

Chapter V

Strategic Assessment of the Missile Race

The fifth chapter, **Strategic Assessment of the Missile Race**, focuses on the impact of the India-Pakistan missile race. The study reviews the respective national missile programs and the concept of deterrence within the context of their respective national nuclear missile strategies, nuclear policies and postures, and the resultant strategic implications arising out of the impending arms race and proliferation.

Chapter V

Strategic Assessment of the Missile Race

Southern Asia is a term that includes South Asia and western China, and has a quarter of the world's population and a long history of domestic insurgencies and political-military conflict. India, Pakistan and China are the region's three powers currently possessing large-standing militaries, nuclear weapons, strike aircraft and ballistic missiles. India and Pakistan going overtly nuclear in 1998, in particular, has changed the strategic landscape in the region. Further, India's relations with Pakistan are characterized by poor communication and mutual distrust.

This chapter attempts to assess the effects of the India-Pakistan missile race and missile rivalry, their further development, induction and deployment in South Asia. Within this context, the delivery systems for nuclear and conventional weapons strongly influence each country's threat perceptions and military strategy. The chapter explores the nature and type of missile threat in view of the significant military capabilities attained by the countries, the stabilising and destabilising factors, and the value of defensive strategies for managing the proliferation. An impressive array of cross-disciplinary studies has long pointed to the critical importance of accurate assessment as a pre-condition for the successful decision-making. Nowhere is the importance more important than in the arena of national security where leaders risk their States' futures and in cases involving armed conflict, the lives of their citizens, and at times, national survival¹

Definition of Strategic Assessment

A strategic assessment happens early in the planning process and examines the potential impact of actions which might stem from one or more policy, program or plan. "Strategic assessment" implies a forecast of peacetime and wartime competition between two nations or two alliances that includes the identification of enemy vulnerabilities and weaknesses in comparison to the strengths and advantages of one's own side. The practice of strategic assessment involves efforts to measure and forecast trends in various military balances, such as the power-projection balance, the strategic nuclear balance.

Strategic assessment focuses on weapons and force comparisons, with efforts to produce judgments about military effectiveness that sometimes revealed India and Pakistan differences in measuring combat effectiveness and often showed the contrast between what each side considered important in combat. The analysis and assessment of particular issues of concern like the ongoing missile race may involve identifying competitive advantages and distinctive competencies of each nuclear missile force posture; highlighting important trends that may change a long-term balance; identifying future opportunities and risks in the military competition; and appraising the strengths and weaknesses of forces in light of long-term shifts in the security environment. One lesson is that there are different national styles of making strategic assessments. By viewing missile race in comparative perspective, it may be possible to understand better the implications. The word implication used in this study describes the consequence or result of both previous and present event and action.

In short this chapter attempts to investigate the various strategic and security implications arising out of the missile race between India and Pakistan at the global level, and in particular, at the South Asian level. Weapon delivery systems strongly affect the threat perceptions and resultant strategies of India, Pakistan and China. Ballistic missiles present a combination of operational capabilities (range, survivability, lack of an effective defence) and features (flexibility, cost) unmatched by aircraft. As nuclear delivery systems, they can provide a survivable deterrent force. As conventional delivery systems, the relatively low cost of missiles can enable a militarily weak state to counter its numerical inferiority through other areas. As a result, ballistic missiles have become an important part of the world's military arsenals and hence, it is imperative to understand the characteristics of the missile variants and their implications.

Of the missile variants under scrutiny, ballistic missiles play an increasing role in the political and security dynamics of South Asia. India and Pakistan frequently match missile tests on a tit-for-tat basis. The presence of significant numbers of ballistic missiles concurrent with a crisis creates a security dilemma where the protagonists might opt for pre-emptive military action². Missiles are a factor in domestic politics as well. India and Pakistan use deeply symbolic and historical names

for their missiles. The growth of missile forces in Southern Asia has resulted from an action-reaction cycle and tit for tat syndrome in which one side reacts to an act (or perception of an act) by another. India's concern about the ability of Chinese missiles to strike its territory is at the core of its threat analysis. Pakistan feels threatened by the development and capability of Indian missiles. China's transfer of ballistic missile technology to Pakistan, in response to India's development activities, alarms India. Hence, the threat perceptions of the three countries are linked to their respective ballistic missile programmes.

The current security problem in Southern Asia stems from asymmetry. Threat perceptions need to be managed and reduced. Strategic stability with respect to ballistic missiles and nuclear weapons is best achieved within an arms control framework aimed at achieving a mutually agreed set of objectives. It seems likely that, in the absence of arms control agreements, the growth of ballistic missile forces in the region will continue. A number of stability factors were found to play a common role. On balance, there appear to be more destabilizing than stabilizing factors resulting from missile deployment. Similarly there are a variety of primary stabilizing and destabilizing factors that cause a lot of anxiety, tension and mistrust. The most important factors are listed below:

Primary Destabilizing Factors

- Official statements implying almost all missiles are “nuclear capable” create ambiguity
- Missile tests conducted during periods of tension are provocative
- Ambiguity regarding whether a specific missile is nuclear armed
- Concern that the other side's command, control and security of missiles and nuclear weapons may permit an accidental or unauthorized launch
- Concern about pre-emption causes missiles to be deployed defensively early in periods of tension
- Incomplete or inaccurate intelligence information may indicate that an attack is pending and support a decision for pre-emptive action.

Primary Stabilizing Factors

- Small numbers of MRBMs and IRBMs are to be deployed
- Delay results from the process of warhead mounting, missile preparation, and movement
- Missiles are located in garrisons during normal conditions
- Ballistic Missile Proliferation

Pakistan's Babur and Ra'ad Cruise Missiles: Strategic Implications for India³

If recent missile tests are any indication, cruise missiles, rather than ballistic missiles, appear to be taking an increasingly prominent role in Pakistan's strategic force posture. The Babur (Hatf-7) land-attack cruise missile was inducted in 2010, and has been tested three times since. Pakistan's newest cruise missile – the air-launched Ra'ad (Hatf-8) – has been tested four times in all and is due to be handed over to the armed forces in the not-too-distant future. Official Pakistani statements following the cruise missile tests have emphasised their "Strategic" function. Instead of carrying conventional warheads, the cruise missiles are engineered to deliver either conventional or nuclear payloads. If it can overcome significant technological hurdles – including miniaturising nuclear warheads – Pakistan clearly envisions a nuclear role for its cruise missile programme. The strategic aspirations of Pakistan's new and growing missile arsenal comprising of Babur and Ra'ad, would certainly influence India's strategic behaviour in the near future.

The Impact of Babur and Ra'ad

The credibility of Pakistan's nuclear deterrent, augmented by its new strategic cruise missile program, will steer India towards an increasingly prudent military posture. Due to its numerical and geographic advantage over Pakistan – which would almost certainly lead to an Indian victory in a conventional engagement – India would like to create a firewall between conventional and strategic operations, keeping nuclear weapons out of any future conflict with Pakistan. Pakistan however, will not allow this to happen. Instead, Islamabad has done everything, including eschewing a no-first-use doctrine, developing the Nasr short-range ballistic missile, and operationalizing

nuclear-capable cruise missiles like the Babur and Ra'ad – to give the Army the tools to quickly turn a conventional attack from India into a nuclear crisis.⁴

The Babur and Ra'ad have brought the fundamental dilemma in Indian defence planning vis-à-vis Pakistan into sharp relief. That is, India's armed forces – conventionally superior to Pakistan – must be used in a way that punishes the adversary, yet falls short of crossing one of Islamabad's nuclear red-lines. This must be done as Pakistan remains ambiguous about what its nuclear thresholds actually are, and threatens nuclear retaliation.

Furthermore, when Pakistan's newest weapons systems are deployed, they will, especially, be vulnerable to theft from terrorist groups – a non-trivial concern. Clearly, cruise missiles make an existing challenge to Indian defence planning more complex.

Impact of Pakistan's Cruise Missile

Pakistan's nuclear-capable cruise missiles have the potential to complicate India's decision-making calculus and even constrain Indian strategic behaviour. First, Pakistan's cruise missiles will pose a serious challenge to India's fledgling missile defence system. Cruise missiles are virtually undetectable and highly survivable, even in the face of modern missile defences. The first few weeks of the 2003 Iraq War demonstrated that sophisticated missile defences could shoot down ballistic missiles with relative ease, but faced a significantly more difficult task in preventing a cruise missile strike. This is not to say that cruise missiles can never be shot down or that they are perfectly invulnerable. Several US cruise missiles veered wildly off-course – in a guidance-system failure called “clobbering” – during its missile campaign against Afghanistan in 1998, and during the Iraq War.

Additionally, Cruise Missile Defence, unlike Ballistic Missile Defence (BMD), is relatively new end technologies developed to deal with this threat, and are likely to emerge in the coming years. Nevertheless, these shortcomings are superseded by the tremendous advantages cruise missiles have over ballistic missiles in defeating existing missile defences. If the goal of India's missile defence system has been to bait Pakistan into an economically ruinous arms race – as some suggest the US did with the Soviet Union in the 1980s – then it appears to be succeeding. But at what cost to India's

security? Going down this path can only lead to a weaker, poorer, less-stable Pakistani state with more fissile material, nuclear warheads, and missiles. This result – an even more heavily-armed, less-stable Pakistan – is clearly not in India’s interests.

Second, the addition of cruise missiles to Pakistan’s arsenal can obscure the distinction between tactical and strategic weapons, thereby complicating nuclear signalling by creating a degree of uncertainty in the minds of Indian decision-makers. Nuclear signalling involves the preparation or movement of nuclear weapons in order to communicate to the adversary that a situation has escalated to the point where these weapons may be used. Signalling works best in a setting where the message being communicated between adversaries is explicit and clear. Since the Babur and Ra’ad cruise missiles can be used in a conventional or nuclear role, Indian decision-makers may mistakenly view conventional preparations as strategic ones, or vice versa. This confusion would likely lead to India’s armed forces avoiding any unnecessary risks, like penetrating deep into Pakistani territory, crossing the Line of Control, or the use of air power. On the other hand, this ambiguity could provoke the opposite response too. To eliminate a perceived Pakistani threat, New Delhi may disregard its long-standing no-first-use pledge and use nuclear weapons in an offensive, rather than a defensive, fashion. Although this scenario appears extremely unlikely, states will do what they must to protect their sovereignty, even if it means abrogating on previous commitments.

Implications of India’s Ballistic Missile Defence Programme

Indian technologists have yet again demonstrated their increasing abilities to furnish India with a ‘credible’ deterrent. The latest has been the destruction in mid-air of a Prithvi II missile that depicted an incoming hostile missile with an anti-ballistic missile system comprising radars and the weapon. This is part of the BMD programme that has tested both Exo-atmospheric and Endo-atmospheric anti-missile systems so far. Clearly, since this is the Star Wars domain, there is a long way to go. But the media report, in its description of the tests, informs of India, “joining the US, Russia and Israel in an elite group of countries to have accomplished the mission.”

