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A Curious Criterion: Cost Effective at the Margin for Missile Defense

Matthew R. Costlow

Matthew R. Costlow is Senior Analyst at the National Institute for Public Policy. He was formerly Special Assistant in the Office of Nuclear and Missile Defense Policy at the Pentagon.

Introduction

What are the valid criteria for choosing a homeland missile defense system? A budget planner may say “cost,” a force planner may say “kill probability,” an engineer may say “efficiency,” and a President may say, for domestic purposes, “reliability.” In truth, these and many other criteria impose a set of performance requirements on missile defense in general, but U.S. homeland missile defense in particular. Yet, since 1985, the so-called “Nitze criteria” have been central to the debate on U.S. homeland missile defense. Then-Special Adviser to President Reagan on Arms Reduction Negotiations, Paul H. Nitze proposed three criteria – explained in greater detail in 1986 – on how the Reagan administration would judge whether the technology produced by the Strategic Defense Initiative (SDI) should be pursued: the missile defenses had to be effective, survivable, and “cost-effective at the margin.”¹ For critics of U.S. homeland missile defense, even if they concede a system could be effective and could be survivable, they retreat to the *primus inter pares* of the criteria, that systems are unlikely to be “cost-effective at the margin.”²

I wish to challenge the elevation of this particular criterion, not because economic considerations are invalid – they are wholly necessary and worth significant consideration – but because “cost-effective at the margin” is subjectively applied only to missile defense to the point where critics have largely lost sight of the strategic context. Namely, there is nothing



unique about missile defense systems to suggest that the costs to build them in relation to the costs to defeat them should dominate the question of their value to U.S. security interests. In short, questions of cost-effectiveness – like any other criterion – should be viewed in the broader context of the purposes of a missile defense system, and the value the United States places on its mission.

The following discussion briefly examines the origin of Nitze’s “cost effective” criterion for SDI, its unstated assumptions, its seemingly unique application to missile defense, its logical deficiencies, and finally suggests an improved definition of “cost effective” as it relates to missile defense.

What is “Cost Effective at the Margin?”

When Amb. Nitze first proposed his three criteria for assessing whether a missile defense system should be pursued under SDI in 1985, the program was in its technological exploration phase. In other words, these were criteria for theoretical systems that had not yet been developed. The criteria were meant to, in Nitze’s words, “... serve as guidance to all those in the executive branch who would be out talking, lecturing, and testifying on the developments at the Shultz-Gromyko meeting [on nuclear arms control and missile defense].”³ In 1985, Amb. Nitze explained that: “New defensive systems must also be cost effective at the margin – that is they must be cheap enough to add additional defensive capability so that the other side has no incentive to add additional offensive capability to overcome the defense. If this criterion is not met, the defensive systems could encourage a proliferation of countermeasures and additional offensive weapons to overcome deployed defenses instead of a redirection of effort from offense to defense.”⁴

A little over a year later in 1986, Amb. Nitze elaborated on his “cost-effective” criterion for SDI, saying, “... the defensive system must be able to maintain its effectiveness against the offense at less cost than it would take to develop offensive countermeasures and proliferate the ballistic missiles necessary to overcome it,” adding that such criteria “... has valid application to other military systems as well...”⁵ In his memoir, Nitze stated that while he believed U.S. technology was unable to meet the criterion at the time, he defended supporting the criterion by noting that U.S. technology was capable of “unexpected breakthroughs” and such a breakthrough could have provided “negotiating leverage” during nuclear arms control talks with the Soviet Union.⁶

As Nitze notes, critics of the criteria at the time believed his intentions were far from noble and they suspected he hoped to trade away SDI as a serious program in exchange for Soviet concessions – making it appear the United States gained something tangible while giving up undeveloped technology.⁷ Indeed, these beliefs appear to have some merit given that in each



of his major speeches on SDI, the central importance he places on meeting his criteria is both times connected with the broader prospects for arms control with the Soviet Union.

Whatever the case may be, “cost-effective at the margin” gained an especially hallowed place among critics in the debate over homeland missile defense since it appeared unlikely that the cost of a defensive interceptor would ever drop below the cost of an offensive missile. Thus, even if a missile defense system was effective and survivable – two incredibly important criteria in and of themselves – if the missile interceptors cost more, or were likely to begin an arms race, then the whole system was deemed not worth considering on the grounds of cost and arms race stability.

