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Iran's Ballistic Missile Program: A New Case for Engaging Iran?

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ABSTRACT *Much like Iran's nuclear program, scholars and policy makers are largely puzzled to understand Iran's intentions in developing its ballistic missile program. The aim of this study is to understand Iran's objectives in developing its ballistic missiles arsenal. To fulfill this objective, the article reviews the entire history of Iran's ballistic missile program. It hypothesizes that just like its nuclear program, Iran developed its ballistic missiles arsenal as a strategy of deterrence, a response to Iraq's invasion and Washington's policy of containment. The second hypothesis held that Iran's determination to continue developing its ballistic missile program might be an attempt to dissuade its rivals from exercising power in the Middle East.*

Unlike the nuclear program, Iran's ballistic missile arsenal has received only scant scholarly attention. At best, some highly technical analysis has been offered, at worst, the missiles have been considered part of the nuclear package designed to carry nuclear warheads. However, the missile program is a complex and sophisticated response to Iran's unique security challenges which should be analyzed on its own. The signing of the Joint Comprehensive Plan of Action (JCOPA) in July 2015 has made this task more urgent. With the nuclear program rolled back, the missiles have become a new target of international attention. The ballistic program is run by the Islamic Revolutionary Guard Corps (IRGC), commonly known as the Revolutionary Guards, which has been subject to numerous sanctions because of its alleged terror activities and other infractions.

The focus is especially intense in Washington, where the Obama Administration's drive to conclude the nuclear accord was highly divisive. For instance, some critics urged to impose a new round of sanctions on Iran to curb its missile program. Others suggested using American anti-ballistic missile defense

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capabilities in the region to target Iranian ballistic trials. According to this rationale, denying the Revolutionary Guards the ability to test missiles would disrupt its research and development opportunities.[1]

Both courses of actions have potentially far reaching consequences. Slapping on more sanctions may prompt Tehran to abrogate the JCPOA. Intercepting missiles of a sovereign country violates international law and may lead to a huge conflagration in the Middle East and beyond. Given the high-level stakes of these policies, an analysis of Iran's rationale for developing its ballistic arsenal is in order. To increase the scientific rigor of this research, it needs to be grounded in Intentional Relations (IR) theory.

This paper is organized into five sections, which reflect the research goals outlined above. Section one offers a short analysis of the pertinent intentional relations theories. Section two traces the history of Iran's missile program and explains how developing indigenous missile and anti-missile systems became one of the components of Iran's deterrence strategy. Section three covers the arms race in the Middle East and its impact on Iran's security environment. Section four discusses the implications of the JCPOA for Iran's missile program. The concluding section considers the impact of the 2016 presidential election in the United States on the future prospect of the ballistic missile program.

Realism and Neorealism: Theories of Motivation

Literature indicates that the decisions that drive proliferation of nuclear weapons are quite like those which prompt the quest for a ballistic missiles program. Both nuclear weapons and ballistic missiles are instruments of power that may be used as deterrent or compellent threats. They both serve to enhance the security of a state through raw power.

Realist and Neorealist IR theory postulated that a state that faces a deteriorating security situation will opt for developing its nuclear arsenal/ballistic missiles program as a safeguard against adversaries. Both theories are driven by the rational choice model, that is the assumption that rational actors act in a rational way when they opt for a nuclear or ballistic option to maximize their security when faced with a serious challenge. As John Mearsheimer, a leading Realist theorist puts it, states always strive to maximize their power over their

rivals with hegemony as their ultimate objectives. In fact, the anarchic nature of the international system encourages players to seek out opportunities to enhance their power *vis-à-vis* other players.[2]

