, and a number of other issues discussed briefly at the end of this article), assured destruction nuclear situations might be preferable to those in which defenses drastically reduce the superpowers’ vulnerability to nuclear attack.27

The implications of this conclusion for U.S. policy are obvious, and profound. Whether the United States could be more secure in a world of highly effective defenses should no longer be viewed primarily as a technological issue. The United States should examine more completely the strategic and political issues associated with defense against nuclear attack before making a decision to pursue such a fundamental change in nuclear strategy. Given the reservations about deploying defenses raised by the preceding analysis, the recent enthusiasm for BMD must be judged imprudent.

Additional Problems with Strategic Defense

This examination of strategic defense has analyzed a best case for defense. Effective defense was hypothesized to be technologically and economically

27. The transition to a defensive situation deserves extensive analysis that is beyond the scope of this paper. The preceding analysis can, however, be used to analyze U.S. security during a symmetric transition. A symmetric transition would likely be the safest possible transition.
feasible. Even with these highly controversial assumptions, the decision to pursue the deployment of defense and to make the associated fundamental shift in nuclear strategy is found to have serious shortcomings. The case for effective defense and for starting to deploy defenses in the foreseeable future is further weakened by a number of factors:

1) Uncertainty. The effectiveness of U.S. defenses would be uncertain and small uncertainties would be highly significant. In addition to the uncertainties inherent in the operations of complex systems, the effectiveness of defenses would be uncertain due to the severe limits on testing. The defense could not be tested against a full scale attack or against Soviet offenses. And while estimates could be made of effectiveness against deployed Soviet offenses, there would always be reasonable questions about Soviet penetration aids that could be quickly added to their offensive force.

Small uncertainties would be significant because, with the large offensive forces which are currently deployed, a small difference in the percentage of penetrating weapons would translate into a large difference in destructive potential. The uncertainties involved with a defense which was in fact perfect would be likely to be large enough to leave the United States unsure about whether it was vulnerable to an annihilating attack by the Soviet Union.

The effect of uncertainty would affect U.S. policy in a number of ways. The United States would never feel adequately defended. (Nor would the Soviet Union.) Even without uncertainties, there would always be arguments that the United States needed additional defense to improve its protection against Soviet attacks and as a hedge against Soviet offensive breakthroughs. The strength of these arguments would be greater than those made about

Therefore, because a transition would probably not be symmetric, the significance of the symmetric transition should not be overestimated. However, because the transition to a defense situation is generally believed to be very dangerous, it is interesting to briefly consider this best case.

Security in transition states would be determined by the same factors as in the defensive situations already studied. Applying the conclusions of the analysis of defensive situations to the transition, we find: 1) Premeditated attacks could be deterred equally well throughout the transition; 2) Crisis stability might not decrease during the transition; and 3) Robustness would decrease during the transition. It follows that the probability of nuclear war in the final state of the transition is likely to be greater than in any of the transition states.

The analysis of defensive situations presented in this article turns the conventional wisdom about strategic defenses on its head. It finds that the desirability of effective defenses, which is usually taken for granted, is at best highly questionable; and that the probability of war during a symmetric transition, which is usually believed to be high, could be lower than in the final defensive state.
the inadequacy of today's offensive forces since defensive capability would start to become redundant only once the defenses were perfect. The existence of uncertainties would be likely to result in unrelenting requests for additional defenses, yet fulfilling these requests would yield little satisfaction and add little to the public's sense of security.

A second effect of uncertainty would be the creation of fears that the Soviet Union had a superior defensive capability. Prudent military analysis could require assessing uncertainties in favor of Soviet defense and against U.S. defense. As a result, if the United States and the Soviet Union had comparable defensive capabilities, U.S. defenses would not provide confidence that the United States was maintaining a strategic nuclear balance and would likely be judged inferior. This conclusion would contribute to the demands for improving defensive capabilities.

2) Allies. Any comprehensive analysis of defensive situations must consider the reaction of U.S. allies and the implications for their security.\textsuperscript{28} One issue of great importance to them has already been raised, that is, the effect of defenses on the probability of conventional war. If strategic defense were believed to increase the probability of conventional war, then tremendous resistance from the European allies should be anticipated. Conventional wars in Europe are expected to be so costly that they are barely less unacceptable than are nuclear wars to many Europeans. A second concern would focus on the vulnerability of allies to nuclear attack. A policy that drastically reduces the United States' vulnerability to nuclear attack while leaving its European and other allies highly vulnerable cannot look good from their perspective. A third concern would be the effect of defenses on the independent deterrent capabilities of the French and British. A highly effective but imperfect Soviet defense would leave the United States with a modest retaliatory capability, but would probably eliminate the value of these independent European deterrents.

