Evolution in Strategic Forces and Doctrine

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ABSTRACT

The era of deterrence through the threat of retaliation is ending. Strategic defense opens new options for deep reductions without loss of stability, which could be a guide for shifting from the residual forces from the offensive era into those appropriate for a multipolar world. There are strong arguments for retiring missiles under the cover of missile defenses and returning to fewer but more capable aircraft for strategic roles. Developing the technologies for theater and strategic defenses could largely eliminate the incentive for the development of missiles by the third world and shift their efforts into more stabilizing areas.

I. INTRODUCTION

This paper covers topics in strategic forces and doctrine, using crisis stability as a guide. Although the collapse of the Soviet empire has reduced the urgency of such discussions, there are several reasons for a review now. The first is the legacy of the last few decades. The evil men do lives after them; that is apparently also true of empires. The Soviet Union has been

buried, but the weapons it built, arguably its highest achievement, live on in the hands of its ex-republics.

The second is that the competition in weapons has spread nuclear technology worldwide. We have sown the wind and shall reap the whirlwind. Thus, the defenses developed to offset Soviet weapons may be needed to address a dozen or more third-world threats in the next few decades.

The third is that crisis stability can help shape the transition from the residual forces of that bilateral strategic offensive confrontation to those appropriate for the multipolar balances of the future. There is time, if appropriate steps are taken soon. Otherwise, we may have the opportunity to relearn these lessons in a less promising framework over the next few decades. This is not the place to outline the likely conflicts during the transition, but it is appropriate to recall Alexander Hamilton's assessment that "To presume a want of motives for such contests as an argument against their existence would be to forget that men are ambitious, vindictive and rapacious."[1]

II. CRISIS STABILITY AND STRATEGIC DEFENSE

Strategic defense is the new element in strategic analyses. Without it, the strategic calculus is indeterminate. With it, crisis stability can be increased significantly over that attainable with offensive forces alone.[2] The central results are illustrated in Fig. 1,[3] which shows that apart from 10-15% variations in crisis stability indices at low levels of defenses, boost-phase and preferential defenses both tend to drive crisis stability indices towards unity. Mixes of the two could effect that transition without ever reducing stability.

Such mixes are useful. Boost-phase defenses efficiently attrit threats to levels that downstream defenses can address preferentially, allowing the mix to save a significant fraction of retaliatory forces. Boost-phase defenses alone are too leaky to protect a significant number of retaliatory forces; preferential defenses alone would require very large numbers of interceptors, because they have to intercept individual weapons.

Some care is required in the choice of mixes. It was remarked by President Gorbachev at Reykjavik that the U.S. could not build a shield against a Soviet first strike but might be able to build one good enough to defend against its ragged retaliation. His concern over space-based interceptors was echoed in early analyses that treated only boost-phase defenses.[4] Figure 1 shows that boost-phase defenses do not reduce stability, because they reduce first and second strikes about equally. If anything, small preferential defenses are more of a concern, because they benefit the attacker's first strike more than the defender's second strike. Proper mixes make it no more "costly" to strike second than first, so there is no incentive to strike.

The first element of the Strategic Defense Initiative (SDI) is Global Protection Against Limited Strikes (GPALS), which is under way. Subsequent steps remain to be decided, partly on considerations of stability and arms control, which could still block the combination of elements needed for stability. GPALS levels of defenses would obviously have little impact on the stability of central balances. Theater ground-based interceptors are geographically unable to intercept strategic missiles, so they are strategically transparent.[5] Space-based interceptors for GPALS could also be strategically transparent, given appropriate limits on inclination, autonomy, and control.[6]

Coverage of accidental or unauthorized Russian ICBM launches should be possible with a hundred ground-based interceptors from a single site. Submarine coverage requires a wider range of azimuths and more sites for close-in launches. That could drive interceptor inventories to levels of about a thousand, where ground-based interceptors could present more of a stability problem than space-based interceptors. Thus, the proximate clash between stability and arms control could come from the latter's blanket opposition to space systems.[7]

Missile defenses imply a profound shift. In the future, missiles could be little more than sinks for other missiles' weapons. Non-alert submarines are more difficult to defend than aircraft, and penetrate no better once launched. And because

they depend on wide dispersal for survivability, submarine-launched missiles are attrited more strongly than land-based missiles. Aircraft have preferred properties of defense and penetration, although there are some subtleties about the latter,[8] which largely break along the lines of stealth.[9] Aircraft or cruise missiles that can penetrate on their own are obviously more resilient if missile defenses make missile weapons for aircraft defense suppression scarce.