The argument goes that the capability is useful for deterrence. The Ballistic Missile Defence system would be required for protecting against a decapitation strike, and command and control echelons. The latter will enable assured retaliation, since India subscribes to the NFU. Further, since the capability cannot cover extensive areas, it could instead be used to protect a set of land-based weapons from the point of view of a second strike capability. Nuclear submarines constitute the sea based second strike capability. The programme serves other purposes that usually go unmentioned. These include a political dividend in terms of showcasing the government's privileging of the security agenda. It enables the technologists to demonstrate their capabilities, thereby ensuring budgets, continuing recruitment and enabling the appropriate positioning of India in case, in the future, such technologies become a security imperative. That India has such a programme enables it to network with likeminded states for interactions in development, including joint development. India had previously made such an offer to the US.

The Impact on Security

In theory, having the protection of a ballistic missile shield is taken as a tendency towards a first strike posture. The logic is that once a defence is available, behind its cover a disarming first strike can be attempted. The cover can then take care of the disjointed, broken-back response of the enemy. It is for this reason that in the Cold War the two adversaries foreswore antiballistic missiles, but for a site in each state. Mutual vulnerability was the basis of their deterrence. India is not slave to Cold War logic. NFU is a principle tenet of its doctrine. It therefore needs to ensure it does not attract a disarming strike. In case it is able to degrade one, it would be able to make NFU credible.

India is in a situation of nuclear asymmetry with one of its neighbours and definitely so in case of a 'two front' situation. Additionally, instability in its neighbourhood requires that India cater for contingencies that may emerge over the long-term, such as changes in an adversary's nuclear posture, accidental launches and attacks by rogue elements. Nevertheless, given the high-end nature of the technology involved and the prohibitive costs, India is unlikely to be able to operationalize its BMD. Also strategic implications of the development are not necessarily all benign,

even if it appears on the surface to be a defensive, and therefore justifiable, move. Given these, India may proceed with the programme treating it, at best, as a technological demonstrator.

Pakistan is likely to employ the BMD developments as reason enough for vertical proliferation. It has doubled its arsenal size over the past half a decade. It is going in for Pu-based weapons so that they can be carried further by its ballistic missiles and also by its cruise missile programme. These initiatives will get a justification in terms of 'more' and 'better' being needed to take on India's missile shield for the credibility of its second strike capability. From the Pakistani point of view, what matters is India's capability rather than its professions, such as the NFU declaration. Knowing Pakistan does not have an NFU doctrine, in the event of hostilities, India could, behind its BMD, attempt to degrade Pakistani arsenal in a first strike. This would expose Pakistan to Indian conventional advantage thereafter. Pakistani inability to technologically match the Indian BMD head-start implies that it will compensate with numbers and an inclination to 'go first'. A counter argument could be that this is the route Pakistan embarked on in any case. A counter argument could be that this is the route Pakistan embarked on in any case, which had not been prompted by the BMD and would not be given up in case the BMD is dismantled. India's BMD programme gives Pakistani build-up a rationale. Therefore, India needs to secure itself against the higher levels aspired to by Pakistan through, among other measures, BMD.

This strategic dialectic suggests that security is an unintended casualty. Clearly, unilateral advance in isolation of the other is not enhancing the security of either. There is therefore a need for engaging each other. At a minimum, a reversion to the sixth point of the Lahore MOU is a must. This must be resumed as a separate, uninterrupted track. On the domestic front, a parliamentary standing committee needs to be formed for overseeing the nuclear complex and embedding its wares within India's overall strategic doctrine⁵.

The Concept of Ballistic Missile Defence (BMD)

The United States is the pioneer of the concept of developing and deploying nationwide missile defences. The idea of a nationwide US anti-missile system goes

back to the 1980s when President Reagan envisioned a missile defence shield for continental America, named Star Wars, and laid down plans to build the shield to protect mainland America against ballistic missile attacks. It was George W. Bush Jr.'s administration that decided to give it a new impetus. President Bush decided, in December 2002, to field initial elements of a limited missile defence system by September 2004.

India's Pursuit of Missile Defences

India, in its pursuit of ballistic missile defence, has taken two fundamental routes: one to acquire missile defence systems from abroad and second, to develop the system indigenously. India's missile defence acquisition efforts have revolved around variants of Russian S-300 BMD system, the Israeli Arrow BMD and the American Patriot Advanced Capability-3 (PAC-3). India's indigenous efforts have centred on the domestically designed, Akash, a long range surface-to-air missile (SAM).

Therefore, in the short to medium term, India's option could be to acquire the systems from abroad or go for a mix of imported systems and indigenous ones. Given the size of the country, a national BMD system is unlikely. Since BMD systems cost billions of dollars, from an economic point of view India cannot afford a nation-wide missile defence. This would suggest a limited point defence system to protect targets such as Nuclear Command Authority and other nuclear and missile establishments. However, there are a lot of other related issues that confront India as far as deployment of missile defences is concerned. There is some opposition within India against the wisdom of going for missile defences. Even if India managed to deploy missile defences, there is a question mark about its effectiveness against a ballistic missile attack. Moreover, the astronomical costs of BMD systems weighed against the dubious gains from such a system are one of the major concerns of the opponents of missile defences.

Moreover, the Indian government has yet to explain to the public the decision to acquire missile defences. Whatever the shape and size of the Indian missile defence system, its purpose seems neutralisation of a first strike by the adversary and having an assured second strike capability. In addition to the pursuit of missile defences, India

already has a well-developed ballistic missile programme, as well as nuclear warheads, to arm its missiles. For the Government of India, ballistic missiles serve as a potential delivery system for nuclear weapons, as part of a strategic deterrence posture directed against Pakistan and China. While Pakistan's nuclear programme is security driven, India's has wider objectives: it serves an important status function in support of India's long-standing quest for global or at least Asian 'great power' stature. India has developed a short- and medium-range missile capability, which includes the Prithvi and Agni series. At present, India has a missile capability which can target all of Pakistan's territory, and parts of China. But with the IRBM and eventually ICBM development, India will be able to target all of Chinese territory and beyond. To date, deterrence seems to have worked between India and Pakistan, and India and China. However, India's pursuit of missile defences promises to upset and change the deterrence calculations of Pakistan and China.

Implications for the Region

An Indian BMD system, whatever its shape and size and whatever its operational shortcomings, will have a major political and psychological impact on both Pakistan and China. Pakistan and China would respond to an Indian BMD by bringing quantitative and qualitative changes in their nuclear forces and deployment postures, and perhaps go for missile defences of their own. India would in turn be affected by a build-up of offensive weapons and technologies by Pakistan and China, and would have to enhance its own capabilities in response. This action-reaction spiral is likely to give rise to a regional arms race. China, India and Pakistan are enmeshed in a complex three-cornered interaction with great potential for instability. Each member of the nuclear-armed triangle has mounted a war on at least one of the others - China and India fought over their disputed Himalayan boundaries in 1962, and India and Pakistan have gone to war three times, in 1948, 1965 and 1971 and a limited war in 1999. All three states share Lines of Actual Control apart from the international borders. In this scenario, the introduction of missile defences will play a destabilising role, disturbing existing patterns of deterrence. Although all three states pledge to minimum deterrence, leaders in all three capitals have also said that deterrence is not a static concept; the

requirements of each state would therefore, depend on what the others are doing or might seek to do.

The pursuit of missile defences by India would increase chances of conflict between India and Pakistan. The deployment of missile defences, irrespective of whether they are effective or not, could create a false sense of security among the political and military leadership of India and invite military adventurism or even a pre-emptive strike, particularly against Pakistan. India's inclination for a more aggressive approach will have its own disastrous consequences for the security and stability of the region. Missile defence would also put Pakistan at a disadvantage in a conventional conflict, since it can easily intercept airplanes while surveillance and radar components of missile defence systems would put India at an advantage. Thus, missile defences would also accentuate the conventional imbalance between India and Pakistan.

Missile defences will also have a negative impact on arms control efforts. Transfer of BMD technologies from Washington to New Delhi or from Tel Aviv to New Delhi would violate Missile Technology Control Regime (MTCR). Missile defence would undermine regional and global nuclear arms control initiatives and reverse the process of reducing the number of MIRVed warheads in nuclear stockpiles. It would generally weaken China's support for the CTBT, the MTCR, and the Fissile Material Cut-off Treaty (FMCT) negotiations. India and Pakistan would also reconsider their support for FMCT in their pursuit of increased number of nuclear weapons. Improvement of warhead designs by Pakistan might necessitate nuclear testing, disturbing the nuclear test ban in effect between India and Pakistan, and would also lessen the chances of either India or Pakistan supporting the CTBT.

The net effect would weaken support for non-proliferation efforts in the region. The effect of these developments would be to fuel an arms race between the three nuclear powers - perhaps not an arms race in the real sense of the word, but definitely more offensive arms and technologies in the region. It would have a negative impact on the peace process between India and Pakistan. India's move to counter Pakistan's nuclear deterrent could also make the resolution of the Kashmir dispute more remote, and escalate the chances of conflict over the issue. The social and economic development of the region would also be affected. In a region that has a high rate of

poverty and is underdeveloped, increased spending on offensive and defensive weapons would further retard development and increase poverty. In addition, India's social and economic development might be adversely affected if funding for missile defences is added to military expenditures. Pakistan would also have to increase its defence expenditure to compensate for qualitative and quantitative changes in its nuclear arsenal and forces. This would amount to unnecessary burden on the economies of India and Pakistan, and diversion of resources from much-needed developmental activities.

The introduction of missile defences in South Asia by India will not take place in a vacuum. China and Pakistan will respond and reassess their minimum nuclear deterrence requirements. Pursuit of missile defences is only going to give rise to an unnecessary and expensive arms race. In an already conflict prone region, India's missile defences would bring more insecurity and instability, not only for Pakistan and China, but also for India itself. Elements within India need to realise that pursuit of missile defences would be a costly affair, necessitating investment on systems with no proven capability of providing credible defence against ballistic missiles.⁶

Missile Defence in South Asia: Implications for the Region

Over the past decade, India has pursued an active missile defence option with the help of the United States, Israel and Russia, in the shape of Patriot Advanced Capability (PAC), the Arrow, and S-300 missile defence systems. It has also considered developing a system of its own. In a region which has seen four wars over the last 65 years and where, in the last few years, the nuclear armed adversaries - India and Pakistan - have fought one limited war and seen a tense period of force mobilisation, the introduction of missile defence is likely to adversely impact the fragile security and strategic balance. Moreover, China, which provides the declared rationale behind the maintenance of an Indian nuclear arsenal, would also be affected.

China's deterrence, which is based on a modest deployed nuclear arsenal, would be certainly affected with the introduction of missile defence by its neighbour. The nuclear deterrent of Pakistan, and to some extent, that of China would be in danger of becoming destabilised. These countries might respond by either increasing their nuclear

arsenals or by trying to acquire missile defence systems of their own, among other defensive options. In either case, the net effect is likely to fuel a nuclear arms race, as well as a costly race for better and effective defence systems. Since the pursuit of missile defence in South Asia is a relatively recent development, little analytical attention has been paid to India's ballistic missile defence plans, its costs and implications for India itself, and for its neighbours Pakistan and China in terms of security and stability of the region. This study aims at analysing the net effect of missile defence on the deterrent capabilities of Pakistan and China and their likely responses.

