

Chapter 4

Missile Defense and Israel's Deterrence against a Nuclear Iran

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Israel's national security doctrine has been molded in a reality of gaping asymmetry, both geographic and demographic, between itself and its hostile neighbors. The security environment of a tiny country with a small population surrounded on three sides by substantially larger states and overwhelmingly larger populations has perforce bred an offensive military doctrine and the preference for offensive rather than defensive weapons. Lacking protective geographical features such as mountain ranges, large rivers, or surrounding seas, Israel, like other small countries in the same situation, could not afford the huge costs of permanent, costly defensive fortifications. Preemptive wars, of which the Six Day War was perhaps the most outstanding example, were always seen in Israel as the preferred military doctrine.

It is not surprising, therefore, that public debate in Israel on deterring a prospective nuclear Iran is conducted in aggressive terms and focuses on offensive capabilities. The few analysts who examined the issue of defense against the evolving threat of Iran's long range missiles judged strategic defense as trivial or even detrimental to Israel's security. Missile defense was described as a useless "strategic fallacy" that contravenes the IDF's longstanding military doctrine¹ and an anachronism that is easily suppressed, "since in the era of missiles, offense holds an absolute advantage over defense"; as a danger to stability and an incentive for a preemptive strike on Israel;² and as irrelevant since it cannot guarantee against the penetration of one single nuclear missile and is in fact an admission of weakness.³

Nuclear deterrence theory evolved in the United States at the start of the Cold War. The debate on credible deterrence against a nuclear antagonist lay at the core of the wider debate on national security doctrine. Much attention was given to the issue of defense systems, their feasibility, and their implications for deterrence, and to the stability of the confrontation between the two superpowers. Occasionally the debate on strategic missile defense intensified to overshadow all other dimensions of the nuclear debate, for instance following President Reagan's announcement of the Strategic Defense Initiative (SDI – "Star Wars"). While a consensus was never reached on this subject, the extensive analysis of the value of strategic defense and the accompanying wide public debate, which was waged by the best military and political brains in the US, were quite thorough and addressed the issue from every conceivable aspect – political/military, technological, and economic.

Israel, in contrast, has to date seen no significant debate on deterrence against nuclear threats, not to speak of the prospective role of missile defense in such deterrence. As in the early 1980s when Iraq was on the verge of attaining a nuclear capability, so today public debate in Israel vis-à-vis Iran focuses on how to stop Iran's nuclear program – by political or other means – rather than on how to deter Iran if the attempts to stop its program fail. It is hardly surprising, therefore, that defense in the nuclear age has not been addressed in Israel more deeply than at a superficial level, and that whatever conclusions were drawn were colored by traditional concepts of conventional rather than nuclear conflicts.

This paper strives to correct the situation and analyze in detail the role of missile defense in the overall deterrence doctrine against a nuclear Iran. This will be discussed from the perspective of the survivability of Israel's retaliation force rather than the minimization of damage to Israel's population. It will be argued that in Israel's specific environment, missile defense stands to play a key role in Israel's deterrence doctrine. In fact, missile defense is destined to be the most visible measure among all the survivability measures and will therefore have the most important position in the gain versus loss calculus of any nuclear aggressor concerning the prospect of its own survival following a strike on Israel.

Originally conceived to counter the threat of chemical missiles from Syria, Israel's missile defense array is apt to be even more significant

against a nuclear Iran. Yet defense is not an end in itself. Defense should augment offense rather than replace it. Thus, the question is not whether defense is preferable to offense, but rather how to combine the two for optimal results. Israel must retain all its offensive assets to deter a nuclear Iran. The role of defense will be to provide viable survivability to the offensive assets, thereby leveraging their deterrence value.

The Evolution of Israel's Missile Defense

The quest for defensive responses against the looming missile threats started in the late 1980s, when then-Minister of Defense Yitzhak Rabin decided on Israel's participation in President Reagan's Strategic Defense Initiative. Rabin viewed the emerging missile threat as one of the most dangerous future threats to Israel's security⁴ and supported the notion of deploying an active defense system against it. Later, he approved launching an R&D program that eventually led to the Arrow program. The Iraqi missile attack in 1991 found Israel devoid of any means of defense. This compelled then-Minister of Defense Moshe Arens to direct the Israel Ministry of Defense (IMOD) and the Israel Defense Forces to acquire the US-made Patriot PAC-2 extended air defense (with some capability of intercepting ballistic missiles) and to embark on a full scale development program of the indigenous Arrow missile defense system. Rabin, on his return to the post of defense minister (as well as to the post of prime minister), confirmed Arens' directives and allocated the necessary budgets for implementation.