Unstated Assumptions Behind the “Cost Effective at the Margin” Criterion

For a broader understanding of why “cost effective at the margin” is a poor choice for a criterion with essential veto power over any potential missile defense system, it is useful to state explicitly the unstated assumptions behind the criterion. First, the criterion assumes that the adversary knows, and is confident in its knowledge of, the “true” cost-exchange ratio between its missiles and countermeasures and U.S. missile interceptors. Second, it assumes that the adversary will want to spend the funds necessary to provide some level of confidence in being able to defeat U.S. missile defenses. Third, and more fundamentally, it assumes that the adversary indeed *can spend* more funds on defeating U.S. missile defenses, funds that the adversary may believe are better spent on more pressing needs. Fourth, and perhaps most fundamentally, it assumes that the adversary does not already believe it can defeat U.S. missile defenses with the appropriate confidence level – an assumption that currently contradicts a host of senior Russian statements about their ability to defeat U.S. missile defenses.⁸ These assumptions, both individually and collectively, range in credibility from doubtful to, at best, potentially true only in limited scenarios.

A Criterion Unique to Missile Defense

Given Amb. Nitze’s comment that “cost-effective at the margin” applies to other major U.S. defense programs, an outside observer might be surprised just how untrue that rings today. While there are certainly debates about the wisdom of investing great deals of money in weapon systems that are particularly pricey given their vulnerability to lower-cost counters, no other major program is judged to be not worth the investment on that reason alone. For example, the lead ship of Ford-class of U.S. aircraft carriers, CVN-78 *Gerald R. Ford*, cost approximately \$13 billion to procure.⁹ While there are no official open-source estimates of what a weapon might cost that could enable Russia or China to sink this aircraft carrier, one can safely assume the figure is far below \$13 billion. Likewise, other major defense programs like the F-35 joint strike fighter, Abrams tanks, and likely even satellites all may theoretically be



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defeated by less costly counters – that is, they are not “cost-effective at the margin” according to the Nitze criterion.

Yet, the United States still invests massively in these and other capabilities; the question then is: why is the “cost-effective at the margin” criterion given such priority when evaluating missile defenses but not other systems?

There are two likely answers. First, critics of missile defense hope to focus debate on the subject on the one area where they can quantify an expected disadvantage for missile defense – as of today, it does likely cost more to successfully intercept a missile than it does to build and deploy that missile. As is discussed below, however, this observation does not end the debate. That logic, if applied to other defense systems with equal emphasis, would reduce the U.S. military to something not worth of the name. Indeed, it is obvious that focusing primarily on cost-exchange ratios *for any defense program* is penny-wise and pound-foolish.

A second reason why missile defense critics insist so emphatically on prioritizing the “cost-effective at the margin” criterion to missile defense is that it simplifies (in a manner to their liking) the “equation” of whether a missile defense system is worth the investment. It ignores the primary roles for missile defense, i.e., deterring war and limiting damage should deterrence fail. Missile defense systems may spend most of their operational life fulfilling one role primarily, i.e., deterrence, and it is impossible to quantify the value of a near-infinite series of non-events.¹⁰ Instead, it is easier for critics of missile defense to ignore the deterrent value of the system and focus on what can, notionally, be quantified: costs of U.S. and adversary equipment. Analysts, as Thomas Schelling noted, simply cannot afford to ignore the “incalculables” just because they cannot be quantified: there is “... a common difficulty in defense planning: budgets need calculations, and the ‘incalculables’, however central they are to strategy, get subordinated to ‘hard facts’, whether or not hardness equals relevance or assumptions are facts.”¹¹

Towards a New Definition of “Cost Effective” for Missile Defense

The Nitze criterion of “cost-effective at the margin” was clearly flawed at birth, inexplicably elevated above other criteria and applied politically with such force uniquely against missile defenses. How then can one fairly judge the level of investment that is “appropriate” for missile defense? Clearly the “cost” criterion must be a major factor in U.S. decisions on missile defense – the question is how does the “cost” criterion relate to the other criteria?