Arms build-up in India's Missile Test

India's successful test of a long-range ballistic missile capable of carrying a nuclear warhead is the latest escalation of an arms race in Asia, where the assertiveness and rising military power of China has rattled the region and prompted a forceful response from the Obama administration. The testing certainly signifies another milestone in our quest to add to the credibility of our security and preparedness, and to continuously explore the frontiers of science. By launching the Agni-V, a ballistic missile capable of reaching Beijing and Shanghai, India joined a small club of nations with long-range nuclear capability, including China, Britain, France, Russia, Israel and the United States. While India was jubilant, Pakistan and China reacted warily, amid growing international apprehension about the increasing militarization in Asia.

India and China share a 2,100-mile border, which both countries have beefed up militarily in recent years. The testing of Agni-V would enable the Indian military, for the first time, to reach China's most important cities, Beijing and Shanghai, with a nuclear attack. The timing of the missile launching could heighten Chinese suspicions and also "increases the perception of an arms race, and the reality of an arms race, in East Asia, particularly between China and India." Perhaps no Asian nation has been more unnerved by rising Chinese power than India.

The missile can be launched from a mobile platform, a claim that raised immediate concerns with India's traditional rival, Pakistan, which is also a nuclear power. The missile adds to India's growing second-strike capabilities, particularly if

India can construct a naval version of the Agni-V to deploy on its nuclear-powered submarines. A submarine based missile “can be deployed beyond the reach of a Pakistani first strike, thus ensuring survivability of its nuclear force”. This could alter the strategic balance in South Asia, and further affect Indo-Pakistan relations in the near future. However, India’s military abilities, strategic and conventional, still lag far behind China’s, whose missiles can hit targets 6,200 miles away.

India’s Missile Modernisation⁷

India's 5,000km range Agni-V ballistic missiles first test represents, in the words of its architects, 'a quantum leap in India's strategic capability'. The manner in which India now operationalizes and builds on this platform will serve as an indicator of its intentions for how the country balances the twin demands of credibility and economy in its nuclear arsenal. Over the decades, India has made gradual progress towards a diversified nuclear triad and mature command and control arrangements.⁸Based on sequential scientific advancements, and guided by a sense of the nuclear force as a numerically small yet critical aspect of India's great power aspirations and national security, its arsenal now approaches new benchmarks of lethality and range. No Indian missile has been assigned as much political significance as the newly tested AgniV.

Maturing second-strike capability

The AgniV missile is the first to put Beijing, Shanghai and other northern and eastern Chinese targets within India's nuclear reach. Mr.V.K.Saraswat, Director of the Defence Research and Development Organisation (DRDO) developing the missile, alluded to its prospective targeting at China in explaining its specific range, stating that ‘the missile's range and lethality is based on the immediate objective of threat mitigation’. The missile is also road- and rail-mobile, employs a solid propellant, and is configured to hold several Multiple Independently Targetable Re-entry Vehicle (MIRV) warheads. These measures collectively enhance the 'penetrability', potency and survivability of the Indian deterrent - and therefore the robustness of its second-strike capability.

This will still take some time yet. As defence journalist Manoj Joshi observes, 'the launch has been decreed a success, well before the DRDO would have had the time to analyse the telemetry data that the test launch provided'. It will take years, and more tests, before the missile is inducted. Nonetheless, its development reflects a process of technological and diplomatic transformation. The Agni-V is an offshoot of India's indigenous effort. Previous missiles in the programme have included the Agni-III, with a reach of over 3,500km, and the Agni-II (2,300km) and Agni-I (800km). The Agni-V is classified as an Intermediate Range Ballistic Missile (IRBM), usually understood to have ranges between 3,500km and 5,500km and therefore some classify Agni-V as an Intercontinental Ballistic Missile (ICBM).

Diplomatically, too, the Agni-V is a symbol of India's changed place in the world. In 1994, the United States pressured India to suspend testing of the Agni series after just three test flights. India formally suspended the programme at the end of 1996, although it deployed other short-range ballistic missiles near the Pakistani border in early 1997, and resumed testing that same year. The muted American response to the test of the Agni-V, despite Washington's concern over the missile programmes of Iran and North Korea, is indicative of the rapid improvement in the US-India bilateral relationship over the past fifteen years.

Implications of India's Long-Range Missile Capabilities

As the latest addition to India's expanding arsenal, the launch of the Agni-V long-range missile is another step forward in the diversification of India's nuclear strike capabilities. While India celebrates its technological achievement, the development of a nuclear-capable intermediate-range ballistic missile, with an estimated range of 5,000 kilometres or 3,100 miles, is likely to intensify strategic competition between Pakistan and China, which have viewed these developments with reservation. Although senior Indian officials publicly say that the Agni-V is for deterrence purposes only, India has a clear rationale behind the missile's development, which is to demonstrate its expanding strategic strike capabilities, impress the world's major powers that possess intercontinental missiles and deliver a strong message to Pakistan and China.

As a nation that has reportedly doubled the size of its nuclear arsenal within the last ten years, the Agni-V is the latest addition to India's nuclear-capable weapon systems, adding to its existing missile and aircraft-delivery systems. Among Indian strategic planners there is an influential school of thought, which firmly believes that India must develop world-class military strike capabilities and project the symbolism of a major world power. This, they believe, will provide greater international recognition and further strengthen India's case to obtain a permanent seat in the UN Security Council.

Although the Indian Government has tried to downplay the Agni-V and portray it as a defensive weapon, Indian defence analysts and the media point out the weapon's significance in giving India strategic parity against China. The fact that India deliberately chose not to inform China of its intention to launch the new missile is indeed revealing, given that all other permanent members of the UN's Security Council were reportedly told. At this stage, what impact the Agni-V may have on China's strategic and defence policies is difficult to interpret, but it is likely that China will look to strengthen further its strategic ties with Pakistan, and other Indian Ocean countries that surround India's immediate neighbourhood. This development could certainly draw both Pakistan and China into rivalry and intense competition with each other.⁹

India's Nuclear Doctrine

One important question is whether the missile heralds a new plateau in India's nuclear ambitions, or merely serves as a bridge to a yet-more advanced arsenal. Following its 1998 nuclear test series, India sought to assuage international fears by convening a panel of civil servants, defence scholars and journalists, chaired by K. Subrahmanyam, a former civil servant and one of India's pre-eminent strategic thinkers, to formulate a draft nuclear doctrine. The resulting doctrine envisioned an Indian nuclear force defined by principles of 'no-first-use' and 'credible minimum deterrence'. Although this intended as a small, defensive Indian nuclear force, its size was to be conditioned on its ability to deter adversaries.

India's Cabinet Committee on Security (CCS) then issued an official nuclear doctrine in 2003. This tightened up the language of the 1999 doctrine, while outlining

the establishment of a Nuclear Command Authority to create a clear chain of command. The doctrinal statement of India could be seen in the context of credibility, in terms of numbers or weapon systems that coincides with India's most impressive advancements in the history of its nuclear force, culminating in the Agni-V and the sea trials of its first indigenous nuclear-armed submarine, the Arihant. In the absence of a new doctrinal direction, the future of the Agni-V will shed some light on India's nuclear intentions. In the years since 2003, it became apparent that credible minimum deterrence would be interpreted so as to require Indian planners to 'take into account the arsenal size and posture of both of India's nuclear neighbours', and that 'India [had] nuclear weapons requirements beyond those needed simply to destroy a minimum number of Pakistani or Chinese cities'¹⁰. In other words, the balance between the 'credible' and 'minimum' parts of the nuclear doctrine remained in flux.

The China Factor

The two most prominent strategic concerns for India have been Pakistan's arsenal, estimated at 90-110 warheads, and China's at 170 warheads, the latter bolstered by an ICBM of over 11,000 km range. The missile balance with respect to China was seen as particularly adverse. One estimate from 2009 judged that China deployed a 'total of 66 ballistic missiles, based in Kunming in Yunnan, and Xining in Qinghai, apparently target India (among other countries)¹¹. These include the 1,800 km DF-21, 2,800 km DF-3A, and 4,750 km DF-4. According to Ashley Tellis, 'the current Chinese [nuclear] modernization effort merely represents a continuation of the latent threat that India has lived with since 1964', the year when China obtained nuclear weapons.¹² The test of the Agni-V is the culmination of many years of cumulative research and development, and is not directly related to the immediate state of the Sino-Indian relationship. New Delhi also worries about a deepening Chinese presence around its land periphery and in the Indian Ocean, as well as Beijing's continued support to Pakistan's nuclear programme and military. Consequently, the Agni-V has been ascribed a political status and symbolism to a greater extent than prior missiles. Even as operational questions - such as the balance of airpower with China, and Indian military readiness - remain worryingly open, the ripening of India's second-strike capability will provide a certain degree of reassurance to India about the strategic balance.

An Agni-V deployed in modest numbers, and accompanied by political signals that the system's development represents the maturity of India's nuclear forces, would most closely accord with the initial spirit of credible minimum deterrence. By contrast, if the Agni-V is seen as a 'bridge' to a much more diverse and sizeable Indian arsenal, and its production and deployment eventually takes place in large numbers, this could herald a strengthening of the more assertive strand in Indian nuclear thinking. This is not about India adopting a nuclear posture of counterforce and embracing nuclear war-fighting. Rather, this is about a longstanding debate, pioneered in the United States, between the view that 'deterrence can be achieved only through difficult choices, sustained with intelligent effort, and will depend very much on the technical details' and the opposing view that, 'beyond a certain point, all of this is crazy talk, and the technical details don't matter very much at all'¹³. India's approach to nuclear weapons is, and is likely to remain, closer to the second of these - but that is not to say that the 'technical details' of nuclear deterrence will not assume greater prominence in India's security policy.

According to Michael Krepon, 'Pakistan and India are entering a less stable phase of offsetting, growing, and more diversified nuclear missile capabilities, one that is complicated by China's strategic modernization programs.'¹⁴ This should not be taken, as it is in some superficial accounts, to imply an arms race. Arms races entail a mutually reinforcing and open-ended arms build-up. Nor does it mean that India's nuclear force is growing as fast as Pakistan's - it is not. But India lacks a national security strategy or a nuclear posture review. As a result, it is difficult to assess the likely contours of India's arsenal over the longer term. As India's former Army Chief, General K. Sundarji, once observed, 'in war-fighting, whether conventional or nuclear, whilst calculating relative strengths, more is always better. But for deterrence, more is not better if less is adequate.'¹⁵

Credible Minimum Deterrence

India has been modernising its missile capabilities. It has successfully flight-tested its longer range missiles like Agni-IV and Agni-V. It has also made efforts at canisterising its missiles with statements from senior DRDO officials pointing to the development of missiles capable of carrying multiple warheads. These developments

have resulted in analyses (here and there) which argue that India is “moving away from its stated doctrine of minimum deterrence towards one with more war-fighting like capabilities.” However such arguments are a simplified understanding of a complex dynamic that underpins the relationship between China-Pakistan alliance and India. Such an understanding fails to take into account India’s unique geo-political situation where it shares borders and a troubled history with two nuclear armed neighbours, China and Pakistan.