Following a string of failures in its first three years, the Arrow program finally hit its stride and accumulated a growing record of successful tests. To date, the Arrow has scored fourteen successes in sixteen tests, a success rate of about 88 percent. Initial operational capability was achieved in December 2000, with full operational capability achieved not much later. The system is currently in operation by the Air Defense Command of the Israel Air Force (IAF) in conjunction with the US Patriot system, which serves as the lower tier in a combined two-tier missile defense array protecting most of Israel's homeland territory.

The Arrow program was not a solo venture, and Israel invested in other concepts of defense against missiles. During the 1990s Israel's Ministry of Defense studied the concept of destroying missiles during their boost phase by specialized air-to-air missiles – dubbed MOAB – launched from

deep loitering UAVs. While showing promise, the study was terminated by the IMOD. Another concept, using high energy laser to shoot down incoming missiles, was jointly investigated by the US military and the IMOD but after scoring some spectacular successes in the test phase was subsequently abandoned. However, the high energy laser concept was aimed to defend against tactical, short range rockets (e.g., Katyusha) and not against ballistic missiles from Syria or Iran, and is thus irrelevant to this paper.

The decision to develop and deploy an indigenous missile defense system was not reached easily and was accompanied by a sharp and sometimes shrill debate, mostly behind the closed doors of the IMOD but in some cases also in public. The most incisive criticism of the concept of missile defense for Israel was aired by Dr. Reuven Pedatzur in a comprehensive study published in 1993 by the Jaffee Center for Strategic Studies (forerunner of the Institute for National Security Studies).⁵ The arguments made in that study conformed to the opinions of numerous defense officials and analysts, and echoed many of the arguments made by the SDI critics in the US.

Pedatzur argued that it was exceedingly simple to fool an Arrow-type defensive system with simple, cheap, and easily installed countermeasures that would render the Arrow system ineffective. He doubted Israel's defense industries could rise to the challenge of such a complex system, citing anonymous experts in the IDF who predicted that the system would not be able to be deployed before 2010. He envisaged enormous costs that would distort budgeting priorities and divert funds from vital enhancement of the IDF's warfighting capability, thus forcing a profound revision of Israel's national security doctrine. He further argued that even if effective against conventional, chemical, and biological missiles, the Arrow would not be relevant against future threats of nuclear missiles, since it would never be able to supply hermetic defense and the impact of even one single nuclear missile in Israel's dense urban area would be an existential threat to Israel.

Following the first Shahab 3 test in Iran, Pedatzur contended there was no reason why a credible mutual deterrence could not be achieved, since Iran would have no real interest to attack Israel – on the contrary, it would have an interest in reducing regional tensions. In his opinion, Israel should

aim to dissuade Iran from launching missiles against it rather than defend itself against such missiles. The way to do it, in his opinion, was to rely on an explicit threat of devastating retaliation. In his view, missile defense will contribute nothing to the balance of deterrence vis-à-vis Iran.⁶ Pedatzur and other critics argued that other countries also refrain from developing or deploying missile defenses, and called upon the government of Israel to follow suit.⁷

With the passage of time, most of Pedatzur's pessimistic predictions proved unfounded. Israel's defense industries overcame the technical challenge, the system's development was completed a full decade ahead of what was predicted, and there are no indications that the expenditures for the Arrow harmed other IDF procurement plans to any degree whatsoever. Israel's national security doctrine has indeed undergone fundamental changes, but these are due to the dramatic developments in the region – the war in Iraq and the ascent of Iran as a regional power – rather than to anything to do with missile defense.⁸ Compared with those tectonic changes in the Middle Eastern theater, the purportedly destabilizing effect of Israel's missile defense is at most minute.