At the more fundamental level, which defense objectives does the United States value most? Clearly, the most highly valued objectives are those which, if failed to be achieved, would be the most consequential for the United States. Thus, both the 2018 and 2022 summaries of the *National Defense Strategies* list “defending the homeland” as the number one objective or



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priority.¹² Any analysis, therefore, of the appropriate criteria for homeland missile defense that does not account for the value of the “defending the homeland” objective is taking the issue out of context. In other words, the appropriate level of investments in time, money, and opportunity costs rise according to the relative priority of the objective. The United States simply ought to be willing to invest more in the most consequential missions than it is in the less consequential missions.

Under the objective of “defending the homeland,” U.S. officials could plausibly decide U.S. policy will be to deter, and if necessary, defeat and limit the damage from coercive missile strikes on the U.S. homeland, no matter the attacker. This objective would necessarily be a high priority, which means relatively more value would be placed on criteria like “effectiveness” and “reliability” than on “cost.” In this sense, the relative priority given to the criterion “cost” only makes strategic sense when properly placed in the context of what is at stake for U.S. policy. Elevating the criterion of “cost effective at the margin” to the level of a veto factor, as the Nitze criteria does in this case, makes little sense when clearly the United States would be willing to bear greater costs for a higher priority objective. Clearly, if the United States intercepted 10 North Korean warheads headed towards major cities in the U.S. homeland, no one with any sense would question the system’s value simply because it cost more, even substantially more, to intercept those warheads than it did for North Korea to build and launch them.

A historical example makes clear the importance of first defining the political objective and then, and only then, choosing the appropriate corresponding criteria. In a classic RAND report on the subject of defense acquisition, the authors Charles Hitch and Roland McKean employ the example of the allies in World War II studying the various alternatives to sink the most enemy ships at the least cost in man-years of effort. As they point out, choosing the “sinking enemy ships” criterion to measure gain was a poor choice because the real allied objective was to stop enemy ships from achieving their objectives – a mission that does not actually require sinking ships and may be done more cheaply through mine-laying for the same effect.¹³ In the same way, the U.S. policy objective should not be “to intercept adversary missiles” *per se*; instead, the objective should be to deter, and if necessary, defeat and limit damage from coercive missile strikes against the U.S. homeland – an objective to which active missile defenses can contribute. Once U.S. policy determines the political goals (deterrence and damage limitation) and the stakes in achieving that goal (very high), only then can one discuss costs, among other criteria, in a realistic and contextually appropriate way.

Thus, the criterion for “cost-effectiveness” for missile defense must encapsulate more than a purely financial comparison of unit costs between a missile and the missile interceptor; an analysis that stopped there covers only the “cost” in the term “cost-effective.” The analysis must answer the follow-on question: effective towards what end? This is the question for



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policymakers – once they answer that question, then analysts can rationally debate the place for the “cost” criterion.

As a final exercise, it is useful to take the “Nitze criteria” at face value (effectiveness, survivability, and cost-effective at the margin), eliminate one, and ask whether the United States might rationally pursue a system that fulfills only two of the three criteria? The most obvious scenario, as suggested by this analysis, is a system that is effective and survivable, but still costs more to intercept a missile than it does for the adversary to build and deploy the missile. Might it be reasonable to pursue such a system? Even a cursory analysis of the options indicates yes, such a course might be very reasonable given the value of what is being defended.

A missile defense system that could effectively defend itself and defeat 200 adversary missiles, for example, would be of great interest to the United States even if it cost more for the United States to defend against those missiles than it did for the adversary to employ them. After all, at a certain point an adversary must begin to consider if sending more than 200 missiles against the U.S. homeland to overcome the missile defense system risks appearing to the United States to be the opening salvo of a first strike – with the attendant risk that the United States will respond accordingly. Even if critics of missile defense would not choose this option themselves, the point is that the “cost-effective at the margin” criterion for missile defense should not have veto-power over any possible missile defense system.

Conclusion

The great Prussian strategist Carl von Clausewitz stated in his classic book *On War* that war is not simply a contest between physical forces; he in fact derided the idea of reducing war between opponents down to “comparative figures of their strength” as a “kind of war by algebra.”¹⁴ Just as war cannot be simplified to a comparison of forces, neither can missile defense be judged by “cost-effectiveness” alone – a “war by algebra.” Critics of missile defense have yet to explain why such a criterion only seems to apply to missile defenses and not other major defense programs, or why a system that provides very significant deterrence and damage limitation benefits must always be outweighed by cost-driven considerations alone.