Mixes of defenses are needed, but there is considerable flexibility in choosing and deploying them. Defenses could be used to support the build down of heavy missiles, offset by offensive reductions, or deployed unilaterally without significantly impacting stability indices.[10] Defenses for theater, accidental, or unauthorized launches could be deployed without significantly impacting stability. Given the demise of the Soviet Union, perhaps the simplest way might be joint development and control of defenses. That could be extended to other partners--possibly even to offensive weapons. However the deployment of defenses is arranged, the era of deterrence through the threat of retaliation appears to be coming to a close.

III. CRISIS STABILITY ISSUES

The comments above are made within the framework of current analysis, which has three parts. The first is the interaction between given offensive and defensive forces in first and second strikes, which is based on analyses that are now reasonably well accepted.[11] The second is the valuation of the US and Soviet military target bases addressed, which has recently been reviewed.[12] The third is the objective function or metric to order each side's preferences for various outcomes, which has also been studied extensively.[13]

The conventional metric is simple to calculate, but has two weaknesses. The first is that it joins each side's competing objectives of defending its own value and retaining the ability to damage the other's value by simply adding them, which is justified primarily on the grounds that it produces results that

are not overly sensitive to the relative weights given to the competing objectives. No one has suggested a better way to combine these two essentially incommensurate objectives.

The second issue is the metric's scaling on offensive forces. When forces are reduced strongly, falling indices indicate serious reductions of stability. That is because performance is measured in terms of damage functions. As the number of offensive weapons is reduced, damage decreases. That helps the damage denial objective, but undercuts that of maintaining the ability to inflict damage on the other, so stability indices decrease. This is a real effect, which is discussed further in the next section.

This reduction in the number of weapons relative to the number of targets could ideally be eliminated by reducing the number of targets along with the number of weapons. But those targets are largely conventional forces, which would retain their utility after strategic forces lost theirs, making combined negotiations difficult.

IV. CRISIS STABILITY AND OFFENSIVE FORCE REDUCTIONS

Strategic forces are large; one does not change them lightly. Figure 2 shows combinations of weapons on missiles and aircraft. After START, the US and the Soviet Union each had about 5,000 weapons on missiles and 4,500 weapons on aircraft. As shown on the down-sloping lines, it would take about 300 weapons to destroy each sides' cities, about 3,000 to destroy all real military targets, and perhaps 5,000 weapons to destroy all industry. Each side now has about 10,000, which is enough to destroy each others' military targets about three times over, or cities about 30 times over. These ratios do not reflect actual targeting; they just size inventories and indicate the overheads involved in offensive deterrence. It might take an inventory of 10,000 weapons to be able to deliver 3,000. Multilateral offensive confrontations could take even more. The first stage of defenses would just reduce these overheads.

Both sides now see the value of reducing these numbers. The traditional way would be to reduce missile and aircraft weapons proportionally through arms control, maintaining all elements of the "triad." Proportional reductions are acceptable down to about 5,000 weapons, perhaps even the 3,000 recently recommended by the National Academy of Sciences, where each side could only destroy the other's military once.

Beyond there, reductions are more difficult. By the time inventories are below a thousand weapons, the conventional metric suggests targeting cities. When one has too few weapons to hold a significant number of the other's military forces at risk, one sees an incentive to shift to higher value targets. The impact can be summarized by the stability indices and expected losses for the transition. Figure 3 shows the stability indices for reductions with and without defenses of a few thousand boost-phase and preferential interceptors. Without defenses, reductions keep the index well below unity because too few weapons are left to cover the targets.[14] With defenses, the stability index rapidly climbs to unity.

