



UNDERSTANDING THE ARMS "RACE" IN SOUTH ASIA

Toby Dalton and Jaclyn Tandler

NUCLEAR POLICY | SEPTEMBER 2012

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Contents

Summary	1
The South Asian Security Dynamic	3
On Your Marks	4
Nuclear-Capable Missile Tests as a Measure of Arms Racing	6
Fifteen Years of Missile Testing	7
Missile Testing in Context	15
Racing on Different Tracks	18
Appendix	21
Notes	25
About the Authors	27
Carnegie Endowment for International Peace	28

Summary

The apparently rapid pace of nuclear developments in India and Pakistan has led many analysts to warn of an impending arms race between the two countries. India and Pakistan are indeed entangled in a long-standing security competition. However, they are not two closely matched opponents engaged in a competitive tit-for-tat cycle of nuclear weapons development in which one state makes advancements to its nuclear capability and the other reacts in kind.

An analysis of aggregated missile test data since 1998 reveals that the armament dynamic is far more complex. The Indian and Pakistani nuclear programs are largely decoupled. The data show little correlation between the adversaries' testing behavior contrary to what would be expected in a classic arms race. In fact, the types and ranges of missiles under development provide concrete evidence of the divergence in their nuclear objectives and security strategies.

India and Pakistan are indeed racing toward their respective national security objectives, but they are running on different tracks and chasing vastly different goals. Pakistan is building weapons systems to deter India from conventional military operations below the nuclear threshold. India is developing systems primarily to strengthen its strategic deterrent against China, meaning this dynamic is not confined to the subcontinent. Government policies that aim to change the trajectory of the South Asian security competition need to take these complexities into account.

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The South Asian Security Dynamic

In its third missile test of the year, India conducted the first test launch of its new Agni V ballistic missile on April 19. Six days later, Pakistan tested the Shaheen IA, also a ballistic missile, one of six missile tests undertaken by Islamabad in 2012. This recent spate of nuclear-capable missile tests in South Asia has revived long-standing concerns that India and Pakistan are entangled in a nuclear arms race.

These concerns might be passed off as Western media hype, if not for the serious scholars and practitioners voicing them. Recently, for instance, retired Indian Navy Admiral Arun Prakash argued that “India and Pakistan are edging dangerously close to a spiral in the growth of their nuclear weapons arsenals. This could become a mindless race, driven by mutual suspicion, rather than the actual needs of deterrence and stability.”¹ Similarly, Hudson Institute defense analyst Richard Weitz argued that the most dangerous aspect of security in South Asia “is almost certainly the nuclear arms racing between [India and Pakistan].”²

In recent years, both states have indeed tested a broad spectrum of ballistic and cruise missiles capable of carrying nuclear weapons, including short-range, tactical systems. But is this frequent testing and development of similar types and ranges of missiles really indicative of an arms race or is there another dynamic at play?

The variable most frequently used by academics and strategists to answer that question is military expenditure because it is reasonably easy to track and measure in consistent terms over time. But the strategic context in South Asia has changed since 1998, the year both India and Pakistan conducted nuclear tests and announced possession of nuclear weapons. The recent missile testing, for instance, takes place against the backdrop of significant economic growth and an associated quadrupling of military spending in India, but serious economic troubles and comparatively slow growth in military spending in Pakistan. Expenditures alone therefore cannot describe a potential arms race.

Missile testing provides an interesting alternative window into the current security dynamic between India and Pakistan. Through analyzing aggregated missile test data since 1998, it becomes apparent that the Indo-Pakistani relationship is explained less by classic conventional or nuclear arms race models than by the asymmetries in their security strategies as reflected in the types of nuclear

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delivery capabilities they are developing. These asymmetries are widely recognized, but the missile data add concrete evidence of the extent to which Indian and Pakistani nuclear capabilities are disjunctive. Pakistan is building systems to deter India from conventional military operations below the nuclear threshold, while India is developing systems primarily to strengthen its strategic deterrent against China. Both states may be racing, but they are running on different tracks and chasing vastly different goals.

On Your Marks

Since before World War II, scholars have sought to define, model, and hypothesize the causes and effects of arms races, from the famed Dreadnought race between Great Britain and Germany in the early twentieth century, to the Cold War nuclear contest between the United States and Soviet Union. In the academic literature, an “arms race” is defined as a competitive, reciprocal, peacetime increase or improvement in armaments by two states perceiving themselves to be in an adversarial relationship. Early scholars of arms race theory hypothesized that an arms race is animated by a security dilemma in which a state’s pursuit of security decreases the real or perceived security of its adversary, producing an “action-reaction cycle” in which one state reacts to the other’s current or anticipated military and political behavior, and vice versa.³

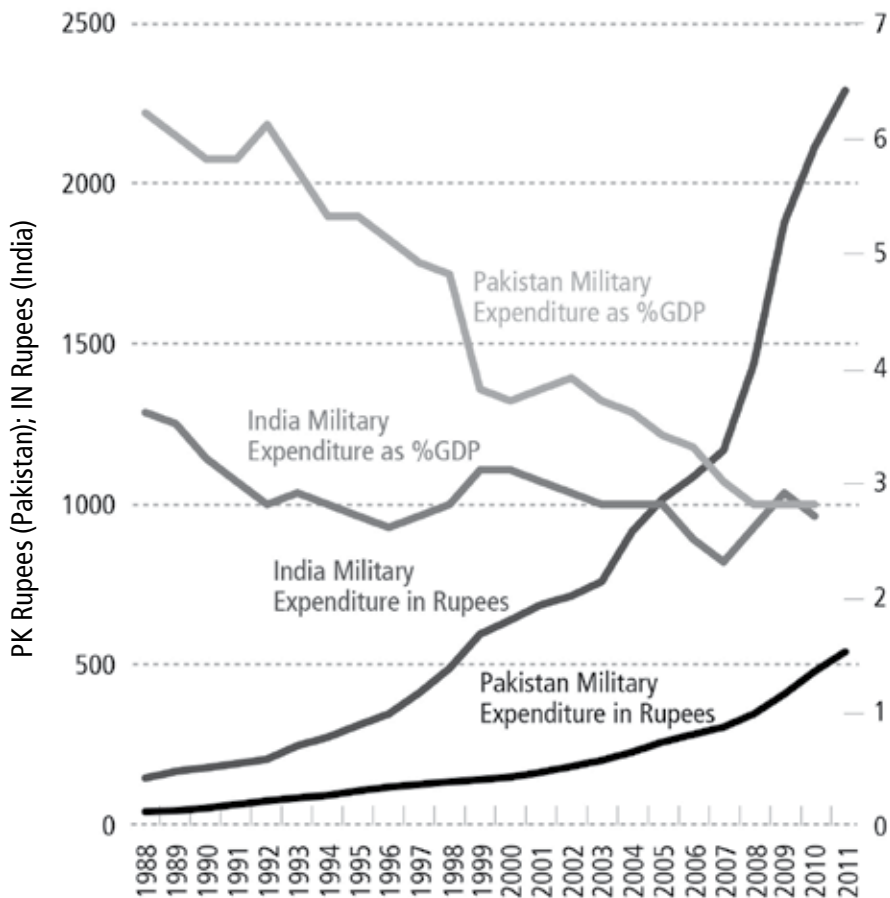
The interactive competition may result in a rivalry that can be quite destabilizing and dangerous, not to mention expensive. U.S. and Soviet deployments of thousands of nuclear warheads during the Cold War—in total, sufficient to obliterate life on earth several times over—demonstrated the absurd heights to which adversaries might carry an arms race.