Over the past few decades, China has made rapid advances in economic, military and technological spheres to assume a pre-eminent position in the comity of nations. China’s great power ambitions have put it in direct competition with the United States. While largely directed at the US, Chinese actions have an inevitable impact on India’s security. However, the analyses referred to in the above paragraphs, conveniently choose to ignore the larger fundamental drivers for the current state of affairs, and prefer to focus on a small subset thereby placing the entire onus of maintaining stability on Indian shoulders. On closer look it is apparent that China has already canisterised its long-range, solid-fuelled missiles like the DF-21, DF-31 and the DF-31 variants. Similarly, China is believed to be deploying the MIRV capability in its missiles as the June 2012 test of PRCs DF-41 establishes. India is therefore not the first mover in this field but is merely responding to the developments in its neighbourhood. The developments in the Indian missile programme need to be seen in the context of the emerging developments in both Pakistan and China and not in isolation.

Modernisation and India’s Nuclear Doctrine

Nuclear doctrines and nuclear postures are dynamic in nature. By definition they will respond to the changing security threats and the overall security environment. India has a declared policy of no-first-use (NFU), and India’s nuclear doctrine espouses a posture of “credible minimum deterrence” and not “minimum deterrence.” The difference is crucial in understanding the recent developments. It is widely accepted that India follows a centralized command and control. Therefore, the ability to launch missiles from canisters – which China also possesses – should not be seen as an end in itself but should be viewed in conjunction with the country’s command and control (C^2) structure. In a centralized C^2 structure, deploying canisterised missiles

would not necessarily translate into a move towards acquiring war-fighting or assuming a first-strike posture. The acquisition of such a capability therefore does not necessarily mean that India will launch a first strike.

Mobile and canisterised missiles are harder to target, especially given the fact that a proportion of such missiles could also be decoys. This would in essence increase the survivability of India's nuclear forces as it would not be possible for India's adversaries to be certain that they have indeed destroyed all of India's nuclear forces in a first-strike. This would in essence add to the credibility of India's nuclear deterrent image, and promote stability. Secondly, working towards the capability to launch a second strike in the shortest possible time would strengthen India's NFU policy. Given India's centralized C² structure, this would translate into India having the option to wait till the last possible opportunity before moving to heighten the readiness levels of its nuclear weapons during a conflict. In crisis situations, this would in essence delay escalation of the conflict. Definitely that cannot be seen as destabilising factor.

Also, shorter response times and an assured response would add to the credibility of India's nuclear deterrent image as perceived by New Delhi's adversaries, thereby adding to the stability in the region. In any case, following the doubts introduced by China in the April 2013 Defence White Paper regarding its NFU, India is the only country which continues to publicly espouse a policy of NFU in its nuclear doctrine. **Lastly, given the dynamic nature of nuclear doctrine and postures, countries are likely to respond to changing security dynamics. Therefore, the ongoing modernisation of India's missile programme in terms of improvements in payloads, accuracy and responsiveness add to India's stated policy of "credible minimum deterrence" and New Delhi's resolve to follow through with its commitment to No-First Use.** They are in essence attempts by India to preserve such technological options for the future rather than for immediate deployment. As such, these efforts are nothing but natural responses from New Delhi to the changes in its security environment rather than any move away from its stated nuclear doctrine.¹⁶

Pakistan's Strategy

As far as Pakistan is concerned, its nuclear missiles and strategies are entirely *India-centric*. In spite of three wars and a major setback in the Kargil conflict, it has so far not changed its fundamental approach. The use of non-state actors to further its cause does not require any reiteration. In the nuclear weapon and missile domains, it is trying to change the terms of its engagement with India from a strategic nuclear weapons game into a more conventional war-deterrence game. Pakistan's recent focus on the Khushab reactors and the production of plutonium, cruise missiles and the Nasr battlefield nuclear capable missile that can be used in a land war with India, are clear indications of a shift away from a simple nuclear deterrence strategy towards a more complex conflict or war deterring strategy that uses the threat of nuclear escalation to deter the opponent, in this case India.

An additional benefit of such a strategy is that it can help Pakistan in continuing its support to jihadi terrorist groups without any response from India. To categorise the Indian response signals to her adversaries' actions as destabilising is to apply the Cold War logic of deterring nuclear war to a more complex situation in the Asian region. The above developments would suggest that both China and Pakistan follow similar approaches which cannot be ignored or overlooked. For them nuclear weapons are not meant to deter and prevent nuclear war but to raise the threshold for any kind of military intervention in a conflict scenario with their adversaries.

Nuclear Weapons and Deterrence

Nuclear doctrine and strategies are dynamic in nature and are not set in stone. They evolve and change in response to changing security environment that any country faces. Depending on the security challenges that India faces, New Delhi's strategies and postures will evolve. Current developments however do not warrant a change in India's nuclear doctrine of No-First-Use and Credible Minimum Deterrence. While China has the distinction of possessing the world's fastest growing nuclear force, Pakistan is home to the fastest growing nuclear stockpile in the globe today. In the background of continued Sino-Pak alliance, these developments pose an important security challenge for India¹⁷. One needs to understand the changing security dynamics in the context of

the emerging missile race in Asia in general, and South Asia in particular, with reference to Pakistan. So long as the race continues, there is bound to be a change in their approach and strategies.

Strategic Implications

- Given its strategic situation, India's missile development, admittedly, constitutes an important element of its national defence preparedness. But the launch of the Agni-V, especially the timing of the test, coming right after the North Korean missile launch failure, has put the West in a political quandary. The US, Britain, France and Australia, which support India's rise and see it as a potential counterweight to China, now seem to openly acknowledge that when it comes to strategic missile tests, some countries are more equal than the others. This is exactly what appears to have riled Chinese strategists. Needless to say, the latest Agni launch may not just end up impacting the balance-of-power equation in the subcontinent, but also the broader India-China relationship.

Such an outcome may be unfortunate. Despite being dubbed as an 'enigma' by political and strategic experts in both countries, India-China relations have, in recent days, witnessed a turn for the better. The two nations regularly engage in dialogue and have declared their intention to build a stronger bilateral relationship, even undertaking a dialogue on maritime security. However mistrust persists, even as the enduring legacy of the border dispute continues to hold the relationship hostage. To make matters complicated, each country has seemed to have established stronger security relations with the other's primary potential adversary.

- While Beijing is worried over India's emerging relationship with the US, India continues to regard China's ties with Pakistan with suspicion. Given the history of Beijing's assistance to Islamabad in nuclear and missile technology, India's is an entirely valid apprehension. China's growing assertiveness in the Indian Ocean has been giving India the strategic 'heebie-jeebies', and many Indian experts remain convinced that Beijing's "strategy of encirclement of India" is no conspiracy theory. Meanwhile, China remains anxious about India's supposed interference in Tibet and on its increasingly assured assertions on the border issue. Sadly, the somewhat 'partisan' media on both sides continue to sensationalise issues and stoke passions, much to the chagrin of the politicians, at least in India.
- China's reactions to the event, on the other hand, provide evidence that strategic missile capability remains a crucial determinant of strategic equations between powerful nations. Strategic weapons, in a sense, continue to mediate the hierarchy of power and geo-strategic clout among the top global players. India's rapid economic growth and military rise has catapulted it onto the international centre-stage. But even as New Delhi urges the other occupants of the high table to take a

balanced view of the Agni-V test, many will interpret it as an act of “strategic messaging”.

India’s first indigenous radar satellite RISAT-1

India successfully launched its remote sensing Radar Imaging Satellite (RISAT-1) on 26th April 2012. This success, when viewed along with the successful launch of the first long-range ballistic missile speaks volumes about India’s technological growth in recent years. India’s first ingeniously made Radar Imaging Satellite (RISAT-1) was launched by the Polar Satellite Launch Vehicle (PSLV-C19). The success of this launch has also proved the reliability of the Indian Space Research Organisation’s (ISRO) PSLV launch vehicle; this was the 20th successful successive launch of this vehicle. The rocket launched the satellite to an altitude of 480 km and within a few days in-flight manoeuvres would take the satellite to its final orbital configuration at 536 km altitude. RISAT-1 weighs 1,850 kg and has a designed life of five years. This satellite is the result of a 10year effort by ISRO, which undoubtedly is no mean effort.

Indian Ballistic Missile Defence and its Consequences¹⁸

India’s proven Ballistic Missile Defence (BMD) network is ready for a roll-out in at least two metropolises – New Delhi and Mumbai. While limited in scope, its breakthrough technology showcased the capabilities of the country’s scientists and technologists. The first successful launch of PAD (Prithvi Air Defence) anti-missile was conducted in November 2006 in which PAD missile successfully intercepted a modified Prithvi-II Missile at an altitude of 50 km. The Prithvi-II Ballistic Missile was modified successfully to mimic the trajectory of Chinese M-11 missiles. Recently validating its Ballistic Missile Defence (BMD) capability, India successfully launched an interceptor missile to destroy an incoming target missile in a direct hit over the Bay of Bengal on 10 February 2012. The interceptor, called Advanced Air Defence (AAD-05), was launched from a mobile launcher on Wheeler Island, off the Odisha coast, and destroyed the target missile in mid-flight at an altitude of 15 km over the Bay of Bengal. The AAD-05 used a longer range seeker to inch close to the intruder and “kill it in a direct hit”. The target missile mimicked an incoming enemy missile with a range of more than 2,000 km. This was the seventh interceptor mission and the fifth endo-

atmospheric interception. Six of the tests to date have been successful, including the first three in a row.

The Role of Indian Strategic Force Command (SFC)

The Indian Strategic Forces Command (SFC), sometimes called Strategic Nuclear Command, forms part of India's Nuclear Command Authority (NCA). It is responsible for the management and administration of the country's tactical and strategic nuclear weapons stockpile¹⁹. It was created on January 4, 2003 by the Vajpayee Government²⁰. Air Marshal Teja Mohan Asthana became its first Commander-in-Chief.²¹ It is the responsibility of the Strategic Forces Command (SFC) to operationalize the directives of the NCA under the leadership of a Commander-in-Chief who is a three-star rank officer.

The SFC will have the sole responsibility of initiating the process of delivering nuclear weapons and warheads, after acquiring explicit approval from the NCA. The exact selection of the target area shall be decided by the SFC through a calibrated, cumulative process involving various levels of decision-making, and with formal approval by the NCA.²² The SFC manages and administers all strategic forces by exercising complete command and control over nuclear assets, and producing all contingency plans as needed to fulfil the required tasks. Since its inception, the SFC's command, control and communication systems have been firmly established, and the command has attained a high state of operational readiness.

The Strategic Forces Command which handles nuclear weapons delivery system, test fired the surface-to surface Prithvi-II missile on January 8, 2014 from a mobile launcher. The missile, capable of carrying a 500 kg nuclear warhead, covered its full 350 km range with ease. Naval missile equivalent of Prithvi-II is Dhanush. This strategic missile launched from ships is capable of carrying a 500kg warhead over a distance of 250 km²³. India's nuclear deterrence programme gained strength again when Agni-IV, a surface-to surface missile was again successfully test fired on January 20, 2014. Agni-IV is a strategic missile that can deliver one-tonne nuclear warheads about 4000 km away. The Defence Research and Development Organisation (DRDO), which developed Agni-IV, fired the missile. DRDO personnel tested it for its entire

range of 4000km. This is the third successful flight in a row for the missile- the first triumph was in November 2011, and the second in September 2012. The string of successes paves the way for the missile's induction into the Army. It takes India's level of deterrence, its preparedness and effectiveness to newer heights.