Theoretically conceptualized, the anarchic state of international affairs forces actors to engage in a constant conflict for power and security. Because of the high degree of uncertainty in such a system, states do not trust the actions of other states. Therefore, they succumb to the so-called security dilemma - defined as the inability for individual states to maximize their own power and security without threatening the security of other states - a fundamental driver of global politics. As the renowned nuclear expert Michael Krepon noted, plagued by a security dilemma states prefer to be safe than sorry, a position which compels them acquire too much security. Such "over insurance" can be understood as a response to a persistent state of uncertainty in an anarchic situation.[3]

Neorealism, also known as structural realism, postulates that no single entity governs the international system, prompting national actors to worry about their existence and stay highly vigilant. In this view, states are security-conscious entities, and their military policies are driven by their "most probable threat appraisal" as opposed to the worst-case scenario. Besides, in a zone of high-level conflict characterized by constant violence and mistrust, states engage in enduring rivalries and protracted conflicts. Regional countries which are not protected by the superpower patrons are more prone to maximize their power to deter any potential attack by their adversaries. Clearly, Neorealist scholars believe that a decision of a weak player to maximize its power is a rational response to a serious security dilemma. Such countries are characteristically unable to protect their vital interests or stand up to major powers by relying on conventional deterrence. Conversely, giving up such weapons is perceived as a dangerous act since it requires placing trust in other states' actions.[4]

A large body of research indicates that states use rational choice thinking when deciding to proliferate or acquire a ballistic arsenal. In the case of Iran, however, the discourse of the regime's motives has been highly politicized, with rational choice theories taking a back seat. At best, analysts have sought to apply methods of varying rigor to evaluating rationality; at worst, they have projected their own view of what rational behavior should be. Consequently, two camps have emerged - the optimists and the pessimists. The former considers the Iranian regime to be a rational player driven by security concerns; the latter views it as an irrational, messianic entity seeking to maximize its power for offensive purposes. Absent conclusive evidence to prove or disprove either side, the discourse has turned into a "profession of faith." As one observer put it, when it comes to Iran, rationality and irrationality is in the "eye of

Iranian President Hassan Rouhani and Defence Minister Hossein Dehghan stand next to the new Bavar 373 missile defense system which was designed to intercept cruise missiles, drones, combat aircraft and ballistic missiles.

AFP PHOTO / IRANIAN PRESIDENCY / HO

the beholder."[5] Still, a theoretically rigorous analysis of Iran's ballistic missile program should clarify the motivations of the regime.

Early Missile Ambitions: The Rise of Iran's Ballistic Missiles Program

Developing indigenous missile and anti-missile systems have been key components of Iran's deterrence strategy. The tension between Iran and its powerful neighbors goes a long way toward explaining why Iran feels the need for greater defense capabilities. Iran was forced to consider nuclear and ballistic options because of the long and bloody war with Iraq which had a profound role in shaping Iran's strategic thinking.[6]

The history of this bloody conflict between the two countries is well known. The second longest war of the twentieth century, it has been frequently compared to World War I. Like the 1914 war, it relied on trench warfare, human wave attacks, indiscriminate assault on civilian population and, most importantly, Iraq's use of chemical weapons against Iranian soldiers and civilians. Altogether, the human cost of the war to the Iranians was enormous; with 188,015 killed, 320,000 wounded and 2 million people left homeless by Iraqi SCUD missile attacks on cities.[7]

Although Iran's dedication to exporting its revolution, a goal that the regime was not willing to forgo in the face of extreme hardship, exacerbated the con-

flict, the war left deep and enduring scars on the collective psyche. Even a casual perusal of cultural narratives indicates a deep sense of insecurity and vulnerability. Admittedly, in IR theory, revolutionary export should be considered an Idealist position; its consequences - the war with Iraq and a collision with the United States and its allies - created an unprecedented security predicament.