Contrary to the assertions of Dr. Pedatzur and other critics, Israel's policy of active defense against missiles parallels rather than counters worldwide trends: Japan, India, and Turkey formally adopted active defense policies and all three are engaged in developing or procuring such systems. Major European countries, whether as NATO members or individuals, are developing, buying, and integrating deployable missile defenses. The European parliament accepted a recommendation to favor a continent-wide defense against missiles. Most of the Gulf states, driven by the same concern as Israel, are seeking defense systems against the Iranian missile threat.

Israel's missile defense is now an established fact, and most of the warnings issued by critics have failed to materialize. One could rest at this point and regard the entire debate as an historical anecdote. Nevertheless, and in the face of the looming threat of a nuclear Iran, it is worthwhile to revisit one of the critics' major arguments, namely, that against the threat of a nuclear tipped missile, active defense is meaningless because it cannot guarantee against a single nuclear missile evading the defense and

wreaking havoc in Israel. The focus of this paper is the examination and discussion of this claim.

Prerequisites for a Credible Israeli Deterrence

Before discussing the role of missile defense in the establishment of a credible deterrence posture, the question arises whether a nuclear Iran will be deterrable at all. Iran is frequently referred to as an “irrational” state, a state whose decision making processes do not proceed along rational lines and that might choose to act in a suicidal manner. Since a suicidal actor cannot be deterred, it follows that if the assumption is that the Iranian regime is suicide-bent, Iran as a state is undeterrable.

A cursory examination of the Iranian regime’s record and way of doing business casts a significant doubt on the hypothesis of a suicidal Iran. A full discussion of the nature and modus operandi of the Islamic republic is beyond the scope of this paper, yet it is enough for our purposes to take note of two aspects of Iran’s conduct and grand objectives: first, Iran’s cool and calculated management of the uranium enrichment crisis vis-à-vis the international community, and second, Iran’s vision of itself as the leader and prime mover of the Islamic world. Both aspects do not support the portrait of a suicidal regime, eager to sacrifice itself for the cause of global Islam, rather of a pragmatic regime that aspires to become the leader of global Islam. It is more plausible to assume that Iran, fanatical and radical as it is, will continue to be a rational player that will do the utmost to advance its radical agenda but will do so pragmatically and with a careful weighing of gains versus losses.⁹ Judging by Iran’s actions rather than its rhetoric, it can be assumed that Iran is deterrable. With this assumption we can now proceed to discuss the conditions for establishing a credible deterrence against a nuclear Iran.

Europe and the US wield considerable levers over Iran, including political, economic, and military. This is not true in the case of Israel. By itself, Israel cannot exercise any influence over Iran’s economy and only a slight influence over its international ties. On the other hand, and judging by numerous expressions of Iranian officials, it can safely be assumed that Israel wields a significant military lever. Iran claims that Israel is a nuclear state and demands that it denuclearize. In Iran’s perception, Israel has a strategic air arm with sufficient range to inflict unacceptable damage on

Iran's major cities. It is reasonable to assume that for a rational leadership – regardless of its radical worldview – this perceived Israeli capability would act as a significant deterrent, *but only if* that leadership is entirely convinced that an Israeli retaliation is inevitable and that there is no way to evade this retaliation. Iran's own perception of Israel's strategic capability can be exploited to establish a credible deterrence, pending Iran's perception that it has no way to frustrate an Israeli retaliation.

The above hypothesis might be rebutted with an argument that whatever damage is universally perceived as unacceptable is from Iran's standpoint quite acceptable. In December 2001 Hashemi Rafsanjani, one of the most influential leaders of the Islamic Revolution in Iran, preached a Friday sermon in a Tehran mosque, stating that a nuclear Iran would have the advantage since "Israel could be destroyed by one single nuclear bomb while the Islamic world could absorb many nuclear hits."¹⁰ If this represents the Iranian leadership's belief in a "winnable nuclear war," then Israel's deterrence would be entirely reliant on nuclear guarantees from Europe and the US. On the other hand, official Iran remained mute on the subject and no official confirmation of the "Rafsanjani doctrine" has ever surfaced. It is thus not impossible that Rafsanjani's statement expressed a personal opinion that did not necessarily represent a consensus among the leadership. Assuming with some confidence that this is indeed the case, we can propose that Israel's own military levers could, under certain conditions detailed below, serve to establish credible deterrence against a nuclear Iran.