Agni-IV was an entire warhead minus the nuclear part. The missile is fuelled by solid propellants. The missile had several modifications compared to its previous flight. They included its limited telemetry and its design which was close to the deliverable configuration for the Army. With its range, it can cover the entire area on the other side of the border. Since the missile can lift-off from a road-mobile launcher, it can move anywhere in the country, and this is its main strength. Agni-IV is equipped with sophisticated avionics, fifth generation on-board computer and distributed architecture. It has features to correct and guide itself during in-flight disturbances. The missile is 20 metres long and weighs 17 tonnes.²⁴ While the country is elated, there is a strategic unease in the region. Thus, the mission's significance was that it was flight tested in deliverable configuration for the Army, with the active participation of personnel from the Strategic Forces Command (SFC). The SFC handles India's nuclear weapons delivery system. The Army has already deployed Agni-I, II, III, Prithvi-II and Dhanush missiles, all of which carry nuclear warheads. The Sea-based and Land-based nuclear armed ballistic missiles and are given in the following **Tables: 5.1 and 5.2.**

Missile Name	Type	Maximum Range	Operational Status
Dhanush	Short Range Ballistic Missile	350 Km	Developed but not Operationally Developed
Sagaraika (K-15)	Submarine Launched Ballistic Missile	700 Km	Awaiting Operational Development on INS Arihant
K - 4	Submarine Launched Ballistic Missile	3,500 Km	Under Developemt

Table 5.1: Sea-based Nuclear Armed Ballistic Missiles

Missile Name	Type	Maximum Range	Operational Status
Prithivi - I	Short Range Ballistic Missile	150 Km	Operationally Deployed
Agni I	Short Range Ballistic Missile	700 Km	Operationally Deployed
Agni II	Medium Range Ballistic Missile	2,500 Km	Operationally Deployed
Agni III	Intermediate Range Ballistic Missile	5,000 Km	Operationally Deployed
Agni IV	Intermediate Range Ballistic Missile	4,000 Km	Successfully Tested
Agni V	Intercontinental Ballistic Missile	➤ 5,500 Km	Successfully Tested
Agni VI	Intercontinental Ballistic Missile	10,000 Km	Under Development

Table 5.2: Land-based Nuclear Armed Ballistic Missiles

Voids in Air Defence Forces

Air defence remains a crucial element in the context of the growing missile variants in the region and there exist a few shortcomings of current air defence cover, which are summarized as follows: at present, surface to air missile (SAM) defences are confined to relatively short-range defence of point targets. Area defence is exclusively the preserve of manned interceptors. Many of the principal long-range 3-D (detecting range, bearing and height of airborne object) surveillance and ground control interception radars (GCI) are ageing. Most of the systems are of 1980s vintage and, despite being upgraded, would provide inadequate detection capabilities against stealthy cruise missiles and ballistic missiles. The AD surveillance, reporting and defence network is not fully extended nation-wide. Defences are concentrated at targets

within aircraft range from Pakistan and China. These are ineffective around increased number of strategically and economically vital targets deep within India's heartland and in the South. India's SAMs and the manned interceptor aircrafts lack meaningful capabilities against ballistic and cruise missiles, unarmed aerial vehicles (UAVs) and attack helicopters.

Pakistan's Missile Capability

With a reported total stockpile of 100 plus nuclear warheads, Pakistan is likely to be able to arm a significant proportion of its missile inventory with such weapons. The ranges of Pakistan's missiles in service and under development would put almost all of India within its striking range. Pakistan's missiles are all land-based. Hence, their points of launch and trajectories are relatively easy to predict. However, because of the close proximity of launch sites to India, the warning time in the event of an attack could be as little as 5 minutes. This would demand an extremely rapid detection, tracking and engagement system. Pakistan has developed a cruise missile Babur (Hatf-7), which is nuclear-capable.

Pakistan's Missile Capabilities and its Impact on India

For Delhi, Pakistan's missile force sustains a strategic preoccupation with its larger political-military challenge. Pakistan's emphasis on increased accuracy, manoeuvrability and the apparent range of non-nuclear warheads, at least for the Ghaznavi, point to an edge over India, especially concerning SRBMs. While the Indian Prithvi SRBM is reported to have high accuracy and some manoeuvre capability, its use of liquid fuels might also limit its flexibility. This has led India to develop one and show more interest in the Russian Iskander-E solid-fuelled SRBM, which is capable of low, manoeuvring trajectories, and has an optical seeker for attacking moving targets. Meanwhile, India has a clear superiority in the development of indigenous electro-optical and future radar satellites that can aid missile targeting. But Pakistan could quickly catch up if given access to information from imminent Russian-influenced Chinese electro-optical and radar satellites. If acquired by Pakistan, the HQ-9/FT-2000A ATBM might be useful only against short-range Indian missiles like the Prithvi or Dhanush, and not against the faster and longer-range Agni missiles. This points to a

possible emerging Pakistani advantage: it may be in the process of developing a better defence against Indian SRBMs, and challenging possible future Indian ATBMs to take down a manoeuvring and low-altitude Ghaznavi/DF-11 Mod 1. However, possible future Indian high-altitude ATBMs like the Israeli Arrow 2 might pose a credible defence against the lower-tech Ghauri or the Shaheen 2-if attacked early enough in the flight cycle. One hope in the India-Pakistan missile competition is that the interest in missile defence systems might prompt bilateral interest in a stable balance of offensive and defensive systems. At this point it is too early to determine if this will prove to be the case. Nevertheless, during the summer of 2004, Pakistan and India took clear and welcome steps to put in place new "confidence building measures" essential to build towards further dialogue.

Dangers of Proliferation

For Delhi, Washington and others, Islamabad's missiles highlight the dangers of Beijing's and Pyongyang's continued proliferation of weapons of mass destruction, and possible new dangers of secondary Pakistani proliferation. Washington has repeatedly sanctioned Chinese and Pakistani missile concerns on the basis of their continued cooperation. The on-going development and deployment of successive Chinese and North Korean-based missiles in Pakistan is a sure indication that all three countries are choosing to ignore Washington's concerns. The last decade has also seen the dangers of Pakistan's participation in nuclear weapons technology trafficking, especially by the "father" of Pakistan's nuclear weapons, Abdul Quadeer Khan. Khan's network was exposed to the world by Libya, when in 2003 it chose to begin dismantling its nuclear and missile systems in return for Western recognition. And while Pakistan may have curtailed Khan's personal involvement in WMD proliferation, there is the continued danger that Khan's associates or other high-level Pakistani nuclear and missile experts may be inspired to follow his example. Pakistan's solid and liquid fuel missile development and production infrastructure point to another potential area of proliferation. While India and Pakistan may continue to strive for missile advantages to serve perceived deterrent objectives, outside actors have some tools for influencing this competition. Encouraging the positive dialogue between Delhi and Islamabad, started in mid-2004, is an obvious one. But it is also useful to shift this competition into

defensive systems, to help reduce the desirability of ever greater numbers of offensive systems. To this end it serves the interests of South Asian stability for the US to continue to engage India in missile defence cooperation. Such cooperation also serves to place positive pressure on China to reconsider its rapid build-up of offensive missiles, and its unwillingness to halt its dangerous missile proliferation. While they are not all linked, missile defence cooperation with India can complement US missile defence cooperation with Australia, Japan and Taiwan. This effort affirms American strategic leadership in this region while demonstrating that Asian democracies will defend themselves against Beijing's growing direct and indirect missile threats²⁵.

China's Missile Capability

Even though analysing China's missile capability is not within the purview of this study, their 600 ballistic missiles and approximately 240 reported nuclear warheads can never be ignored, for China is a most formidable nuclear power with ambitions extending beyond South Asia. China also possesses a substantial inventory of air and sea launch cruise missiles, some capable of carrying nuclear warheads. China's air force is also undergoing modernization with increased capability of launching air to surface munitions including nuclear weapons. The trends noticed therefore can never be taken lightly, ignored or overlooked in the context of threat perception. India's missile capabilities in contemporary times need to provide assurance against coercion, deterrence and protection not only against threat of attack on homeland but also in facilitating the security of its interests.

Complexity of BMD System

The BMD concept is very complex. Thus having PAD and AAD does not equal the interception of entire range of BMs in the inventory. Range of a BM determines its speed of travel, altitude, trajectory and the technological sophistication. Hence a broadly used classification is as follows:

- ICBM – Above 5000 km range, speed – 12 to 22 mach.
- IRBM – From 3000 to 5000 km range and speed – 8 to 12 mach.
- MRBM – From 1000 to 2000 km range and speed – 5 to 8 mach.
- SRBM – From 300 to 1000 km range and speed 3 to 6 mach.

Ballistic missile/air defence system for each of the above class of missiles will require a different range of increasingly complex and hyper levels of technologies to enable desired interceptor missile speeds, altitude, manoeuvring, navigation and homing systems, and type of warheads. Also required will be equally real time and reliable Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities from satellites, airborne early warning, UAVs to series of ground based stations and also Battle Management Command Posts (BMCPs). India's successful Moon Mission would imply that it has access to all types of technologies which are required to develop various types of ballistic missiles, and also BMDs along with associated support systems. A missile defence system has three main components namely: Interceptor system to include interceptor missile, fire control radar, support launcher and indigenous Battle Management Command Post (BMCP).

Early Warning Sensor System (EWSS), Battle Management Command Post (BMCP), Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR)

An oncoming missile can be intercepted during boost phase (30 to 300 seconds depending on range of missile), mid-course (3 to 10 minutes) and terminal phase (10 to 20 seconds). Boost phase interception is very difficult as it needs space/ airborne/ sea based platform and an early warning system to detect and engage the threat missile. Mid-course interception usually takes place outside the earth's atmosphere (above 30 km termed as exo-atmospheric interception). Terminal phase interception takes place after the threat missile's re-entry into the earth's atmosphere (called endo-atmospheric interception). Interception of MRBMs with more than 3500 km range is termed upper layer interception (generally above 80 km altitude). In order to get an acceptable level of kill probability, BMD system attempts to engage incoming threat missile with a minimum of two missiles at different ranges and altitudes. This determines scale and pattern of deployment with early warning imperatives of a BMD system.

Project Air Defence

It is a two tiered system consisting of two interceptor missiles, namely Prithvi Air Defence (PAD) missile for high altitude interception, and the Advanced Air

Defence (AAD) missile for low altitude interception. Development of Anti-Ballistic Missile (ABM) system began in 1999. Around forty public and private companies were involved in the development of the ABM System. The System consists of the PAD, which would intercept missiles at exo-atmospheric altitudes of 50-80 km, and AAD Missile for interception at endo-atmospheric altitudes of up to 30 km. The deployed system would consist of many launch vehicles, radars, launch control centers (LCC) and a mission control center (MCC). All these are geographically distributed and connected by a secure communication network. MCC is the software intensive system of the Ballistic Missile Defence. It receives information from various sources like Radars, Satellites, etc. which is then processed by ten computers running simultaneously. MCC is connected to all other elements of the system through a wide area network (WAN). MCC performs target classification, target assignment and kill assessment. It acts as a decision support system for the commander. It can also decide the number of interceptors required for the target for an assured kill probability. MCC after performing all the functions assigns the target to Launch Control Centre (LCC) of a battery.