Academics and strategists have modeled arms races extensively, relying for the most part on statistical analysis of rates of military expenditures or, less frequently, stockpiling of particular categories of armaments.⁴ In particular, scholars look for the existence of a linear relationship between the change in military stocks or expenditure of one country and that of its rival’s rate of change in the same areas. Looking at relationship-based rates of change seems to provide the best evidence of the action-reaction dynamic at the heart of the arms race. Several scholars have applied this model to South Asia directly to test for empirical evidence of an arms race. However, studies on military expenditures by India and Pakistan have produced no unanimity of view on whether an arms race existed historically, let alone today.⁵

Military expenditure data may be relatively easy to collect and track, but it comes with a high degree of uncertainty. Publicly available budget data presumably omit secret programs, including some nuclear and missile development efforts. The data also tend to capture just one aspect of a security dynamic and are relatively insensitive to other trends or external factors, as well as to the military capabilities still under development.

For instance, during several periods of its history, including in the last decade, the United States provided sizable assistance to Pakistan’s military, which inflated military spending. During the same period, India began to increase its own military spending in gross terms consistent with its economic growth, but its expenditure did not increase as a percentage of GDP. Figure 1 demonstrates this real and concurrent growth in the military expenditures of both countries. On aggregate, then, change in military expenditures in the last decade might suggest a linear relationship characteristic of an arms race, but the reality is much more complex. Focusing just on expenditure misses the defining feature of the evolving security paradigm in South Asia—the introduction of nuclear weapons in 1998.

Figure 1. India’s and Pakistan’s Military Expenditures



Source: Stockholm International Peace Research Institute (SIPRI)

Nuclear-Capable Missile Tests as a Measure of Arms Racing

Indian and Pakistani nuclear developments are the main cause of arms race concerns. Ideally, the best measure of whether the two are in fact in a classic, reciprocal nuclear arms competition would be the rate at which both sides are deploying nuclear-armed missiles or bombs (or, perhaps, “deployable” missiles, given the going assumption that both countries keep their nuclear weapons in a recessed posture, with warheads and delivery vehicles stored separately).⁶ But these data are not public. The U.S. and Soviet nuclear data was eventually reported under their bilateral arms control treaties, but no analogous process or mechanism yet exists in South Asia under which India and Pakistan might share or publish such information.

The best estimates from Western nongovernmental experts put the number of weapons in each state’s arsenal at 80–100 for India and 90–110 for Pakistan, and they suggest that India and Pakistan have both doubled their nuclear inventories over the last decade.⁷ Indeed, scholars have cited this apparent growth to argue that an arms race does indeed exist. These are useful estimates, but they are just that: educated assessments based primarily on calculations of fissile material and delivery vehicle production, rather than hard data.

In the absence of data about deployed or deployable nuclear weapons, tests of nuclear missiles (those capable of carrying a nuclear payload) provide an interesting alternative indicator of the South Asia dynamic. Unlike military expenditures and estimates of nuclear arsenals, missile tests are reasonably transparent: both countries announce their missile tests, publicize the results (particularly when the tests are successful), and often even release video. Missile tests, unlike broader measures such as expenditure, probably also mirror developments in the strategic environment that would tend to motivate arms-racing behavior, even if they are merely conducted as part of a technology development effort. While both India’s and Pakistan’s missile programs predate their May 1998 nuclear tests, the programs took on new significance when they became the means for delivering nuclear weapons and operationalizing nuclear deterrence.

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Nuclear-capable ballistic and cruise missiles also shed considerable light on how states operationalize their nuclear arsenals. Technical details such as payload, range, launch platform, and fuel type are strongly linked to nuclear doctrine, posture, and the trajectory on which these are evolving—even in the absence of formal declaratory policy. Nuclear-capable missile tests also arguably reflect, at least to some degree, the rate of development of a country’s nuclear weapons program. Few flight tests might suggest that a state in an

adversarial relationship assesses it is reasonably secure with its existing capabilities and therefore need not respond to developments by its competitor. A higher number of test launches and testing of new missile capabilities could suggest the opposite, that a state might be in the action-reaction throes of an arms race, particularly if there were observable relationships in the types and capabilities of missiles being tested. Missile flight tests thus offer an active way to demonstrate real capabilities and technical prowess. Indeed, according to a retired Pakistani brigadier, Feroz Khan, South Asian nuclear missile tests have been used as “tools of policy” to convey signals to opponents and the broader international community.⁸

Admittedly, nuclear missile tests are an imperfect measure of arms racing. For one, there may not be a strong relationship between missile testing and missile deployment (or, in a recessed deterrence posture, induction into strategic forces). And in terms of racing behavior, since missile tests can be planned years in advance, a test conducted in a specific year most likely reflects the decisionmaking of prior years. It is also tempting to assess that tightly coupled periods of missile testing by adversaries reflect an action-reaction cycle or perhaps nuclear signaling. But these periods could just be coincidental overlap in the stages of missile technology development, planned for months but not known to either side until the tests were announced. In fact, the vast majority of nuclear missile testing by India and Pakistan since 1998 seems driven by milestones in technical development programs rather than political demands for signaling. It is also possible that in South Asia there are particular times of the year in which weather conditions favor missile tests, which would lead India and Pakistan to both conduct tests during those periods.