Deterrence and Crisis Stability

By themselves, military levers are necessary but not sufficient to ensure a stable deterrence posture. The stability of the Cold War confrontation relied not only on the mutual fear of total annihilation, but on an extensive network of communication channels between the antagonists and on the crisis management mechanisms established by them almost from the outbreak of that conflict. From an historical perspective, there was no "ancient foe" syndrome between the US and the USSR, both being relatively new political entities in the world's history. Furthermore, immediately prior to the Cold War both superpowers allied themselves in a bitter and bloody war against Nazi Germany. The Cold War itself did not alter the formal state of

peace between the superpowers, which continued to maintain fully staffed embassies in each other's capital cities. When both countries realized that they could bomb each other to oblivion, they created real time, confidential communication channels between their national leaderships to ensure against misunderstandings. Both superpowers readily negotiated and often concluded arms control treaties (i.e., the ABM treaty) to reduce tensions and alleviate economic burdens. The Cuban missile crisis was resolved not by the actual use of force but through engagement and negotiations that drew on the entire spectrum of the communication channels between the two superpowers, set up to resolve exactly such situations.

None of the characteristics and mechanisms that prevailed during the Cold War prevail today between Iran and Israel, nor are they likely to prevail in the foreseeable future. The two countries were closely allied before the Islamic Revolution of 1979; following the revolution, the new Iranian regime adopted the Islamic world's legacy of hostility towards Israel, embellishing it with the most virulent anti-Semitic propaganda since the 1930s. The prospects of arms control agreements between Israel and Iran are practically nonexistent. There are no direct, rapid, and confidential communication links between the two governments and none appear on the horizon. Indirect communications channels – through third parties or the UN – could be too slow and thus ineffective in crisis situations. In short, and contrary to the proposal of some Israeli analysts,¹¹ the Cold War cannot be taken as a model or serve as a guide to a stable mutual deterrence in an Israeli-Iranian standoff.

In the absence of any “external” Cold War-type stability mechanisms, the stability of the deterrence equation between Israel and Iran will be wholly dependant on “internal” mechanisms – namely, the intensity of Iran's own concerns of surviving Israel's retaliation following an Iranian first strike. Lacking external mechanism, stability will be wholly dependant on the question of how Israel is perceived by Iran. To achieve stability, Israel must project an image of its retaliatory forces' invulnerability to any Iranian strike. Furthermore, Israel must strive to make sure that Iran's leadership is convinced beyond any doubt of the inevitability of Israel's aggressive response, of Israel's capability to launch such a response on its own (and not by a third party), and of the intolerable damage that will be generated by that response. Finally, Israel must strive to cause Iran to gain

this perception on its own, through its own national intelligence means and by its own internal debate and decision, rather than through Israeli declarations of policy (like the futile threats aired by Israeli leaders on the eve of the Iraqi Scud attacks in 1991).

There are no winners in a nuclear war, and from Israel's perspective the required achievement is not how to "win" a nuclear war but how to avoid it. Pedatzur's observation that "Israel's policy should be that no nuclear missiles are launched"¹² – by either side – is very apt, both in times of tranquility and in crisis scenarios.

The supreme test of deterrence occurs in crisis situations. It is not illogical to suppose that a rational leadership, as fanatic as it may be, will recoil from launching a surprise nuclear attack "out of the blue" if the anticipated reprisal outweighs the gains from such an attack. In crisis situations, however, the calculi of gains versus losses and of advantages versus disadvantages acquire a totally different flavor. In the heated atmosphere of a crisis, factors like national prestige, personal pride, and sheer panic play prominent roles, tending to cloud rational judgment and push towards dangerous threshold policies. Moreover, when there is no way to exchange official messages between protagonists, as is the case between Israel and Iran, huge gaps in respective perceptions of reality are possible. Overheated statements to the press, routine military activities, satellite launches, natural disasters, or industrial accidents can all be misinterpreted in the distorted thinking process typical of a crisis as a telltale sign of a forthcoming nuclear strike. When deterrence is exclusively based on offensive weapons and doctrines, the temptation of "use them or lose them" can overpower rational gain and loss calculations and precipitate a nuclear first strike.

Finally, and especially since Iran views Israel as a Western appendage, economic or political steps taken by other countries against Iran might be misinterpreted by Tehran as Israeli plots and precipitate a strong reprisal. Israeli deterrence must be strong enough to mitigate any aggressive impulse from Iran even in crisis situations that are not directly connected to Israel.