Launch Control Centre (LCC) starts computing the time to launch interceptor, based upon information received from the Radar. This is decided on the basis of data received from radar, on the speed, altitude and flight path of the target. LCC prepares the missile for launch in real time, and carries out ground guidance computation. After the interceptor is launched, it is provided target information from the radar through a data link. When the Interceptors close on to the target ballistic missile, the LCC activates the active radar seeker to search for target missile and guide itself to intercept the target. Multiple PAD and AAD interceptors can be launched against a target for high kill probability.

Prithvi Air Defence (PAD)

Prithvi Air Defence (PAD) is an anti-ballistic missile developed to intercept incoming ballistic missiles outside atmosphere (exo-atmospheric). Based on the Prithvi missile, PAD is a two stage missile with a maximum interception altitude of 80 km. The first stage is a liquid fuelled motor that uses two propellants and two oxidizers while second stage is solid fuelled. It diverts thrusters which can generate a lateral

acceleration to more than 5 Gs at 50 km altitude. Guidance is provided by inertial navigation system, mid-course updates from long range tracking radar (LRTR) and active radar homing in the terminal phase. PAD has the capability to engage 300 to 2,000 km range class of ballistic missiles at a speed of Mach 5. Long Range Tracking Radar (LRTR) is the target acquisition and fire control Radar for PAD Missile. It is an active phased array radar having capability to track 200 targets at a range of 600 km. It is the Israeli Green Pine radar.

Advanced Air Defence (AAD)

The Advanced Air Defence (AAD) is an anti-ballistic missile designed to intercept incoming ballistic missiles in endo-atmosphere at an altitude of 30 km. AAD is a single staged, solid fuelled missile. Guidance is similar to that of PAD - inertial navigation system, midcourse updates from ground based radar and active radar homing in terminal phase. It is 7.5 meters tall, weighs around 1.2 tonnes and has a diameter of less than 0.5 meters. It is claimed by DRDO that PAD and AAD missiles will work in tandem to ensure a hit probability of 99.8 percent. Induction of the system into service is expected at the earliest.

Capability Accretion

The latest success means that India can destroy in mid-flight Hatf and Ghauri ballistic missiles coming from Pakistan. India felt the requirement for a BMD shield in the late 1990s when Pakistan test-fired Ghauri missiles with ranges far enough to threaten Indian cities. It can also intercept Chinese DF-21 deployed in Tibet and the Yunan province.

AD-1 and AD- 2 Systems

Two more new anti-ballistic missiles that can intercept IRBM/ICBMs are being developed. These high speed missiles (AD-1 and AD-2) are being developed to intercept ballistic missiles with a range of 5000 km.

Feasibility of Long Range Surface to Air Missile (SAM)

The current technology incorporated in PAD, had intercepted target at the range of 120 km. It is feasible to develop another long range SAM up to ranges of 100 to 200

km, thus providing an integrated air defence system with medium range Akash, long range SAM and BMD system against entire range of missiles, cruise missiles and aircraft. This capability will be indigenous.

India

India justifies its acquisition of BMD by stating that the country has a 'No-First-Use'(NFU) policy, and therefore it needs BMD to absorb the first strike, ensure its second strike capability and retaliate. This would add value to its deterrent capability. Indian BMD is a theatre missile defence which cannot protect the entire Indian soil but can only give protection to some of its land-based strategic locations. It has a nuclear powered submarine, INS Arihant, in development, which will be inducted into the Indian Navy soon, and will protect the seas. Pakistan for long has been using their 'first use policy' as a deterrent against India's massive conventional superiority to protect itself after indulgence in state sponsored terrorism. India's inability to strike back on the event of Parliament attack and the 26/11 Mumbai attacks is an eye opener about how desperately India needs an effective BMD system deployed to blunt the nuclear threat and state sponsored terrorist activities of its neighbour.

India perceives that its space assets are not secure and are threatened from China, as China possesses Anti-Satellite weapons. Therefore, it has all the right to acquire ASAT which will ultimately enhance its security in space. Moreover, before a legal framework prohibiting the acquisition of Anti-Satellite weapons comes into being, India wants to be a part of the club of 'ASAT haves' rather than 'have-nots'.

- Deterrence credibility is no longer sufficient through massive retaliation.
- US sales pitch may have built indigenous constituency within India.
- Chinese developments likely to reinforce Indian desire.
- India likely receives external assistance from Russia, France, and/or Israel.
- Challenges of satellite coverage for tracking of target missile and also navigation of own interceptor missile and interoperable C4ISR footprint over areas of interest are yet to be overcome. This area requires immediate attention.

- Enabled capability and potential to indigenously develop integrated air defence system for the country are yet to be fielded. Current capability can only take care of Pakistani challenge, as and when operated.

Pakistan and China

The Indian pursuit of BMD and its goal to accommodate ASAT will have regional implications. It has also provoked China to take required steps to have counter measures to overcome Indian BMD. As a result, China conducted successful BMD test in 2010 and is on the road to acquire an effective BMD programme in the near future. While Pakistan's economy does not support it to acquire a BMD program, it would feel insecure with its insufficient counter measure strike capability as it does not possess any assured second strike capability. It would ultimately engage in acquiring additional missiles and launchers to devise a much larger attacking force in hope of eluding the Indian interceptors, leading to triangular security dilemma in the region.

Moreover, Pakistan would certainly improve its nuclear arsenal qualitatively and quantitatively to instil a plausible nuclear threat in the theatre, as it considers the nuclear weapons an integral part of its defence system. India's Prithvi Air Defence System (PAD) in synergy with Arrow, PAC-3 and S-300 and Green Pine radar system can intercept Pakistani missile at boost stage into the exo-atmospheric level. India's Advanced Air Defence (AAD) missile may intercept short range at re-entry in endo-atmospheric stage (re-entry intercept at 20 miles). Feeling safe from de-capacitating, India would be emboldened to launch pre-emptive strikes at Pakistani deployment sites. India's offensive military doctrines, Cold Start and the like, will be more likely/feasible. Pakistan will increase fissile and missile production, and engage in countervailing strategies²⁶.

The proliferation of missiles has been a major security concern for many years. Missiles are the key delivery system for nuclear, biological and chemical (NBC) weapons, and missile proliferation therefore greatly exacerbates the NBC threat. And yet, while major international treaties - the nuclear non-proliferation treaty (NPT), the Biological and Toxin Weapons Convention (BWC), and the Chemical Weapons Convention (CWC) - limit the spread of nuclear, biological, and chemical weapons, respectively, there is no worldwide treaty banning missiles.

Negotiating a global missile non-proliferation treaty may be difficult because the nuclear powers will seek to retain their nuclear missiles in any such treaty. In turn, non-nuclear states are unlikely to agree to an accord where some states can retain missiles but others cannot. Though a comprehensive missile ban would be hard to attain, two other agreements may be feasible: a prohibition on intermediate range missiles and a missile test ban. Both agreements would be non-discriminatory, in the sense that they would apply the same provisions to all countries, and they would not distinguish between missile 'haves' and 'have-nots'. Together, they would provide strong legal barriers against the spread of missiles.

International Controls on Missile Proliferation

The two main global instruments against missile proliferation - the Missile Technology Control Regime (MTCR) and the Hague Code of Conduct against Ballistic Missile Proliferation (HCoC) - are proving to be insufficient to halt and reverse missile proliferation²⁷. The MTCR, formed in 1987, seeks to curb missile proliferation by denying regional powers the technology to build missiles. Yet many states already have the technology to build short and intermediate range missiles. Since the 1990s, IRBM programmes were launched by India, Iran, Israel, North Korea and Pakistan while several other states expanded their missile programmes, which further demonstrated the MTCR's limitations. The MTCR could still delay states from developing advanced IRBMs and long range missiles, but, in time, a state determined to develop such missiles could do so despite the regime.

The Hague Code of Conduct, initiated in 2002, calls upon states to make their missile policies more transparent and to give advance notice of missile and space rocket launches. Though useful as confidence building measures, however, these missile transparency initiatives do not ban missiles and do not offer incentives to refrain from missile activity. Recognising these limitations, the United Nations First Committee Resolution L.50 of October 2004, "welcomed the adoption of The Hague Code" and "encouraged the exploration of further ways and means to deal effectively with the problem of the proliferation of ballistic missiles". The need to develop, support, and strengthen international accords and other cooperative efforts to curtail the proliferation of ballistic missiles became imperative and therefore, developing

international accords against IRBMs and missile tests for a stronger norms and legal barriers against missile proliferation started gaining momentum²⁸.

Missile Proliferation and MTCR

When the MTCR was being negotiated in the early 1980s, it was designed to deal with the emerging ballistic missile threat from Third World states. Although the MTCR's limits on transferring missiles and related technology to non-signatories also apply to cruise missiles, the structure of the MTCR and its specific provisions were negotiated with ballistic, not cruise, missiles in mind, reflecting the conventional thinking during the early 1980s that ballistic missiles were a more serious threat to international security. For instance, the items and technology controlled in Categories I and II are heavily weighted towards those technologies and components required for building ballistic, not cruise, missiles. Subsequent actions by MTCR members have confirmed the bias towards limiting the proliferation of ballistic missiles. There was no such warning that cruise missile proliferation in the Third World would become a threat at the time the MTCR was negotiated. The growing shadow of the ballistic missile threat and potential nuclear annihilation focused the world's attention on those missiles as the greatest potential danger.

First, the events that precipitated the United States' initiation of the multilateral discussions that eventually became the MTCR were all tests of ballistic missiles or technologies vital for indigenous ballistic missile development. These watershed events included South Korea's test of a ballistic missile based on the US Nike-Hercules SAM in 1978, Iraqi efforts to purchase rocket stages from Italy in 1979, India's launch of a satellite in 1980, and Libya's testing of rocket stages (albeit unsuccessfully) in 1981. These events served as notice to the United States and its allies that they had arrived at a threshold period with regard to the ballistic missile proliferation threat. However, there were several farsighted military officers in the American delegation who inserted language in Category I of the MTCR's Equipment and Technology Annex so that it would cover both cruise and ballistic missiles. Unlike ballistic missiles, which do not have such clear payload/range trade-off capabilities, a cruise missile permissible to be exported under the MTCR could be converted within a matter of hours to one that was not. Second, the MTCR does not contain any clear formulae or standards for

calculating the ranges of the missiles covered by the agreement. This glaring omission does not make any difference for ballistic missiles, which must fly on a parabolic flight path where rocket engine efficiency is not a significant issue, but is a major oversight with regard to cruise missiles. Cruise missile ranges can vary widely depending upon the altitude at which the missile flies because of different engine efficiencies at various altitudes. The lack of standards for determining the range of cruise missiles for MTCR purposes could later become a serious problem, creating confusion and undermining the effectiveness of the regime. Although some language regarding cruise missiles is included in the Annex, the very structure and language of the MTCR, as well as other evidence, suggests that, for political reasons, the MTCR was primarily aimed to control the spread of ballistic missile technology, and the cruise missile language was added to the MTCR at the behest of lower level diplomats. Finally, subsequent actions by MTCR members prove that the regime's purpose was to limit the spread of ballistic missile-related technologies. The official statements and rhetoric regarding the MTCR and the spread of missile technology have focused primarily on preventing the spread of ballistic missile technology. There was hardly a mention of cruise missiles in speeches, congressional testimony, or policy proclamations by high-level officials in the Clinton Administration when discussing US missile non-proliferation policy.