Yet in spite of possibly confounding variables, missile testing can offer valuable insights into an area that is otherwise defined by opacity and guesswork. By taking a longer-term and aggregated view of rates of development, many of these data limitations can be discounted.

Fifteen Years of Missile Testing

Since 1998, India and Pakistan have conducted nearly the same number of nuclear missile tests, 60 and 55, respectively. (See appendix for a list of Indian and Pakistani missile tests during this period). Pakistan has primarily tested ballistic missiles, 42 in total, but after its initial test of the Babur in August 2005 it began to conduct cruise missile tests in greater number, now totaling thirteen. India, on the other hand, has tested ballistic and cruise missiles in nearly equal proportion, with 32 and 28, respectively. It is tempting to assess that the high number of cruise missile tests suggests a more important role for cruise missiles in Indian deterrence, but this is unlikely given that all of these tests are of just one cruise missile system, the BrahMos.

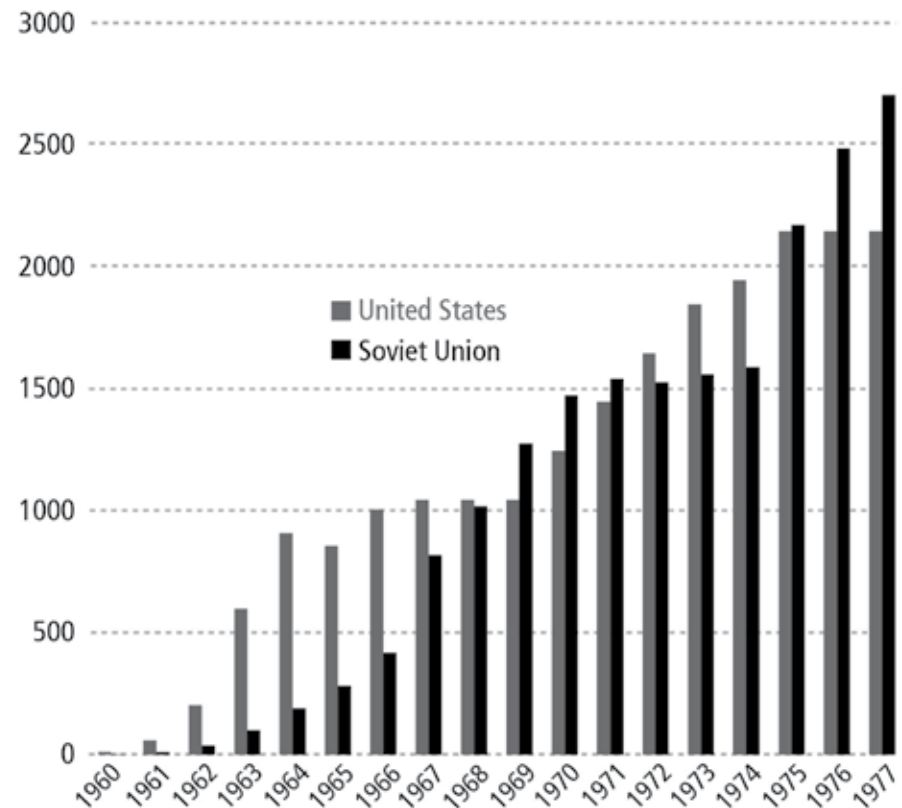
Frequency

Although both countries have conducted roughly the same number of missile tests, the pattern of these tests is not indicative of the existence of a classic arms race. That is, the rate of testing does not appear to be correlated across or between years.

There are several ways to determine how the frequency of both countries’ testing could be revealing—one of which is by considering the tests on an annual basis. In theory, an arms race could be characterized by a similar number of annual tests by the two competing countries; if country X tests, country Y would respond with its own, particularly if nuclear signaling rather than technical maturity was a dominant requirement of testing. As the pattern repeats, the sum of yearly tests would be roughly equal, or the number of tests by one side would be matched or exceeded by the other in the next year.

Warhead deployment during the Cold War exemplifies this pattern (albeit with warheads, not missile tests). Figure 2 depicts the apex of the Cold War nuclear arms race, which was marked by clear incremental and reciprocal increases in U.S and Soviet Union warhead deployments. Throughout the 1960s and 1970s, both countries increased their deployed warheads in rough proportion, with changes in the rate of one state’s deployments appearing to motivate the other’s deployment rate.

Figure 2. Nuclear Warheads on Intercontinental Ballistic Missiles

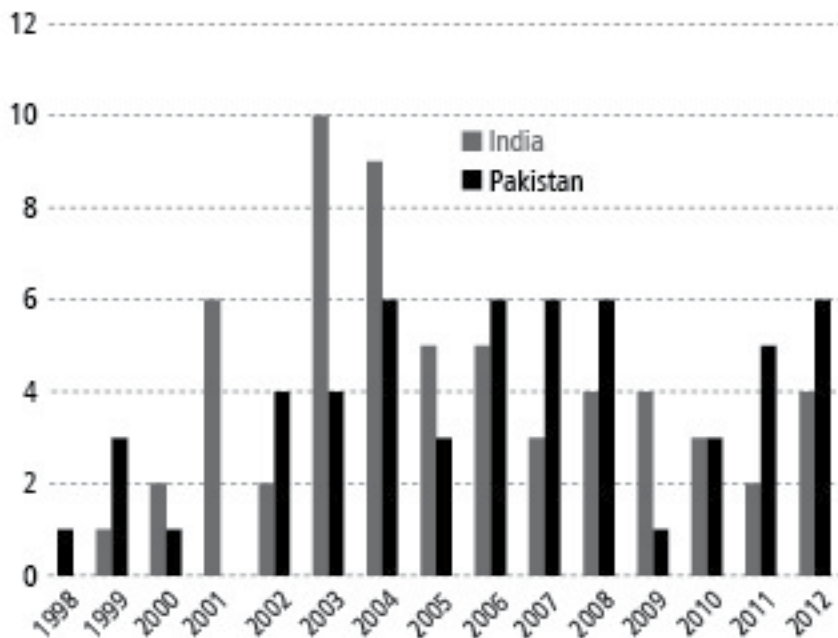


Source: National Resource Defense Council

No similar pattern exists in South Asia, at least as far as nuclear missile testing is concerned, as figure 3 demonstrates.