This difference can be made more concrete. The crisis stability index of Fig. 3 is related to the probability that no one strikes in a crisis. Figure 4 shows its complement, which is essentially the probability that someone does.[15] Figure 5 shows the expected loss, which is the product of this probability of a strike with the number of weapons delivered on value if a strike occurs.[16] With defenses, the expected loss falls monotonically, reaching zero by the time offensive forces fall about 20%. Without defenses, as the number of weapons falls, the probability of a strike doubles, so the expected loss remains unacceptable all the way down to a few tens of weapons. The area between the two curves on Fig. 5 shows the benefit: the possibility of deep, safe reductions in offensive forces.

Ideally, arms control could also bring about such arms reductions, but so far it has not. Defenses could make arms control more effective. Arms control by itself has been unable to generate reductions in missile inventories; strategic defenses

seem unable to address the undiminished inventories. But a combination of reductions through arms control and improvements in defenses might work. Thus, strategic defenses and arms control are complementary in a way that offensive forces and arms control have never been.[17]

V. MORAL ISSUES

These calculations highlight another aspect of this shift in targeting. As offensive weapons are reduced, there is an incentive to shift to killing people to keep up the total value at risk. But killing or even threatening to kill innocents is immoral,[18] so cities cannot be targeted. Thus, without defenses, it is difficult to get through 300 weapons down to zero.

Figure 6 illustrates the morality of the two reductions discussed above. The current strategy of deterrence through the threat of retaliation was thought to be moral before the Catholic bishops' deliberations; now it is thought to be neutral at best.[19] It seems to be losing ground, but the main issue here is that its morality falls with reductions. Strategic defenses kill only machines and protect those who would otherwise be killed by collateral damage, so the strategic defense curve rises. The combination of missile and air defenses would ultimately threaten no one, which is morally preferable. Thus, crisis stability and morality considerations appear to be consistent throughout the transition. Using defense to cover the retreat from offensive forces is appropriate whether you fear the loss of your pocketbook or your soul.

VI. TIME REVERSAL

The calculations above show that missile defenses move horizontally to the left on Fig. 2 to eliminate the utility of missile weapons. The militaries on both sides should then be willing to eliminate their missiles to save money for something else--like the missile defenses themselves.

The next step is air defenses, which would drop vertically down the left side of the figure. By 300 weapons there would

again be about as many weapons as cities. But "slow-walking" aircraft couldn't arrive in time to kill all of the inhabitants. With warning, some could leave before the aircraft arrived. Protection would not be perfect. For a strike without notice, many might be unable to leave. But in practical situations with hours or days of warning or weeks of strain, enough could escape to make cities unattractive targets. As air defenses got better, it should be possible to get to essentially zero strategic weapons without having gone through any region of instability.

The path through missile and air defenses is essentially the reverse of the path taken since World War II. Bombers made the transition from conventional to nuclear offensive dominance; then missiles replaced the bombers and masked their stability advantages. Missile defenses would roll back missiles and re-expose the advantages of the aircraft. Air defenses could then roll back aircraft and re-expose the advantages of conventional defenses. The resulting forces would be truly strategic, not just ones that carried nuclear weapons. Ideally, it would then be possible to eliminate the missiles, aircraft, and missile and air defenses, which could act as Cheshire cats and disappear at the end of the process. Instead, their residue will probably be about right to address emerging third-world threats of coming decades, which could resemble the strategic threats of the '50s and '60s.

With defenses, additional players could fit in without loss of stability; without defenses, the game becomes more complex and less inviting. Most would prefer that a world of many nuclear nations not emerge, but if it does, it would be best to play on an intrinsically stable field. Unfortunately, it appears that a multipolar nuclear world will emerge. Missiles have obvious value today. The Gulf War demonstrated their value and that of terror weapons to the third world, which is developing that combination enthusiastically. That could lead to a fully multipolar world on a time scale of one to two decades.

If, however, the US and its allies developed and made available the technologies required for theater and strategic

defenses, that could largely eliminate the utility of missiles to the third world and shift their efforts into more stabilizing technologies. Thus, there is particular value in the rapid development of defenses before multilateral offensive alternatives come into being.