The Contribution of Israeli Missile Defense to Deterrence Credibility

Military victories are predicated on the actual use of force. In contrast, the essence of deterrence is the non-use of force to achieve what we might call “cognitive decision.” Israel’s missile defenses must be demonstrably capable of intercepting and destroying incoming missiles, and Israel’s retaliatory forces must be capable of overcoming hostile air defenses and delivering devastating blows on the aggressors’ territory, but their very use – even if they score stellar results – will be synonymous with the failure of deterrence. The primary measure of effectiveness for Israel’s strategic assets, whether offensive or defensive, is how threatening they are perceived by the other side; how they fare in actual conflict is secondary.

Retaliatory systems that would be considered vulnerable to a surprise attack are not likely to achieve the cognitive decision that is a prerequisite for stable deterrence. In the Cold War both superpowers achieved cognitive decision by deploying multiple families of retaliatory systems and by using their huge land masses for dispersion, with multiple basing modes on the ground, under the sea, and in the air and heavy sheltering in silos (and also, at least in the case of the Soviet Union, by extreme land mobility). This secured the survivability of their strategic retaliation weapons beyond any reasonable doubt. War games conducted on both sides demonstrated that a second strike from the other side was bound to come, no matter how devastating the first strike. Once this cognitive decision was reached, investments in further survivability measures yielded diminishing returns. This made missile defense superfluous at the time, paving the way towards the ABM treaty.

In contrast, Israel’s tiny land area cannot offer the wide spaces needed for dispersion, and its relatively modest economy cannot afford a superpower-style multiplicity of retaliatory measures. Israel’s population, economic assets, and military bases are all concentrated in an area not much larger than Rhode Island. This, and the perception that Israel’s investments in defense are declining over time, could act as powerful temptations for an aggressive action by Iran. A rational aggressor, fanatic as it might be, will strive to wipe out Israel’s retaliatory means before it proceeds to launch a nuclear strike on Israeli cities. This, of course, would be a grave error on the side of Iran, an error that would incur terrible consequences for Iran

(as well as Israel). The prime objective of Israel's deterrence is, then, to dissuade Iran from making such an error in the first place.

To illustrate the point, consider Israel's main strategic strike asset – the Israel Air Force fleet of long range attack aircraft. Open literature on the IAF force structure and disposition¹³ reports that it deploys in twelve air bases, six of which host the more modern types of aircraft (names and locations of those air bases are provided in the literature). Theoretically, then, a first strike by no more than six nuclear Shahab 3 missiles – one for each prime air base – would be enough to knock out Israel's airborne second strike option, paving the way to an entirely immune follow-up strike against Israel's centers of population.

It is reasonable to assume that the Iran would plan on launching some extra Shahab missiles to compensate for malfunctions and inaccuracies, but in any event, it is obvious that the concentration of Israel's strategic assets in a small number of locations requires just a handful of Shahab missiles to take them out, not much more than the salvo of Iraqi missiles that hit Israel during the Gulf War in 1991.

Enter Israel's missile defense system, which changes the situation completely. As pointed out by Pedatzur, rational Iranian planners would have to factor in an efficient defense system with an upper performance limit equal to what Israel has demonstrated in repeated tests – any lesser assumption would be tantamount to gambling with Iran's continued existence. In concrete terms, this means that the Iranians will have to factor in a kill rate for the Arrow of at least 80 percent in each individual engagement. According to open literature,¹⁴ Israel has now deployed three Arrow batteries. Each battery includes eight launchers each holding six interceptors, for a total of 144 Arrow interceptors deployed and ready to fire. In addition, Israel deploys several Patriot PAC 2 batteries, to be upgraded to PAC 3 capabilities, providing the second tier for its missile shield.¹⁵

A simple statistical analysis indicates that if every single Iranian Shahab aimed at an IAF base is engaged by one single Arrow missile, three out the six targeted bases will survive with absolute certainty and that there is a 90 percent chance that four bases will remain untouched (figure 1, curve 1). With the launching of only six interceptors, the bulk of the Arrow and Patriot missile will remain ready to face a follow-up strike. From the point