The number of annual tests for India and Pakistan is in fact rarely comparable. For example, in 2003, India conducted ten missile tests while Pakistan tested just four; in 2011 India conducted one test, while Pakistan conducted five. In 2003, 2004, and 2005, Indian tests exceeded Pakistani, but in 2006–2008 and 2010–2012, Pakistan tested more nuclear missiles than India. A high number of Indian or Pakistani tests did not necessarily lead to an increase in the number of tests by the adversary the following year. Nor does assessing the missile test data biannually (to account for a greater action-reaction time lapse) indicate causality in either direction. The choppy dips and swells in Pakistan’s and India’s testing histories appear uncorrelated with the adversary’s testing behavior.

Figure 3. **Yearly Missile Tests**



Source: Data aggregated from multiple sources

Looking at the South Asia data by month provides more granularity. There are some periods marked by a back-and-forth testing by the two countries. But a more dominant pattern in the testing history reveals “groupings” of tests—that is, periods of time where one country conducts several missile tests of one or more missile systems without the other country testing. For example, between April 2000 and April 2002, India tested ten missiles without any test by Pakistan. Pakistan then conducted four tests between May and October 2002 without an

Indian test. Such groupings could well indicate efficiencies of conducting several tests in proximity, rather than an action-reaction pattern.

Another way to assess these groupings is to look at periods of crisis to see if tit-for-tat missile testing was an element of signaling and, therefore, perhaps indicative of an arms race dynamic. The 2001–2002 period of missile testing is quite significant in this regard. After a terrorist attack on India’s parliament in December 2001, for which Indian officials held Pakistani militants responsible, India mobilized its armed forces and threatened retaliation. The two countries nearly went to war. Following the onset of the crisis, India conducted two missile tests, the first in late January 2002, about five weeks after Indian forces had mobilized, and the second test as tensions had begun to subside in April 2002. With a new spike in the crisis after another terrorist attack in mid-May 2002, however, Pakistan conducted three missile tests in short order on May 25, 26, and 28. Pakistan conducted another test in October 2002 in the dying days of the crisis.

It seems highly likely that India’s tests had been scheduled in advance of the crisis and that Indian decisionmakers merely decided to proceed with the testing on schedule, despite the possibility that these launches could be perceived as signals of its resolve to retaliate. The three conducted by Pakistan in late May, on the other hand, were probably arranged in response to the Indian mobilization and are most suggestive of signaling, as Pakistan faced the prospect of an Indian offensive. Indeed, commentary during that period indicates that these tests were intended as such.⁹ But this is the only apparent instance of

such behavior, and during the most recent bilateral crisis following the November 2008 terrorist attack in Mumbai, missile tests by India appeared to have little connection to political events.

Thus, while one period of missile testing seems to indicate an action-reaction cycle and probable signaling, the bulk of the data suggest that there is no reciprocal causal-

ity in the timing of missile tests. Indeed, frequency in testing can only unveil so much of the armament trend in South Asia.

The data suggest that there is no reciprocal causality in the timing of missile tests in South Asia.

Capabilities

Perhaps the most informative piece of data on the arms dynamic between India and Pakistan relates to the evolving capabilities of their nuclear delivery systems. States in an arms race tend to adopt reciprocal increases or improvements in armaments. That is, adversaries alter their arms capabilities simultaneously in a way that suggests their military programs are directed at one another. During the Cold War, the U.S. government cited the “bomber gap” and “missile gap” to describe the perceived Soviet superiority in particular nuclear capabilities. This rhetoric was used to garner support for increased defense spending to “close the gap” with Soviet technological advances in

those capabilities. While hindsight reveals that these perceived gaps were unfounded, it was this type of competitive culture and action-reaction cycle that generated the synchronized increases in Soviet and U.S. arsenals during the Cold War.

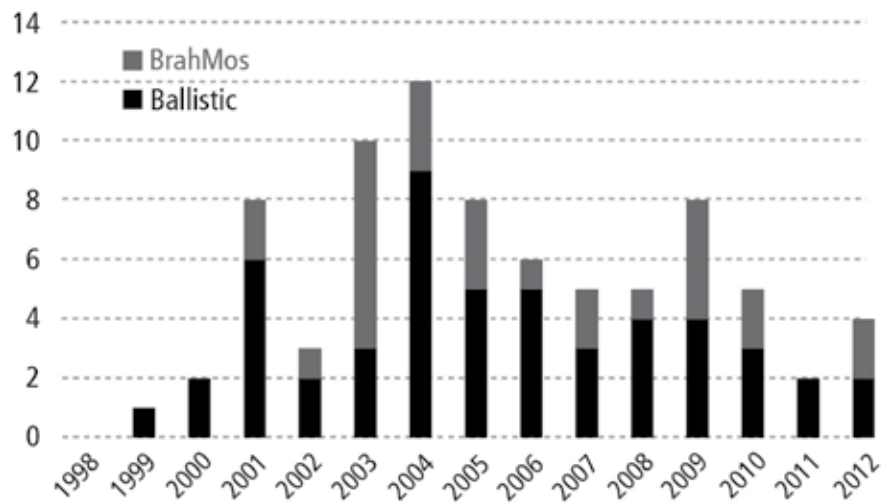
Does a similar pattern appear in South Asia, with India and Pakistan perceiving “gaps” and testing nuclear missiles that would mitigate perceived advantages of the other? Looking at the development of different missile types, namely ballistic and cruise missiles, and their intended platform can help answer that question. Analyzing the operational ranges of nuclear missiles being developed, which indicate the strategic objectives of a state’s nuclear posture, is also informative in this regard.

Cruise and Ballistic Missiles. Indian and Pakistani missile programs were still rather nascent when both tested nuclear weapons in 1998, consisting of several tested short- and medium-range missiles still in development. After the nuclear tests, it was obvious that strategic deterrence required the development of longer-range systems capable of reaching targets further from their shared border. Over the subsequent years, both tested medium-range systems (Agni variants for India, Ghauri and Shaheen variants for Pakistan) in mobile configurations. The data indicate periods of co-development of such capabilities. But it is not clear that there was an action-reaction dynamic at play—both perceived a need to operationalize deterrence with capabilities that threaten massive retaliation.