Nuclear Missile Proliferation and NPT

The implication is that Pakistan is likely to remain a 'latent proliferator'. There are four kinds of latent proliferators. In the first kind, a NNWS party to the NPT may be latent proliferators. The recent revelation in the press that Sweden acquired nuclear capability despite the ban on military activity in the nuclear field, as required in the NPT, indicates that even a prominent anti-proliferation and disarmament advocate (and no one has better credentials than Sweden in this regard) can possess a nuclear weapons capability; it may be a latent proliferator if it has secretly acquired a nuclear weapons capability. The second kind of latent nuclear proliferator may be a country which has a reputation for not abiding by its international obligations when it suits its purpose. Thus, Iraq signed the Geneva Convention (1925) prohibiting the use of chemical weapons and yet, in its fight with Iran, it has done so. Libya is a member of the NPT and yet it is frequently mentioned in the press as a country which strives

continually to acquire nuclear arms. The third kind of latent proliferation lies in the possibility that a country may withdraw from the NPT after having acquired nuclear capability.

Compared to these it is important to note that the signal of a latent proliferator (the fourth kind, e.g. India and Pakistan) with a nuclear weapons option, and which is formally outside the NPT/IAEA regime is quite different from that of a 'latent proliferator' which is a party to the NPT regime. Overtly, the latter is signalling a willingness to join a confidence building measure; the former is signalling an unwillingness to provide such confidence-building. The practical difference in a crisis or in the day-to-day affairs of countries in these categories may not be all that significant in terms of the scope and the level of nuclear activities of the different types of latent proliferators. Indeed it may be argued that the less internationally prominent latent nuclear proliferators (FR Germany, Sweden, Japan, South Korea and Taiwan) may be more advanced than the internationally prominent latent proliferators (India, Pakistan, Argentina, Israel and South Africa) as far as nuclear development at the technical level is concerned. Nevertheless these considerations have an important bearing on the academic and policy debates about the meaning of nuclear proliferation, and about the meaning and utility of nuclear ambiguity in the behaviour of near-nuclear states which are located in regions of second-order international conflict.

Implications

There are four types of states in the non-proliferation system: (A) Hard core near-nuclear states who have refused formally and publicly to accept the statutory obligations of the NPT but who have thus far refrained from publicly acquiring nuclear arms. The principal non-NPT states in this category are Israel, India, South Africa, Argentina and Brazil. Significantly, with the exception of Brazil, these states adopted the path of latent and controlled nuclearization many years before the NPT system was conceived and established. (B) States who have voluntarily renounced the nuclear weapons option even though such a state could have decided to go nuclear in the context of its wartime atomic programmes and expertise. Canada is a prime example of such voluntary restraint. (C) States which the settlement of the NPT had imposed on themselves because of their past history and because of suspicion about their future

ambitions on the part of the Great Powers. This category is represented by Federal Republic of Germany. (D) The fourth category of states are the vertical proliferators – there are five of them in the NPT system. This group has special rights and practically no reciprocal obligations to other members of the NPT system. The NPT system is a coalition of the second, third and fourth category of states.

The countries outside the NPT system can bargain. As long as these states are outside the NPT system, and as long as there is a hope or expectation that the external environment could induce restraint, their presence outside the doors of the Treaty system and their public objections to the Treaty create pressure on the diplomatic and military policies of the NPT parties themselves. For example, because India claims that it was right all along not to sign the NPT (as it is a discriminatory document), such opposition creates a bad conscience among NPT parties. Pakistan's nuclear capability, its nuclear policy and its nuclear posture is linked to its domestic and external settings. In simple terms Pakistan's nuclear development is determined by both its external and domestic factors.

The '**external factors**' include the following:

- (a) Attitudes and policies of hostile neighbours (India, USSR) in checking the likely impact of Pakistan's nuclear activities in the region.
- (b) Attitudes and impact of allies and nuclear suppliers (Europeans, China, US and Canada) towards Pakistan's nuclear activities.
- (c) Attitudes and impact of international organizations (IAEA and other UN organs) towards Pakistan's nuclear activities.

The '**domestic factors**' include the following:

- (a) Attitudes or motivations of the Pakistani political leadership (Bhutto – 1966-71; Ayub – 1958-69; Bhutto – 1972-7; Zia – 1977 – to the present): what did these leaders see in a nuclear position for Pakistan? What was their impact on the development of Pakistan's nuclear policy, its nuclear capability and its nuclear posture?
- (b) The ability (and the personal and professional interest) of the scientific leadership to influence national decisions about the political and technical aspects of Pakistan's nuclear programme, and the impact of personal rivalry between senior members of Pakistan's nuclear scientific community on Pakistan's nuclear activities.
- (c) The attitudes of Pakistan's military officer corps and their impact on the development of Pakistan's nuclear capability and its nuclear strategy.
- (d) The ability of Pakistani scientific, technological and industrial sectors to

support Pakistan's capability to test a device, to possess a few in untested form, to mount a small nuclear force or generally to stay abreast of modern nuclear scientific developments.

- (e) The attitudes of Pakistani domestic public opinion in Pakistan's nuclear development.

Strategic and Operational Value of Missiles

The strategic and operational value of airpower is the ability to destroy targets that are well beyond the front line of enemy forces. This idea of "deep attack" is critically important because it means that aircraft or missiles can be used for the purpose of destroying the power grids, command and control facilities, social and economic infrastructure, and logistics systems that constitute the foundation of modern societies. In view of its technological superiority, the United States has been able to preserve its monopoly in deep attack, while denying this capability to its adversaries. This is an important reason for the unprecedented military superiority that is enjoyed by the United States at the end of the twentieth century.

Since the origins of powered flight, the notion of cruise missiles has competed with manned aircraft for the conduct of deep-strike attacks but, for the reasons that are discussed in greater depth in the Annex, cruise missiles have not been able to achieve their maximum operational potential. The potential of cruise missiles has been weakened by a combination of low reliability, poor accuracy, and vulnerability to intelligence deception, inability to adjust to changing conditions on the battlefield, range limitations, predictable flight paths that make them vulnerable to attack, and the vulnerability of launch platforms. However, by the late twentieth century significant technological advances that accrued over the past thirty years have transformed cruise missiles into reliable weapons, which have militarily significant ranges, extraordinary accuracy, and a significant degree of survivability against sophisticated defences. Not surprisingly, cruise missiles are now a fundamental part of the US arsenal for conducting deep attacks against military and economic targets. The discussion in the following section focuses on the technological developments that have led to this transformation in the capabilities of cruise missiles.

The Strategic Perspective of Missiles

Today ballistic missile technology provides Strategic Power through compact nuclear warheads suitable for deep strike capability. Cruise missiles are easily adapted for air launch, ship launch and submarine launch environments, the latter including torpedo tubes, vertical launch tubes, and slanted launch tubes. There can be little doubt that cruise missiles will become the weapon of choice for a nation intent on challenging the global power of the US.

Flight Test Bans

The concept of a flight test ban was explored in the late 1950s during efforts to get international disarmament negotiations underway. Britain and France favoured the issue, and after initial hesitation, Washington partly supported the idea, provided it would prevent the development of a Soviet ICBM counterforce capability. Though it proved impossible during the Cold War, a flight test ban today would be even more significant: it could essentially freeze all states at their present missile capabilities and stop them from developing new missiles. This is because flight testing is an integral part of the missile development process, and military leaders would have much less confidence in an untested missile; they typically deploy missiles only after a number of developmental tests.

It should be noted however, that while a well-funded rocket project goes through many flight tests (early US rockets went through 30 to 50 tests before deployment, and France, Israel, and India tested missiles five to twelve times before declaring them operational) some countries may today be satisfied with a little testing²⁹. North Korea's No-dong missile, for example, was deployed after a single test. It is possible therefore that some states may develop and deploy short range Scud missiles and single-stage No-dong-type missiles without flight testing, since much of the basic technology for these missiles has been proven. However, flight testing is essential for developing more powerful and multiple-stage missiles. Historical records reveal, for example, that initial tests of such missiles almost always failed. Thus, a flight test ban would thwart countries from developing new missiles, especially multiple-stage

intermediate and long range missiles (unless the missiles are developed and tested in another country).

Key Issues and Options

The presence of nuclear weapons and ballistic missiles is now a fact of life in Southern Asia. Even though overt and deployed nuclear capabilities and delivery systems encourage India and Pakistan to disengage from their low-intensity warfare in Kashmir, the series of missile tests have been characterized by arms race, leading to tension and mistrust. The growth of Indian, Chinese, and Pakistani ballistic missile forces has both stabilizing and destabilizing effects. Regional stability is derived from strategic stability, crisis stability, and arms race stability. Strategic stability (in the nuclear context) is a situation where neither side has incentives to use its nuclear weapons first. Crisis stability is when neither side fears a pre-emptive strike. Arms race stability is when neither side fears its potential adversary is developing weapons that might undermine strategic or crisis stability. This situation is referred to as *Stability–Instability Paradox*.

The nuclear-armed missiles can provide a survivable deterrent force and conventionally-armed missiles can balance military inferiority. However, uncertainty about the status of an opponent's missiles, short warning time and the consequences of a sudden attack may cause a country to strike pre-emptively in the early stages of a crisis. This study assesses the effects of missile development and deployment within the historical and strategic context of India, China and Pakistan. However this study concentrates more on implications of the India-Pakistan missile race. Regional scenarios are used to identify factors affecting stability. Based on this analysis, the study defines a number of political and operational options – both unilateral and cooperative – to increase overall stability. The options include actions such as selected transparency to reduce threat perceptions. Some unilateral options presented do not require much political will because they are in the country's best interests.

The options can be initiated individually or as an integrated set. Unilateral steps, combined with incremental engagement on security topics, could create the

environment for reciprocal and cooperative actions. The stabilization options presented in the study are:

Options applicable to missile and nuclear strategy

- Renew adherence with existing security agreements (India-Pakistan-China)
- Maintain and/or declare a No-First-Use policy (India-Pakistan-China)
- Enter into a de-targeting agreement (India-China)
- Declare missiles with less than 300 km range as non-nuclear (India-Pakistan)
- Eliminate a functional class of missiles (India-Pakistan)
- Ban future deployment of sea-launched ballistic missiles (India-Pakistan)

Options applicable to missile operations and uncertainty

- Separate (“de-mate”) warheads and missiles (India-Pakistan-China)
- Declare number of missiles (by type) and launchers (India-Pakistan-China)
- Continue and enhance pre-notification of missile tests (India-Pakistan)
- Conduct test launches from coastal sites over the ocean (India-Pakistan)
- Create missile non-deployment zones (India-Pakistan)
- Base MRBMs and IRBMs in fixed hardened structures (India-Pakistan-China)

Options applicable to perception and pre-emption

- Incorporate access control into missile storage facilities (India-Pakistan)
- Integrate use-control mechanisms on launch system (India-Pakistan)
- Implement a missile “Personnel Reliability Program” (India-Pakistan-China)
- Re-deploy most capable counter-force aircraft to rear bases (India-Pakistan)
- Install barriers at storage sites to create stabilizing delays (India-Pakistan-China)

India and Pakistan recognize the dangers associated with ballistic missile development, induction and deployment. What are needed are practical proposals and political will. The Lahore Declaration of 1999 included a commitment to “take immediate steps for reducing the risk of accidental or unauthorized use of nuclear weapons and discuss concepts and doctrines with a view to elaborating measures for confidence building in the nuclear and conventional fields, aimed at prevention of conflict³⁰.” To this effect, the Lahore Declaration issued a Memorandum of Understanding that included specific nuclear confidence-building measures, including

prior notification of ballistic missile tests, a continuation of their unilateral moratorium on nuclear testing, and dialogue on nuclear and security issues.