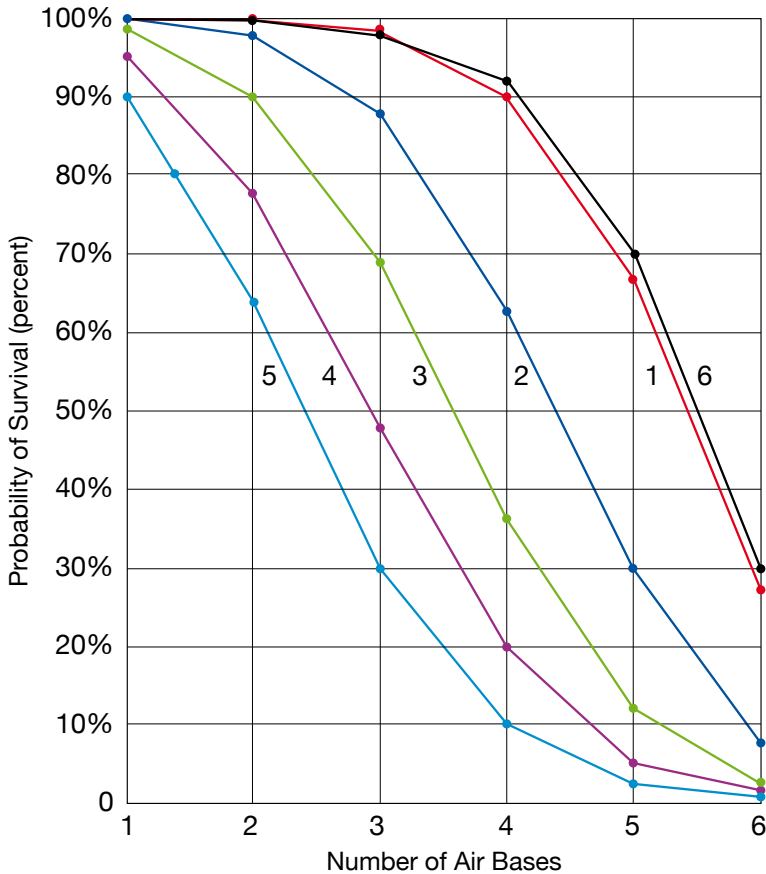


Figure 1. Air Base Survival Probability in Shahab Attack

- Salvo of 6 Shahab missiles, each engaged by 1 interceptor
- Salvo of 12 Shahab missiles, each engaged by 1 interceptor
- Salvo of 18 Shahab missiles, each engaged by 1 interceptor
- Salvo of 24 Shahab missiles, each engaged by 1 interceptor
- Salvo of 30 Shahab missiles, each engaged by 1 interceptor
- Salvo of 30 Shahab missiles, each engaged by 2 interceptors

of view of the aggressor, this is tantamount to failure, since enough air bases will survive to launch a massive retaliation.

Iran could increase its chances of taking out the IAF on the ground by launching several Shahab missiles at each air base. Curves 2, 3, 4, and 5 in figure 1 show the chances of survival of the IAF prime bases against salvos of 12, 18, 24, and 30 Shahab missiles, respectively, when each is engaged by a single Arrow or Patriot interceptor. In the case of a massive salvo of

30 nuclear Shahabs, each engaged by one Israeli interceptor, there is a 90 percent chance that five out of the six prime IAF bases will be hit, seriously eroding Israel's capability to launch a retaliatory strike.

However, professional Iranian planners will have to take into account a multi-tier defense system that can engage each incoming Shahab twice, three times, and even more.¹⁶ Again, simple calculations show that when engaging each of the thirty incoming threats by two interceptors, Israel's missile shield could destroy the vast majority of the incoming Shahab missiles and ensure the survival of at least three bases and possibly four, as seen in curve 6 of figure 1. This simple war game could be extended even further with increasingly heavier salvos, countered by increasing number of engagements, with the same disappointing results from Iran's perspective. Diluting the salvos with conventional Shahabs to exhaust Israel's interceptor stockpiles will decrease the prospects of destroying the IAF, since the impact from a conventional warhead is not likely to impede its air operations seriously. A preliminary strike at the missile defense assets (provided the Iranians know their location) will again yield disappointing results since the system will defend itself with the same efficiency – and between the strike on its missile defense and the subsequent strike on its air bases, the IAF could slip through a devastating strike package.