The picture is different for cruise missiles. Though India and Pakistan have tested roughly the same number of total missiles, the breakdown of this total between cruise and ballistic missiles is quite different, with India testing cruise missiles roughly twice as many times as Pakistan—28 and fifteen cruise missile tests, respectively. In part this can be explained by the earlier initiation of India’s cruise missile program. India first tested the BrahMos in 2001, while Pakistan did not conduct its first test of the Babur until 2005. But that is not the whole story.

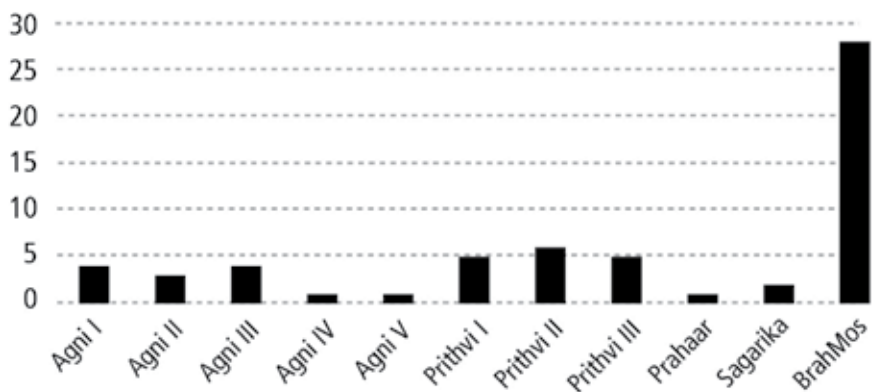
India has conducted more tests of the BrahMos than any of its other missile systems developed to date (see figures 4 and 5). Unlike India’s other missile systems, which have been developed by the Defense Research and Development Organization (DRDO) for use by India’s military services, the BrahMos is a joint venture between DRDO and Russia’s Federal State Unitary Enterprise, NPO Mashinostroyeniya.¹⁰ The missile is intended for the export market, though India will presumably also field it, with the concomitant need to demonstrate consistency when launched from a variety of land, air, and sea platforms and under different test conditions. It can be inferred that it is this need for international marketing that has driven the high number of tests, rather than a serious commitment by India to induct a nuclear BrahMos into its strategic forces or to deploy those missiles at sea, though these developments should not be ruled out.

Figure 4. India's Missile Tests



Source: Data aggregated from multiple sources

Figure 5. Number of Tests in India by Missile Type



Source: Data aggregated from multiple sources

Pakistan's development of the Babur and Ra'ad cruise missiles appears to have been motivated by Indian defense acquisitions, though not specifically by its development of BrahMos. Pakistan first tested the Babur in August 2005 (not coincidentally on President Pervez Musharraf's birthday). President Musharraf's remarks on the occasion are telling. Instead of describing the Babur as a counter to Indian cruise missiles, as would be indicated by an action-reaction dynamic, he stated, "There was talk of India getting Patriot missiles [for missile defense], and there was a feeling that there was an imbalance, which is being created because of the purchase of very advanced technology weapons. Let me say, this improves the balance."¹¹ Thus, a driver of Pakistan's cruise missile program is the perceived need to have the capability to penetrate future Indian missile defenses.

Pakistan has continued to develop cruise missiles also apparently in response to India's work on advanced naval capabilities such as the Arihant nuclear-powered submarine, which will form the sea leg of India's nuclear triad. Pakistani analysts expect Babur to be deployed on submarines to "restore the strategic balance" in the Indian Ocean region.¹² Following Pakistan's Babur test earlier this year, Mansoor Ahmed, a defense analyst in Islamabad, noted, "This is signaling to India that if you are modernizing your weaponry, then we are also not lagging behind. Pakistan is sensitive and responsive to evolving threats. Basically, these missile tests are meant to ensure Pakistan's minimum deterrence."¹³

If both states have a singularity of purpose in developing ballistic missiles, there appears to be rather significant divergence in the purpose of cruise missile development. For India, cruise missiles may prove a lucrative export in addition to a new strategic or conventional delivery capability. For Pakistan, cruise missiles are a potential way to overcome Indian ballistic missile defenses and to deploy nuclear weapons at sea in the near term, when it does not yet have viable submarine-launched ballistic missiles. This difference in cruise missile development and testing is one indicator of the extent to which the Indian and Pakistani nuclear programs are de-coupled. Faced with a "cruise missile gap," Pakistan has sought to close it but not because India's cruise missiles pose a new and unique threat.

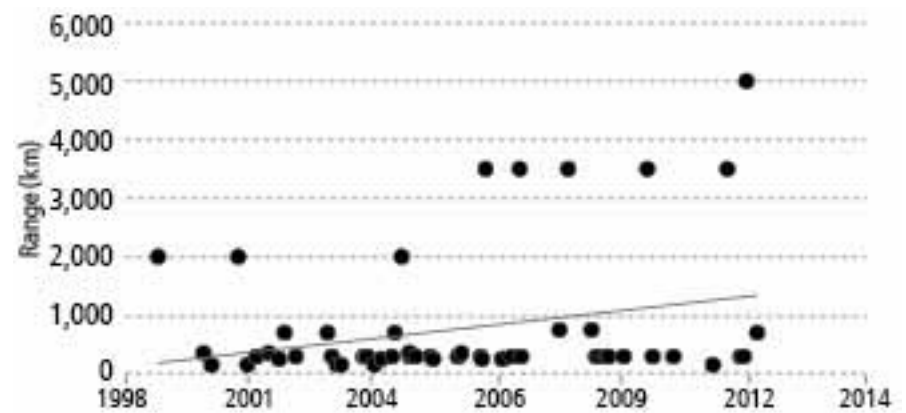
Missile Range. From 1998 until the mid-2000s, there appears to have been some relationship in the missile ranges being developed by both sides, at least as indicated by missile testing. India and Pakistan both constructed medium-range ballistic missiles to operationalize the emerging strategic deterrence between them in the mid-2000s. With both countries proclaiming a posture of minimum credible deterrence and India, at least, adopting a no-first-use doctrine, each side needed missile capabilities with sufficient range to hold population centers at risk. During this period, neither side indicated an interest or started to develop capabilities for counterforce targeting or nuclear war-fighting, which could have required, for instance, a greater number of missiles, the development of multiple independently targetable warheads (MIRVs), and a very high degree of missile accuracy.