There are alternative strategies. The simplest is to maintain current forces and try to maintain stability by preventing change. But in addition to producing a military museum it would lock expected losses in at high levels. Another is a "blue-water" strategy with missiles on submarines only. But the submarine's main advantage is its pre-launch survivability. That was paramount for the bilateral balance with the Soviet Union, but is not necessarily relevant to increasingly important multipolar issues, which are not necessarily subject to deterrence through retaliation. For a multipolar world, defense is needed. Thus, strategic defense and its seeming ability to turn back the clock is the only one of the strategies relevant to the challenges of the future.

VII. SUMMARY AND CONCLUSIONS

The era of deterrence through the threat of retaliation is ending. Crisis stability could be a guide for how to get from the residual forces from the offensive era into those appropriate for a multipolar world. Strategic defense opens new options for deep reductions without loss of stability. Mixes of defenses are needed, but there is considerable flexibility in choosing and deploying them. There are strong arguments for retiring land- and submarine-based missiles under the cover of missile defenses. Fewer but more capable strategic aircraft that could penetrate defenses by themselves would be desirable for both strategic and tactical applications.

Both sides now see the value of reducing weapon inventories, but reductions without defenses tend towards the targeting of cities. A combination of missile and air defenses could avoid such instabilities. The residual defenses would be roughly the size needed to deal with uncertainties and third-world threats.

With defenses, additional players could fit in naturally without loss of stability; crisis stability and moral considerations are consistent throughout. Developing and making available the technologies for theater and strategic defenses could largely eliminate the incentive for the development of missiles by the third world and shift their efforts into more stabilizing areas.

In the sixteenth century, the Japanese gave up the gun after having made and used it for several decades. They did so for practical reasons: guns were killing too many Samurai and erasing the barriers between warriors and peasants. They went back to the sword, and stayed with it for another 250 years.[20]

There are now practical reasons to give up the missile, which threatens to eliminate the modern warrior and peasant alike. The means to do so are at hand. Missile defense and arms control could now eliminate the missile's utility. That would return us to the aircraft, whose stability characteristics are preferred. Then air defenses could gradually reduce their strategic nuclear role as well, leaving a conventional capability that could easily be integrated with tactical forces.

The combination of elements exist to start that transition. Doing so would give the rest of the world an incentive to do likewise. Failing to do so would give the emerging multipolar world an incentive to work towards the forces we now wish to escape, which could cause us to face those weapons in the hands of a number of "ambitious, vindictive, and rapacious" men on the time scale of a few decades.

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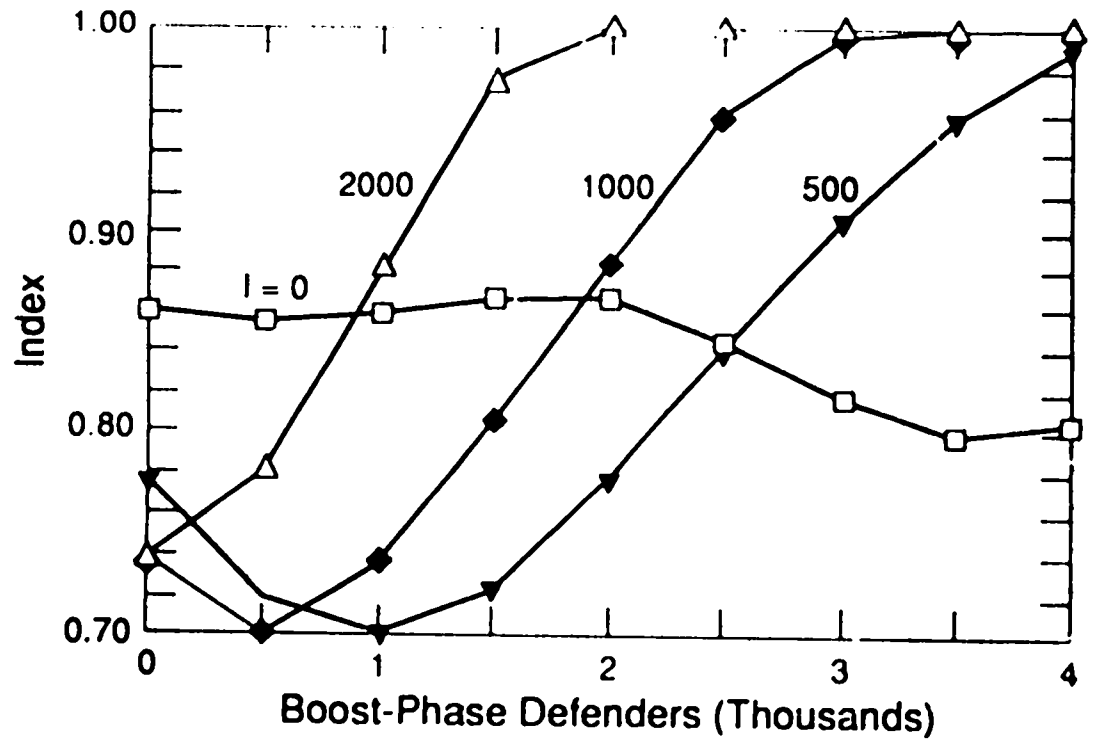