It should be noted that launching a massive 30 nuclear Shahabs salvo is a major undertaking even for a much more advanced nuclear power such as France or the UK. The lethal effect of thirty nuclear bombs going off almost simultaneously – near the ground or in the upper atmosphere – will be devastating not only to Israel's population but to the Palestinian, Lebanese, Jordanian, and Egyptian populations. Under certain meteorological conditions, the lethal effects could spread to Iraq and even to Iran itself.

This simple war game can be repeated by any Iranian science student with a \$25 calculator and access to the internet. Without the need for Israeli leaders to make detailed or threatening declarations, it brings home the truth: that Israel's missile shield, by its very existence, overturns the strategic equation in two ways. First, it transforms the IAF with its small number of prime bases from an easy prey (in Iran's perception) to an almost impregnable objective. Second, it raises the ante for Iran, forcing its planners to specify ever-increasing salvos of nuclear Shahabs, the collateral effect from which could seriously risk Iran's own security and safety. Since

all the information needed to make such somber evaluations is readily available to Iran from its own sources, it stands to reason that the calculus of gains versus losses will be sobering enough to dissuade Iran, even in the midst of an ongoing crisis, from making a potentially disastrous mistake. The cognitive decision, the crucial condition for effective deterrence, is thus achieved.

The stabilizing effect of Israel's missile shield goes beyond the dry arithmetic of gains versus risks. The Arrow system was co-developed with the US and is reportedly designed to interoperate with US missile defense systems. The IAF holds frequent and well-advertised missile defense exercises with the US Army and US Navy. Any Iranian planner must factor in the presence of unknown numbers of US ground and naval missile defense assets at the time of the planned strike. Such assets could take part in the defensive action and catapult the effectiveness of Israel's missile shield even beyond its published performance. Furthermore, an Iranian offensive action that would result in US casualties might draw US retaliation in kind, even in the unlikely case that Israel's retaliatory assets are overwhelmed.

Missile Defense vs. Other Survivability Enhancement Measures

In a nutshell, then, Israel's missile defense is essentially a survivability enhancement measure for Israel's retaliatory assets. The question arises whether the investment in missile defense is more cost effective than other survivability enhancing measures such as dispersion, multiplication, or shielding.

There is no simple answer to this question, yet three significant advantages of missile defense come to mind. First, missile defense has a high public profile, in contrast to other lower profile and often confidential measures. Missile defense tests are closely followed by the general public and are therefore extensively and sometimes sensationally covered by the press. Noticeable successes in the test range tend to influence the thinking and judgment of analysts and decision makers. For example, when the Arrow system succeeded in destroying a real Scud B missile in a test, Egypt's leading paper *al-Ahram* concluded that Israel's missile defense system was changing the balance of power in the Middle East in Israel's

favor.¹⁷ Since what we are seeking here is cognitive decision, investment in such a high visibility measure as missile defense is a better return on investment.

Second, Israel missile defense already exists, most of the heavy investments for its development and fielding have already been made, its capabilities have been put to the test, and its operators gained experience in field exercises and in the preparation for the Iraq War of 2003. New survivability measures might demand investments of the same order of magnitude as those already spent on the Arrow.

Third, the Arrow is a joint US-Israel program, with its costs shared between the two governments. The significant US share in the Arrow costs is in addition to the annual military aid allocations. Improving the Arrow for better performance and tightened defense, as is currently planned by the Arrow 3 concept,¹⁸ is likely to gain significant US financial support. Other survivability enhancing measures, on the other hand, might not gain US financial support, and it is more likely than not that Israel would be reluctant to discuss them at all.

Conclusions

This paper has examined the critics' charge that a missile defense system that does not hermetically seal Israel's skies against each and every single nuclear missile is worthless. Assuming that Iran is a fanatic yet pragmatic enemy, the argument put forth here is that missile defense is even more significant against a nuclear Iran than against the conventional missiles of Israel's other enemies. The "single missile that gets through" argument is a logical consequence of the hypothesis of a suicidal aggressor. We believe this is not the case of Iran.