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3) Suitcase bombs. The ability to defend effectively against ballistic missiles, cruise missiles, and bombers could greatly increase the importance of clandestinely delivered nuclear weapons. Nuclear bombs could be placed on Soviet ships and commercial airplanes, or could be carried into the United States by Soviet agents. These alternative types of delivery are possible today,

\textsuperscript{28} For a discussion of the likely alliance reaction to extensive U.S. homeland defense, see David S. Yost, "Ballistic Missile Defense and the Atlantic Alliance," \textit{International Security}, Vol. 7, No. 2 (Fall 1982), pp. 154–158.
but are not of great importance due to the Soviets’ large ballistic missile and air-breathing threats.

These alternative forms of delivery would not necessarily render defense useless: the Soviet ability to deliver clandestinely weapons in a crisis might be severely limited; hiding weapons before a crisis would be risky unless early detection would be impossible; and the damage from clandestine attacks might be less extensive than is currently possible without defenses. Still, the observation that defense against the delivery systems which are most important today would not eliminate vulnerability to nuclear attack raises basic issues about strategic defense: What threats must the United States be able to defend against? How would a “partial defense,” that is, a defense against standard delivery systems, affect the nuclear threat? How would highly effective or perfect defense against standard delivery systems affect the political and military uses of nuclear weapons?

Conclusion

Strategic defense and the prospect of being invulnerable to nuclear attack have undeniable appeal. But there is no excuse for being romantic or unrealistic about the nature of a world in which the superpowers have built tens of thousands of nuclear weapons and sophisticated delivery systems, and in which the knowledge about these technologies cannot be destroyed. Strategic defense cannot return us to a pre-nuclear world. Defensive situations have not been studied as carefully or extensively as assured destruction situations. There is, however, no reason to believe defensive situations would be either less complex or easier to manage than assured destruction situations.

The best of worlds in which both superpowers have effective defense would not be so good and might not be preferable to today’s redundant assured destruction situation: in all but the case of perfect defense, the U.S. would still depend upon deterrence for its security; the lack of robustness in defensive situations would make them sensitive to small changes in forces and would create strong incentives to pursue threatening improvements in offensive forces; the acquisition of these forces would increase the probability of nuclear war; the probability of large conventional wars between the superpowers and their allies might well increase; and, the threat posed by clandestinely delivered nuclear weapons would be much more significant than today.
Any serious policy for deploying defenses must address the dangers that would result from the difficulty of maintaining the defensive situation. This article has argued that no defensive situation could be highly robust. The most robust defensive situations will require superpower cooperation. This brings to the forefront the issue of U.S.–Soviet relations in a defensive world. Recent statements by the President have suggested that effective defenses would eliminate the need for offensive weapons.29 This outcome is not impossible, but is extremely unlikely. A more realistic assessment is that deploying defenses would lead to an intense offensive and defensive nuclear weapons competition between the superpowers and to tense, strained relations. We should expect that arms control agreements to limit or reduce offensive nuclear forces would be difficult, if not impossible, to negotiate. Careful thought should be given to whether, in a defensive situation, a cooperative relationship between the superpowers would be possible, and to whether the pressures for confrontation could be kept low. If these would not be possible, and I believe they would not be, then the prospects for improving security by shifting to a world of effective defenses must be judged to be especially gloomy.

The United States appears to be at the beginning of a major shift in nuclear weapons policy. There is no evidence that the decision to pursue highly effective defense was based upon a complete analysis of defensive situations. Unfortunately, a world in which both superpowers deployed effective defense is far less attractive than its proponents suggest: even after making the most optimistic assumptions, defensive situations might not be more secure than assured destruction situations; and the more likely outcomes of deploying BMD would place the U.S. in a situation far less secure than today’s. Until a convincing argument is presented for this fundamental change in U.S. nuclear weapons policy, the United States should cut back severely on its enthusiasm and funding for strategic defense, attempt to repair the damage that is likely to have occurred in Soviet understanding of U.S. nuclear weapons policy, and pursue with renewed determination a prudent policy of offensive weapons acquisition and arms control.