Since roughly 2006, however, the ranges of missiles being tested by India and Pakistan have started to diverge. India's ballistic missiles currently have ranges that extend well beyond Pakistani targets—its latest test of the Agni V demonstrated an ability to reach targets at a range of 5,000 km. One need not infer from the range that this system is not targeted at Pakistan; Indian defense analysts have asserted that India is now developing capabilities to strengthen deterrence against China, a stance that was also hinted at in less direct fashion by Indian government officials. India's DRDO spokesman Ravi Gupta stated, "Agni-V is to meet our present-day threat perceptions." V. K. Saraswat, director general of DRDO, similarly applauded the achievement, noting that "the launch has given a message to the entire world that India has the capability to

design, develop, build and manufacture missiles of this class, and we are today, a missile power."¹⁴ Retired Admiral Arun Prakash was more direct: "None of these developments are meant to be Pakistan-centric," he claimed.¹⁵

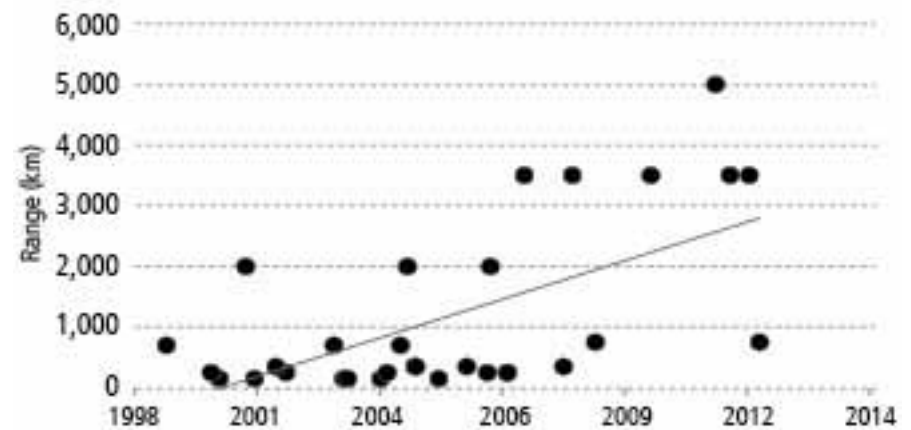
Figures 6 and 7 depict the trajectory of India's missile development as a best-fit line, which is distinctly tilted in the direction of longer-range missiles. But the barely positive slope in the first graph is skewed by the very high number of BrahMos tests. The second graph omits the BrahMos data and shows an even-steeper slope in the direction of longer-range missiles. Though the linear model is not a perfect fit of the data, it still demonstrates fairly strongly that the strategic direction of India's program is toward the kinds of longer-range capabilities Delhi perceives are needed to deter China, not toward capabilities that would suggest an arms race motivated by Pakistani missile testing.

Figure 6. India's Missile Test Ranges



Source: Data aggregated from multiple sources

Figure 7. India's Missile Test Ranges Without BrahMos



Source: Data aggregated from multiple sources

Figure 9. India's GDP (1960–2012)



Source: Data from World Bank, last updated: June 5, 2012

After 2006, this pattern dissipated and the focus of their missile testing started to diverge. What explains this divergence? And if an arms race does not characterize the India-Pakistan nuclear dynamic, what does?

In the case of India, a confluence of factors has motivated its pursuit of longer-range nuclear-capable missiles that seemingly have little to do with

Pakistan. Rather, most of these factors are tied to India's desire to project economic and military power well beyond its immediate neighborhood. Indeed, India's transformation into a rising global power over the past decade has had profound implications for its geostrategic position and capabilities.

Delhi's sustained economic growth has permitted an increase in military expenditures at a time when its aspirations have surpassed regional dominance and are now fixed on the status of a global power, to include United

Nations Security Council permanent membership (figure 9). This status was explicitly recognized by the United States through a strategic partnership initiated in 2005, the centerpiece of which was a civil nuclear cooperation agreement that altered the global rules of nuclear trade to accommodate India.

Although Indian leaders continue to view nuclear weapons largely as political tools and maintain a no-first-use policy, they recognize that to enhance deterrence against China and project power globally, India must continue to adjust its nuclear capabilities. Delhi's recent missile testing reflects that recognition. In April, India tested the Agni V, which, according to DRDO chief Saraswat, "compares favorably with ICBMs in use by nuclear weapons states

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like Britain, China, France, Russia and the U.S.”¹⁶ The Agni V could eventually feature multiple independently targetable warheads (MIRVs), which Indian analysts claim will bolster Delhi’s second-strike capability.¹⁷ Saraswat also spoke of adding antisatellite (ASAT) weapons to India’s strategic defense—a system developed by only the United States, the former Soviet Union, and, most recently, China—though it is worth noting that these statements appear to go well beyond India’s stated defense policy and should thus be judged with some degree of skepticism.¹⁸ Lastly, India’s navy is now poised to complete a nuclear triad with the deployment of the Arihant nuclear-powered submarine, providing India with “nuclear insurance” for its retaliatory strike capability.¹⁹

There seems to be broad consensus on this direction in India’s nuclear trajectory. A recent Indian report authored by several prominent retired officials and defense analysts, *Nonalignment 2.0*, argued for continued nuclear development in a strategic context that emphasizes “hardening and survivability” of the nuclear arsenal and an “assured second-strike capability,” rather than “unjustifiable expansion of its arsenal.”²⁰

If the factors motivating India’s nuclear missile testing since 2006 were driven largely by Delhi’s global orientation, in Pakistan it is specific Indian military capabilities and strategies that are cited as the reason for continued development of Pakistani nuclear forces. Indeed, India’s growth and developments in its nuclear program have not altered the strategic deterrence that exists between the two. However, India’s “Cold Start” military doctrine—which is designed to ensure that a war with Pakistan would remain under the nuclear threshold—and its stated interest in developing ballistic missile defenses creates a dilemma for Pakistan, whose leaders perceive a “deterrence gap” below the strategic threshold. In this sense, Pakistan’s missile tests are instructive.