The Implications on Going Ballistic

The nuclear-armed states still believe they may have to endure or engage in major wars involving nuclear arms. Fortifying this suspicion is the increasing capacity states have, to deliver both nuclear and non-nuclear payloads quickly against one another. Back in 1961, only the United States and Russia had nuclear-capable missile systems (i.e.) cruise or ballistic missile systems capable of delivering a first-generation nuclear bomb of at least 500 kilograms, 300 kilometres or even further. Now, twenty seven countries have perfected or acquired such systems, and no fewer than nine can launch a satellite into orbit (i.e.), have what is prerequisite to develop intercontinental ballistic missiles (ICBMs). In addition, the United States, China, Iran, South Korea, Israel, and key NATO states are all working on precision missiles capable of achieving major results using only conventional munitions—knocking out large military bases and major naval surface combatants³¹. More nuclear-capable missile states are likely to emerge. Each country has raised the topic of missile control. For example, Pakistan’s Foreign Minister Abdul Sattar proposed several measures for missile control as part of a strategic restraint regime in South Asia during a speech to the UN Conference on Disarmament on March 28, 2002³²:

- Non-deployment of nuclear-capable ballistic missiles
- Formalization of the understanding to provide adequate prior notification of flight tests of missiles
- A moratorium on the acquisition and deployment of anti-ballistic missile systems
- Confidence-building measures to reduce the risk of use of nuclear weapons by miscalculation or accident.

There are several generic strategies for reducing uncertainty, decreasing tensions, and increasing stability: declarations, notifications, transparency, constraints, and reduction of capability. Transparency is a key tool reducing tensions and threat perceptions. The United Nations defines transparency as “The systematic provision of information about specific aspects of military activities under formal or informal

international arrangements³³.” Such information can be provided by on-site inspection and technically based monitoring as well as by reports. Sometimes it may be in a country’s own interest to act unilaterally to avoid misinterpretation of intent. In practice, there is a role for both transparency and opacity in measures to reduce the threat perception from missiles and increase stability³⁴. Information to be shared might include everything from force levels to testing plans. However, choosing not to share certain information – retaining some opacity – can serve to enhance stability. For example, information such as system deployment locations, system vulnerabilities, and performance capabilities figure heavily in a country’s deterrent strategy and are unlikely to be shared. Increased transparency between the two countries may lead to greater stability when the following criteria are achieved:

- Increased symmetry of ballistic missile forces and/or capabilities;
- Increased warning time or reduced likelihood of pre-emption success;
- Reduced likelihood of misinterpretation of intent; and
- Minimized vulnerabilities for all sides.

The study attempts to throw a number of options – both unilateral and co-operative - to increase overall stability. The options include actions such as selected transparency to reduce threat perceptions. The options can be initiated individually or as an integrated set or “regime.” The latter approach is the most effective. Some may consider these options to be utopian in the current political environment. Political will and trust are always in short supply in Southern Asia, but opportunities do arise. Such unilateral steps, combined with incremental engagement on security topics, could create the environment for cooperative and reciprocal actions. Governments should therefore be prepared when opportunities for reconciliation arise. The study of these options, their refinement, and the development of additional ones would support this process.

Every journey begins with a first step. India, Pakistan and China have not been historically receptive to monitoring and verification of security agreements, but the Chemical Weapons Convention set a significant precedent. Although all three countries are advanced in defence matters, this expertise has not been applied to improving stability. Third parties could play a beneficial role by conducting demonstrations and training. The three countries could send observers (individually or together) to see how other nations implement the practical aspects of monitoring and transparency.

Cooperation in implementing or evaluating an experiment that demonstrates a stabilization option would be particularly helpful. It would increase understanding of procedures and tools and could become a basis for building confidence between India, Pakistan and China. Finally, all three governments should establish working groups within their defence and foreign policy establishments to systematically develop options, and assess how to implement them.

The Global Response

India is not a signatory to either the Nuclear Non-Proliferation Treaty (NPT) or the Comprehensive Test Ban Treaty (CTBT), but did accede to the Partial Test Ban Treaty in October 1963. India is a member of the International Atomic Energy Agency (IAEA), and four of its 17 nuclear reactors are subject to IAEA safeguards. India announced its lack of intention to accede to the NPT as late as 1997 by voting against the paragraph of a General Assembly Resolution³⁵ which urged all non-signatories of the treaty to accede to it at the earliest possible date³⁶.

India voted against the UN General Assembly resolution endorsing the CTBT, which was adopted on 10 September 1996. India objected to the lack of provision for universal nuclear disarmament "within a time-bound framework." India also demanded that the treaty ban laboratory simulations. In addition, India opposed the provision in Article XIV of the CTBT that requires India's ratification for the treaty to enter into force, which India argued was a violation of its sovereign right to choose whether it would sign the treaty or not. In early February 1997, Foreign Minister I.K. Gujral reiterated India's opposition to the treaty, saying that "India favors any step aimed at destroying nuclear weapons, but considers that the treaty in its current form is not comprehensive and bans only certain types of tests."

Since 1987, more than thirty states have agreed to restrict their transfer of missiles and related technologies under the Missile Technology Control Regime (MTCR). During the MTCR's first decade, several regional powers were thwarted from advancing their missile ambitions. Subsequently however, states such as North Korea, Iran, Pakistan, India and Israel have tested medium-range missiles, and others have expanded their missile arsenals.³⁷

Nuclear Missile–Related Risks in South Asia

South Asia is the only region in the world where there are serious disputes involving the risk of war between three contiguous nuclear-armed countries with a history of military conflict³⁸. The differing world views of the three countries have moulded their individual strategic postures, and each has come to adopt nuclear weapons as a security imperative for differing reasons. Based on their strategic perceptions, the nature and quantum of their nuclear arsenals too, are widely disparate. China views its main threat as the United States, against which its nuclear deterrent is designed. India views its major strategic threat as emanating from China, though its immediate concern is Pakistan's support of cross-border terrorism and the Pakistan military's periodic attempts to change the agreed lines of control on its borders. Pakistan views India as its major threat, whose aim is to destroy the Pakistani state. The nuclear equation between China, India and Pakistan is often characterized by the analogy of a triangle; it would be more apt to compare it to a vicious circle, in which an action by one results in an escalatory reaction from the other two.

India's Strategic Anxieties

The dynamics associated with the endemic rivalry between India and Pakistan must be viewed through the broader lens of regional politics and security. In general, India believes China is encircling the country by establishing special partnerships with many of India's smaller neighbours. Specifically, India is irked by the growing relationship evolving between China and Pakistan, which India believes has a singular purpose of bringing down its natural rise as an aspiring global power. One of the more onerous issues is the perception that has come to be known as the "String of Pearls"³⁹. To provide a frame of reference, Pakistan's Makran coastline has a strategic significance, which offers Pakistan options to counter India's projection of power in the Indian Ocean. Pakistan has already shown signs that it is moving to develop broader air and naval capabilities. The build-up of the Gwadar commercial port along this coast—assisted by China—exacerbates India's anxieties, and provides Pakistan with broader strategic utility. For the Chinese, the build-up provides a potential access to energy pipelines that would "un-lock trade routes to the market and energy supplies of Central Asia," with less risk⁴⁰. This is significant, since India is geographically restricted in its access to the East as well as the West, due to the physical presence of Bangladesh and Pakistan, as well as the Himalayas to the North. In this regard, India's

access to Southwest Asia runs into a geographical barrier because of its rivalry with Pakistan. Similarly, India succumbs to constraints from East Asia via Bangladesh/Burma, which physically blocks India's access to those markets. With China also entering the scene with growing presence along the Makran Coast, the situation from India's perspective becomes ever more tenuous. This, in turn, forces India to rely on its maritime capabilities in order to maintain trade routes and logistics between its continental shores and the rest of the world, making up for this strategic handicap.

As a part of its expanded naval presence, India has launched ballistic missile submarines and other naval capabilities that can act as an extended security arm for protecting its various trade routes, as well as enable a third-strike capability (in addition to its land-based and air assets). India's growing presence in the maritime environment, in conjunction with its overall strategic rise, makes its smaller neighbours nervous. This strategic apprehension creates a ripple effect across the region, in which the smaller countries move closer to external alliances in order to balance India's rising power.

Additionally, India believes China is propping up Pakistan's nuclear and military capabilities in areas where Western technologies are not providing the need. In particular, India is under the impression that Pakistan is taking advantage of America's involvement in Afghanistan, which places it in a unique position to acquire strategic capabilities and other political remunerations. Regardless of these concerns, India's advantage over Pakistan through strategic calculus of structural and conventional forces was neutralized (to an extent) ever since Pakistan demonstrated its nuclear capability in 1998.

Pakistan's Strategic Anxieties

Generally speaking, Pakistan's strategic anxieties in the region are a mirror reflection of India, vis-à-vis the other half of the "enduring rivalry." For Pakistan, however, the objective is threefold and simplistic in nature: national survival, remain a relevant actor in the region and refuse to be marginalized by India. Pakistan is also a country that wields vast manpower, with a population of 170 million; strong strategic assets in the shape of nuclear weapons and natural resources; a half million-size conventional army; and as a proactive player in the Muslim world. The latter status not only serves as a means to connect with the Muslim community on a bilateral sense, but

also helps Pakistan play a role in bridging Islamic countries with China and the United States. Despite such macro-level accolades, there has been intense rivalry and competition with India over the past 60 years.

There are also operational issues that hinder Pakistan's strategic balance on its eastern and western borders. India's strategic orientation remains towards Pakistan, where the bulk of its armed forces are deployed. As a result, since 1948, Indian and Pakistani troops remain deployed - eyeball to eyeball - along the Line of Control (LOC) in Kashmir. On the opposite side of its border, Pakistan's anxieties are no more apparent than in the quantity of internal strife that has embroiled it in multiple insurgencies and instabilities along its frontier territory. In sum, Pakistan is caught between striking a balance of dealing with India and crushing multiple insurgencies, while still retaining interests in Afghanistan.

Both India and Pakistan have various operational missiles in their inventories. The expanding capabilities, marked by significant improvements in payload, range, reliability and accuracy, are not only threatening to push the region towards a debilitating arms race, but also have the potential to bring the nuclear-armed adversaries a step closer towards the deployment of their strategic arsenals. At regional level, the inventory and types of missiles indicate an escalation of tension in the relations between India and Pakistan on the one hand, and between India and China on the other. At global level, the developments in South Asia have serious and rather negative implications on the non-proliferation regime, and encourage the other states to pursue nuclear and missile programmes. The present study is a moderate attempt to investigate the various security implications of missile developments by India and Pakistan on a global level in general and in the South Asian region in particular.

Having seen the strategic implications arising out of the impending missile race, the last chapter presents the summary of the findings, the observations, scope and limitations of the study.

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