Fig. 1. Crisis stability index

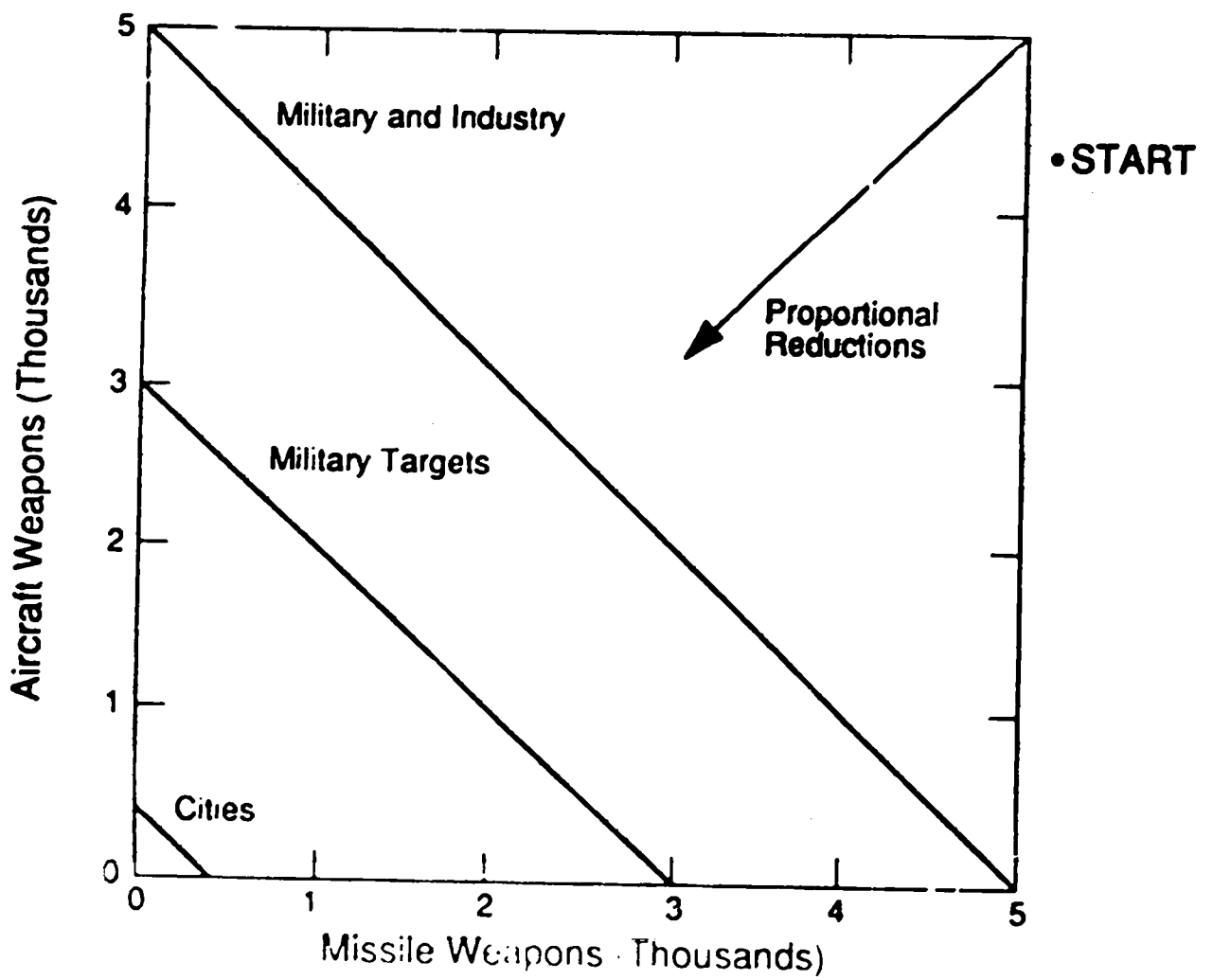

Fig. 2. Weapons available