To deter India from retaliating after a future subconventional attack by Pakistan-backed militants, Pakistan is developing tactical and operational-level nuclear missiles that could be used against Indian tanks in a Cold Start advance. These capabilities are part of Pakistan’s new “full-spectrum” deterrence posture.²¹ Pakistan’s twelve nuclear-capable missile tests in the past two years (compared with seven Indian missile tests) and its recent tests of the Nasr and Abdali missiles in particular are thus intended to demonstrate these new capabilities and presumably convey to India that these systems are credible deterrents to Indian conventional military incursion. (Whether Pakistani use of tactical nuclear weapons against Indian tanks would be sufficiently effective and/or credible to deter India is a different matter that will not be taken up here.)²² And, in order to protect against any Indian perception of advantage from Cold Start or, perhaps, a disarming first strike (after which India could use its missile defense to intercept Pakistani missiles that were not destroyed), however unlikely such scenarios seem, Pakistan has started to plan for a secure second-strike capability by diversifying its missile systems through cruise missiles and the development of sea-based nuclear capabilities.²³

The divergence in Indian and Pakistani missile development and testing can be seen as a result of change in the national security orientation of India and responses by Pakistan to close perceived credibility gaps in deterrence.

The divergence in Indian and Pakistani missile development and testing therefore can be seen as a result of change in the national security orientation of India and responses by Pakistan to close perceived credibility gaps in deterrence. Both sides continue to test missiles that will become part of their arsenals and meet the objectives of their evolving nuclear postures. But this context helps explain why the recent missile testing, alarming as it may be, does not portend a classic arms race.

Racing on Different Tracks

As India and Pakistan grow their military and nuclear capabilities at increasingly rapid rates, it is not too surprising that scholars, analysts, and the media alike have drawn on the convenient term “arms race” to characterize this phenomenon. But the India-Pakistan dynamic is much more complicated than that.

India and Pakistan are indeed entangled in a long-standing competition, but they are not two closely matched opponents running side-by-side on a racetrack until one collapses from exhaustion, as happened in the Cold War. The India-Pakistan “race” is fraught with uncertainties and asymmetries. The opponents are matched neither in size, ability, nor perceptions of the nature and scope of the competition. Nor is it clear whether the “race” is a sprint, a marathon, or a steeplechase. The finish line is evident to no one.

Much of the complexity of this situation stems from the fact that the India-Pakistan nuclear dynamic is not confined to the subcontinent—China’s military modernization transforms what was an antagonistic relationship between two players into a triangle of strategic calculations. India has begun to shape its deterrent posture based on China’s power projection and is already framing its newest missile capabilities in this light. Developments in the China-India competition are likely to continue spilling over to the India-Pakistan relationship, with Pakistan altering its nuclear-delivery options to deter a rising India. The cooperative relationship between China and Pakistan creates the third leg of this triangle. The fact that China’s calculations of strategic requirements depend on actors outside the Asian arena only further complicates the dynamic.

There can be some comfort taken from the long-stated desire of both Indian and Pakistani officials to avoid an arms race. But there is little doubt India and Pakistan are in fact racing toward their respective national security objectives, albeit on very different strategic tracks and reacting to different threat perceptions. And these opponents appear determined to continue running, without pausing to question whether this is really the arena in which they wish to compete or to what end. What their rapidly changing military

capabilities may mean for stability on the subcontinent and in Asia proper is uncertain. What is apparent—from their missile testing histories and changing nuclear postures—is that the armament dynamic is far more complex than a classic arms race. Any policy seeking to alter the current trajectory must acknowledge this reality.

Appendix

India and Pakistan Missile Tests by Date, 1998–July 2012

Data for this table comes from multiple sources, including the Nuclear Threat Initiative's compilation of Pakistan and India Missile Chronologies as well as major news publications.²⁴ Range figures, which in many cases differ from Western estimates, are from Pakistan's Inter Services Public Relations and India's Defense Research and Development Organization.²⁵

Country	Date	Type	Missile	Range (km)
Pakistan	6-Apr-98	Ballistic	Hatf V (Ghauri I)	1,300
India	11-Apr-99	Ballistic	Agni II	2,000
Pakistan	14-Apr-99	Ballistic	Ghauri II	3,000
Pakistan	15-Apr-99	Ballistic	Hatf IV (Shaheen I)	700
Pakistan	24-Jun-99	Ballistic	Hatf V (Ghauri I)	1,300
Pakistan	7-Feb-00	Ballistic	Hatf I	70
India	11-Apr-00	Ballistic	Prithvi III (Dhanush)	350
India	16-Jun-00	Ballistic	Prithvi I	150
India	17-Jan-01	Ballistic	Agni II	2,000
India	31-Mar-01	Ballistic	Prithvi I	150
India	12-Jun-01	Cruise	BrahMos	290
India	12-Jun-01	Cruise	BrahMos	290
India	21-Sep-01	Ballistic	Prithvi III (Dhanush)	350
India	13-Dec-01	Ballistic	Prithvi II	250
India	25-Jan-02	Ballistic	Agni I	700
India	28-Apr-02	Cruise	BrahMos	290
Pakistan	25-May-02	Ballistic	Hatf V (Ghauri I)	1,300
Pakistan	26-May-02	Ballistic	Hatf III (Ghaznavi)	290
Pakistan	28-May-02	Ballistic	Hatf II (Abdali)	180
Pakistan	4-Oct-02	Ballistic	Hatf IV (Shaheen I)	700
India	9-Jan-03	Ballistic	Agni I	700
India	12-Feb-03	Cruise	BrahMos	290
India	26-Mar-03	Ballistic	Prithvi I	150
Pakistan	26-Mar-03	Ballistic	Hatf II (Abdali)	180
India	29-Apr-03	Ballistic	Prithvi I	150
Pakistan	3-Oct-03	Ballistic	Hatf III (Ghaznavi)	290
Pakistan	8-Oct-03	Ballistic	Hatf IV (Shaheen I)	700
Pakistan	13-Oct-03	Ballistic	Hatf IV (Shaheen I)	700
India	29-Oct-03	Cruise	BrahMos	290
India	29-Oct-03	Cruise	BrahMos	290
India	9-Nov-03	Cruise	BrahMos	290
India	9-Nov-03	Cruise	BrahMos	290
India	23-Nov-03	Cruise	BrahMos	290
India	23-Nov-03	Cruise	BrahMos	290
India	23-Jan-04	Ballistic	Prithvi I	150
Pakistan	9-Mar-04	Ballistic	Hatf VI (Shaheen II)	2,000
India	19-Mar-04	Ballistic	Prithvi II	250
Pakistan	29-May-04	Ballistic	Hatf V (Ghauri I)	1,300
Pakistan	4-Jun-04	Ballistic	Hatf V (Ghauri I)	1,300