The ultimate concern that motivates most critics of Israel's missile defense is the fear that its costs will come at the expense of retaliatory weapons. In reality, deployment of the Arrow did not, as far as is known, block or slow down any other Israeli R&D or acquisitions program. From various statements of Israeli officials as well as from hints in the public domain, it can be reasonably assumed that Israel has not given up any offensive option against Iran. The zero sum game feared by the critics concerning investment in offensive versus defensive weapons is illusory. In Israel's particular situation, missile defense is not slated to replace

offensive options – on the contrary, it is deployed to protect them. The task of Israel’s missile shield is not to ensure against the penetration of a single nuclear missile – this cannot be achieved with confidence in any case – but to enhance the survivability of the retaliatory assets, thus posing an existential dilemma to any aggressor.

In the absence of any communication channels with the leadership of a nuclear Iran, an Israeli missile shield will serve as the most visible survivability measure, and each successful test will send another powerful reminder of Iran’s dilemma. At the same time, defense must not be seen as a comprehensive solution for achieving deterrence. The first and foremost condition for a credible deterrence is devastating retaliation assets. Missile defense’s mission is to secure the survivability of those assets.

It would be better for Israel and the entire world that Iran remain non nuclear. Iran’s nuclearization will pose a powerful challenge that requires significant national resources to establish a credible and stable deterrence posture. The missile defense shield that Israel has been prescient enough to deploy ahead of time is a key element in this deterrence, and the continued investment in its enhancement should be seen as necessary and unavoidable, part of the cost of safeguarding Israel’s continued existence and prosperity against any odds, including a nuclear Iran.

Notes

- 1 Aryeh Stav, ed., *Ballistic Missiles: Threat and Response* (Tel Aviv: Yediot Ahronot, 1998), Preface.
- 2 Mark Heller, “Is the Arrow Really Needed?” *Jerusalem Post*, November 5, 1999.
- 3 Reuven Pedatzur, “A Dangerous Failure in Thinking,” *Haaretz*, August 20, 2000.
- 4 Ephraim Inbar, *Rabin and Israel’s National Security* (Baltimore: Johns Hopkins University Press, 1999).
- 5 Reuven Pedatzur, “Arrow and the Active Defense against Ballistic Missiles – Challenges and Questions,” Jaffee Center for Strategic Studies, Paper No. 42, Tel Aviv University, October 1993.
- 6 Reuven Pedatzur, “New Thinking against New Threats,” *Haaretz*, July 17, 2000.
- 7 Reuven Pedatzur, “Like Europe, Not Like the US,” *Haaretz*, July 12, 1999.
- 8 Ironically, the 2006 Second Lebanon War did cause a fundamental shift in Israel’s military doctrine but in an opposite direction to Pedatzur’s recommendation. Missile defense was endorsed as the “fourth leg” of Israel’s revised doctrine, alongside the traditional triad of deterrence, warning, and decision. As a logical follow up of this shift in doctrine, the IMOD embarked on no less than three new missile defense programs.

- 9 Two of Israel's leading analysts, Dr Adir Pridor, founding head of the Institute for Industrial Mathematics, and Dr. Oded Brosh, Director of Studies at the Institute for Policy and Strategy in the Interdisciplinary Institute of Herzliya, voiced similar views on the rationality of Iran's way of doing business. See addresses at the 2008 Herzliya Conference on the Balance of Israel's National Security, January 22, 2008.
- 10 Iran News in English, December 14, 2001.
- 11 Reuven Pedatzur, "The Iranian Threat – Is It so Dire?" *Nativ* 2, no. 109 (March 2006): 39.
- 12 Reuven Pedatzur, "New Thinking against New Threats," *Haaretz*, July 17, 2000.
- 13 See for example www.globalsecurity.org.
- 14 See for example www.army-technology.com.
- 15 Barbara Opall-Rome, "Israeli Defenses to Use Artificial Intelligence," *Defense News*, January 21, 2008.
- 16 A two-tier system operates in the shoot – look – shoot mode. However, if conservation of interceptor stockpile is not a prime consideration – which would be the case in a nuclear strike – Israel missile defense could switch to a shoot – shoot mode and engage each incoming threat with three or more interceptors.
- 17 Galal Nasser, "Testing Arrow," *al-Ahram Weekly Online*, issue # 706, September 2-8, 2004. See weekly.ahram.org.eg.
- 18 Rubin Hughes and Alon Ben David, "Tier Pressure," *Jane's Defence Weekly*, July 11, 2007, p. 29.