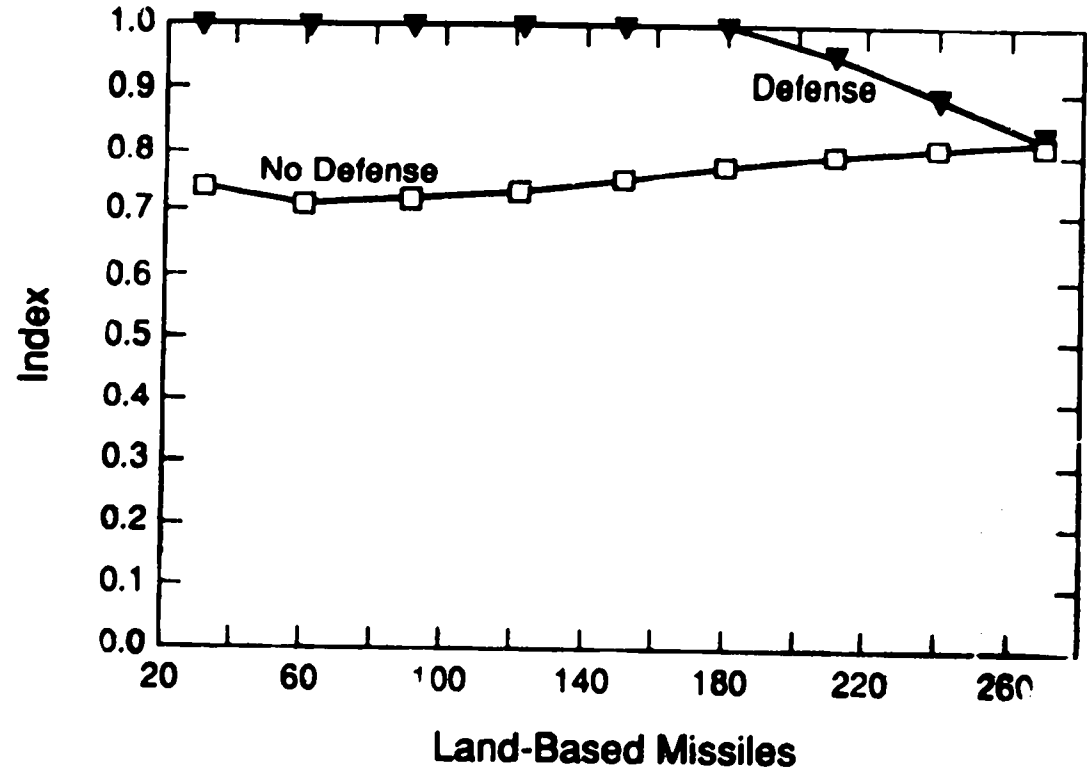

Fig. 3. Crisis stability index