This analysis does not indicate that the “cost-effectiveness” criterion is worthless, far from it; it only seeks to remove that particular criterion from its pedestal as a veto factor in the debate over missile defense. All criteria for a weapon system’s sufficiency, “cost-effectiveness” included, must relate ultimately to the national objective that the system is designed to support. The supposed inviolability of the “Nitze criteria” has placed unworthy constraints on the U.S. debate about missile defense to the detriment of both policies and capabilities. Instead, U.S. officials must make a clear-eyed assessment of their defense policy priorities, what is at stake



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in achieving those priorities, and only then determine the criteria for missile defense's sufficiency.

¹ Paul H. Nitze, "On the Road to a More Stable Peace," as reprinted in, U.S. Department of State, *Current Policy*, No. 675 (Washington, D.C.: Department of State, 1985), speech given February 20, 1985, p. 2, available at <https://catalog.hathitrust.org/Record/007397611>.; and, Paul H. Nitze, "SDI, Arms Control, and Stability: Toward a New Synthesis," as reprinted in, U.S. Department of State, *Current Policy*, No. 845 (Washington, D.C.: Department of State, 1986), speech given June 3, 1986, p. 2, available at <https://catalog.hathitrust.org/Record/007408951>.

² For criticisms along these lines, see, Andrey Baklitsky, James Cameron, and Steven Pifer, *Missile Defense and the Offense-Defense Relationship*, Deep Cuts Working Paper #14 (Berlin: Deep Cuts Commission, October 2021), pp. 23-24, available at https://deepcuts.org/images/PDF/DeepCuts_WP14.pdf.; and, Jaganath Sankaran and Steve Fetter, "Defending the United States: Revisiting National Missile Defense against North Korea," *International Security*, Vol. 46, No. 3 (Winter 2021/22), pp. 68-70.; and, Steven Pifer, "The Biden Nuclear Posture Review: Defense, Offense, and Avoiding Arms Races," *Arms Control Association*, January/February 2022, available at <https://www.armscontrol.org/act/2022-01/features/biden-nuclear-posture-review-defense-offense-avoiding-arms-races>.

³ Paul H. Nitze, *From Hiroshima to Glasnost: At the Center of Decision – A Memoir* (New York: Grove Weidenfeld, 1989), p. 407.

⁴ Nitze, "On the Road to a More Stable Peace," op. cit., p. 2.

⁵ Nitze, "SDI, Arms Control, and Stability: Toward a New Synthesis," op. cit., p. 2.

⁶ Paul H. Nitze, *From Hiroshima to Glasnost: At the Center of Decision – A Memoir*, op. cit., p. 408.

⁷ Loc cit.

⁸ Matthew R. Costlow, *The Folly of Limiting U.S. Missile Defenses for Nuclear Arms Control*, Information Series #505 (Fairfax, VA: National Institute for Public Policy, October 18, 2021), pp. 6-8, available at https://nipp.org/information_series/matthew-r-costlow-the-folly-of-limiting-u-s-missile-defenses-for-nuclear-arms-control-no-505-october-18-2021/.

⁹ Ronald O'Rourke, *Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress* (Washington, D.C.: Congressional Research Service, March 25, 2021), p. 1, available at <https://crsreports.congress.gov/product/pdf/RS/RS20643/248>.

¹⁰ This is not to say that during peacetime missile defenses are not fulfilling roles other than deterrence, such as assurance, protection against accidental or unauthorized launches, cost imposition, etc.

¹¹ T. C. Schelling, *Controlled Response and Strategic Warfare*, Adelphi Papers #19 (London: The Institute for Strategic Studies, 1965), p. 5.

¹² U.S. Department of Defense, *Summary of the 2018 National Defense Strategy of the United States of America* (Washington, D.C.: Department of Defense, 2018), p. 4, available at <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.; and, U.S. Department of Defense, *Fact Sheet: 2022 National Defense Strategy* (Washington, D.C.: Department of Defense, 2022), p. 1, available at <https://media.defense.gov/2022/Mar/28/2002964702/-1/-1/1/NDS-FACT-SHEET.PDF>.

¹³ Charles J. Hitch and Roland N. McKean, *The Economics of Defense in the Nuclear Age* (Santa Monica, CA: The RAND Corporation, March 1960), p. 170.

¹⁴ Carl von Clausewitz, edited and translated by Michael Howard and Peter Paret, *On War* (New York: Alfred A. Knopf, 1993), p. 84.



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