Country	Date	Type	Missile	Range (km)
India	13-Jun-04	Cruise	BrahMos	290
India	4-Jul-04	Ballistic	Agni I	700
India	29-Aug-04	Ballistic	Agni II	2,000
Pakistan	12-Oct-04	Ballistic	Hatf V (Ghauri I)	1,300
India	27-Oct-04	Ballistic	Prithvi III (Dhanush)	350
India	3-Nov-04	Cruise	BrahMos	290
India	7-Nov-04	Ballistic	Prithvi III (Dhanush)	350
Pakistan	29-Nov-04	Ballistic	Hatf III (Ghaznavi)	290
Pakistan	8-Dec-04	Ballistic	Hatf IV (Shaheen I)	700
India	21-Dec-04	Cruise	BrahMos	290
Pakistan	19-Mar-05	Ballistic	Hatf VI (Shaheen II)	2,000
Pakistan	31-Mar-05	Ballistic	Hatf II (Abdali)	180
India	16-Apr-05	Cruise	BrahMos	290
India	12-May-05	Ballistic	Prithvi I	250
Pakistan	11-Aug-05	Cruise	Babur	500
India	30-Nov-05	Cruise	BrahMos	290
India	1-Dec-05	Cruise	BrahMos	290
India	28-Dec-05	Ballistic	Prithvi III (Dhanush)	350
Pakistan	21-Mar-06	Cruise	Babur	500
Pakistan	29-Apr-06	Ballistic	Hatf VI (Shaheen II)	2,000
Pakistan	6-May-06	Ballistic	Hatf VI (Shaheen II)	2,000
India	1-Jun-06	Cruise	BrahMos	290
India	11-Jun-06	Ballistic	Prithvi II	250
India	9-Jul-06	Ballistic	Agni III	3,500
Pakistan	16-Nov-06	Ballistic	Hatf V (Ghauri I)	1,300
India	19-Nov-06	Ballistic	Prithvi II	250
India	27-Nov-06	Ballistic	Prithvi II	250
Pakistan	29-Nov-06	Ballistic	Hatf IV (Shaheen I)	700
Pakistan	9-Dec-06	Ballistic	Hatf III (Ghaznavi)	290
India	5-Feb-07	Cruise	BrahMos	290
Pakistan	23-Feb-07	Ballistic	Hatf VI (Shaheen II)	2,000
Pakistan	3-Mar-07	Ballistic	Hatf II (Abdali)	180
Pakistan	22-Mar-07	Cruise	Babur	500
India	12-Apr-07	Ballistic	Agni III	3,500
India	23-Apr-07	Cruise	BrahMos	290
Pakistan	26-Jul-07	Cruise	Babur	500
Pakistan	25-Aug-07	Cruise	Ra'ad	350
Pakistan	11-Dec-07	Cruise	Babur	500
Pakistan	25-Jan-08	Ballistic	Hatf IV (Shaheen I)	700

Country	Date	Type	Missile	Range (km)
Pakistan	1-Feb-08	Ballistic	Hatf V (Ghauri I)	1,300
Pakistan	13-Feb-08	Ballistic	Hatf III (Ghaznavi)	290
India	26-Feb-08	Ballistic	Sagarika (K-15)	750
Pakistan	19-Apr-08	Ballistic	Hatf VI (Shaheen II)	2,000
Pakistan	21-Apr-08	Ballistic	Hatf VI (Shaheen II)	2,000
India	7-May-08	Ballistic	Agni III	3,500
Pakistan	8-May-08	Cruise	Ra'ad	350
India	12-Nov-08	Ballistic	Sagarika (K-15)	750
India	18-Dec-08	Cruise	BrahMos	290
India	20-Jan-09	Cruise	BrahMos	290
India	5-Mar-09	Cruise	BrahMos	290
India	30-Mar-09	Cruise	BrahMos	290
Pakistan	6-May-09	Cruise	Babur	500
India	30-Jul-09	Cruise	BrahMos	290
India	7-Feb-10	Ballistic	Agni III	3,500
India	21-Mar-10	Cruise	BrahMos	290
Pakistan	8-May-10	Ballistic	Hatf III (Ghaznavi)	290
Pakistan	8-May-10	Ballistic	Hatf IV (Shaheen I)	700
India	6-Sep-10	Cruise	BrahMos	290
Pakistan	21-Dec-10	Ballistic	Hatf V (Ghauri I)	1,300
Pakistan	10-Feb-11	Cruise	Babur	500
Pakistan	11-Mar-11	Ballistic	Hatf II (Abdali)	180
Pakistan	19-Apr-11	Ballistic	Hatf IX (Nasr)	60
Pakistan	29-Apr-11	Cruise	Ra'ad	350
India	21-Jul-11	Ballistic	Prahaar (Sanskrit)	150
Pakistan	28-Oct-11	Cruise	Babur	500
India	15-Nov-11	Ballistic	Agni IV	3,500
India	2-Mar-12	Cruise	BrahMos	290
Pakistan	5-Mar-12	Ballistic	Hatf II (Abdali)	180
India	28-Mar-12	Cruise	BrahMos	290
India	19-Apr-12	Cruise	Angi V	5,000
Pakistan	25-Apr-12	Ballistic	Shaheen IA	1,000
Pakistan	10-May-12	Ballistic	Hatf III (Ghaznavi)	290
Pakistan	29-May-12	Ballistic	Hatf IX (Nasr)	60
Pakistan	31-May-12	Cruise	Ra'ad	350
Pakistan	5-Jun-12	Cruise	Babur	700
India	13-Jul-12	Ballistic	Agni I	700

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