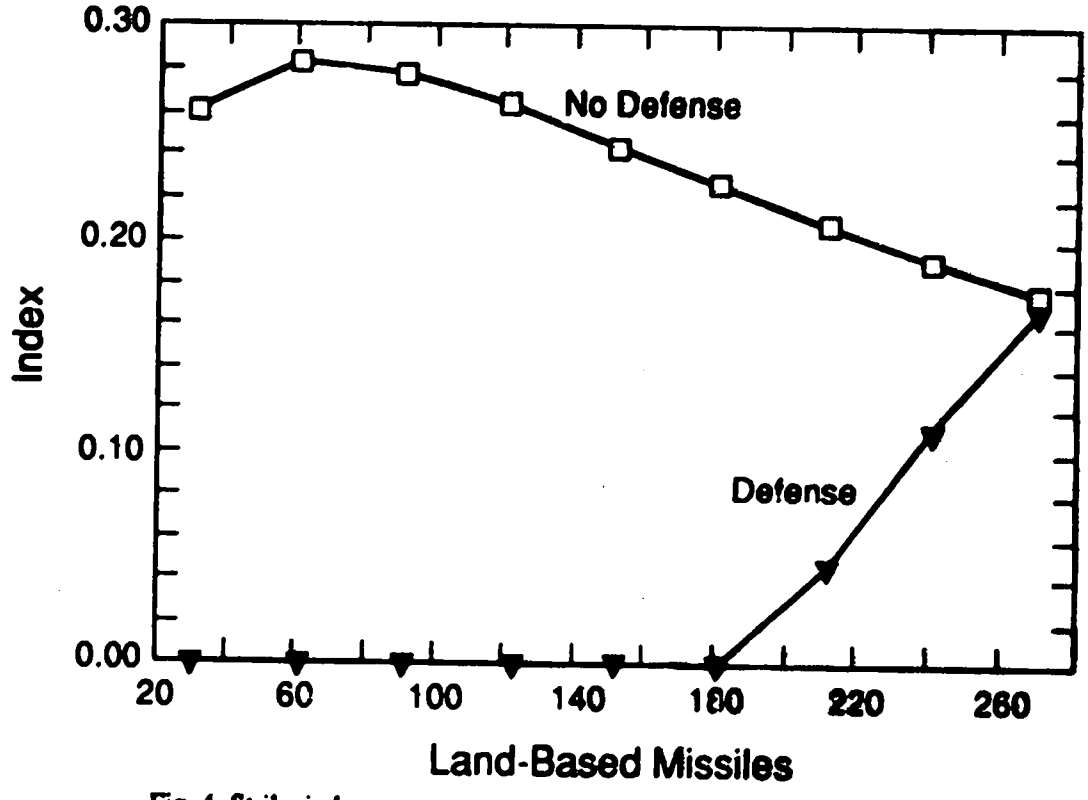

Fig. 4. Strike index

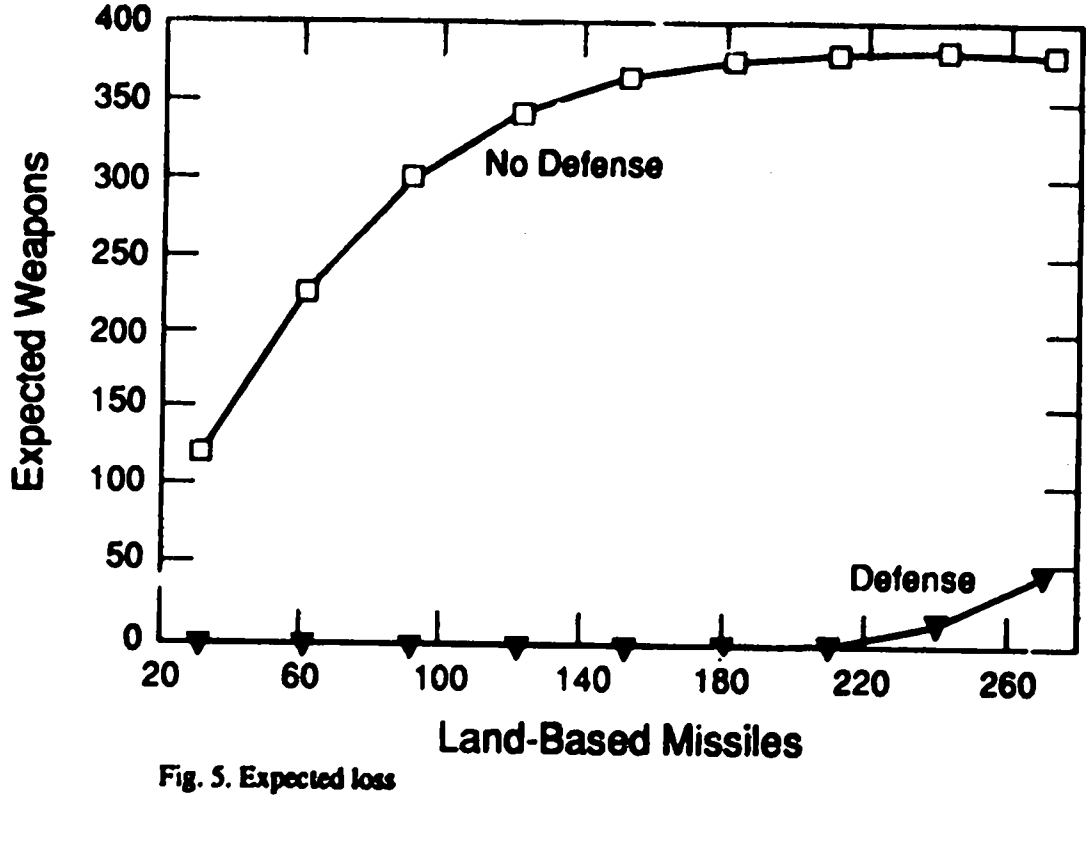

Fig. 5. Expected loss

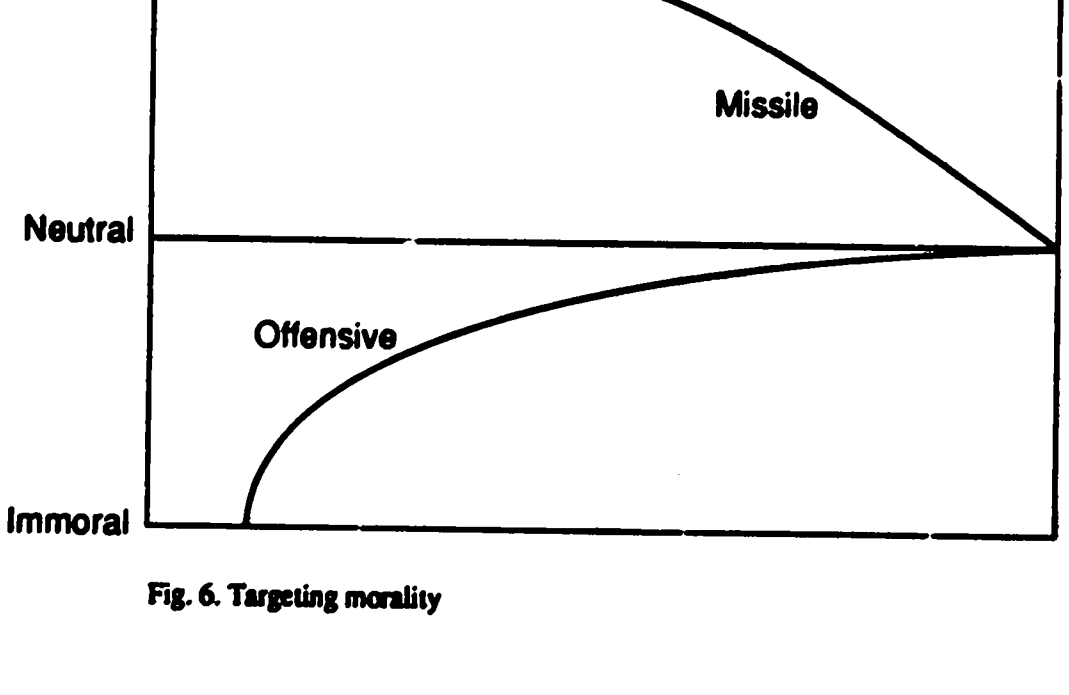

Fig. 6. Targeting morality