The weapons embargo led the regime to believe that, ultimately, Iran must rely on its own resources for self-defense

Both the leaders of the regular armed forces, the *Artesh*, and the Revolutionary Guards, who fought in some of the most ferocious battles of the war, understood that Iran had little in terms of conventional equipment to deter Iraq from launching missile attacks. Thus, the leadership concluded that Iran would need a powerful deterrent of some kind. At its core was the belief that Iran's existence in an unstable and dangerous environment was precarious and that it had suffered horribly at the hands of others. In this sense the war with Iraq was a classic case of a structurally–determined rivalry between two players vying for regional domination, something straight out of the playbook of Realists and Neorealists.[8]

But the embargo on weapon sales pushed by the United States after activists seized the American embassy in Tehran in November 1979 proved to be a huge obstacle for obtaining a strong deterrence. The strained relations with the United States made it even difficult for Iran to access technologies needed to maintain its air force. Obtaining standard weapons and munitions in the black market involved extremely complex arrangements. Things got much worse when, at the request of Iraq, the United States launched Operation Staunch, a global ban on the sale of weapons to Iran in 1983.[9]

Ayatollah Ali Akbar Hashemi Rafsanjani, the then Speaker of the Majlis, who was also in charge of the war effort, searched for an urgent response to Iraqi missiles, which targeted both the front lines and the civilians in the cities. The latter, known as the war against the cities, inflicted substantial casualties and left some two million homeless. Because of the weapons embargo, North Korea was the only country willing to do business with Iran, selling it short-range Scud missiles. Rafsanjani parleyed these initial contacts into a broader cooperation; by the mid-1980s Pyongyang aided in creating an indigenous missile industry in exchange for shipments of oil.[10]

The weapons embargo led the regime to believe that, ultimately, Iran must rely on its own resources for self-defense. In his memoir, Hassan Rouhani revealed that the leadership took a unanimous decision to achieve security self-sufficiency which led the Revolutionary Guards to create the "self-suffi-

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ciency unit" in 1986. Its official task was to develop military industries which would require no assistance from other countries. Headed by Hassan Tehrani Moghaddam, the "founding father" of the missile program, the unit was essentially a Research and Development Institute for missile technology. Moghaddam, who was later promoted to Major General, would go on to lead the self-sufficiency unit and the Guard's Missile Corps formed in 1996 until his death in 2011. To complement the R&D effort, in 1986 the Guards launched an industrial venture, the Shahid Hemmat Industrial Group (SHIG) located in Malard near Tehran. Brigadier General Mohamad Husein Jalali and Brigadier General Hussein Mantequei were put in charge of the production in SHIG. From Tehran's point of view such a decision was a highly rational step – one that ticked off many of Waltz's proliferation factors.[11]

At first, Moghaddam was forced to reverse- engineer the Soviet- era Scud technology, designing the Shahab-1 from a Scud-B missile, which was rolled out by SHIG. But Moghaddam had a more ambitious plan to develop medium and long range missiles to deter possible attacks from Israel and other perceived enemies of the regime. In early 1997 the SHIG unveiled a prototype of Shahab-3 C with a range of 2,000 km, Iranian's medium-range ballistic missile (MRBM). Based on the original Scud-C technology, it was a supped-up version of the North Korean Nodong 1. Intelligence reports disclosed that Russians and Chinese technicians helped with engineering the Shahab-3; the latter was said to help with the targeting and control systems. After a series of initial failures in flight tests, the Shahab 3 was officially added to the ballistic fleet in July 2003. Following further modifications, the missile was introduced as Ghadar 110 (also known as Ghadar 101).[12]

Dissatisfied with the Nodong's reliability and precision, Iran sought Russian assistance in obtaining high-grade alloys to improve the strength of the missile while maintaining its light weight. Iran also obtained from Russia special metal foils to protect the missile's navigation system, a wind tunnel and other equipment to test the missile, technology to enable the warhead to withstand high speeds, and technology to create asymmetrical warheads that are more capable of evading antimissile defense systems. Energomash, a Russian missile engine manufacturer, provided Iran with equipment to improve the Shahab-3 engine. By increasing the pressure and temperature in the combustion chamber, the engine could carry the missile farther without using more fuel.[13]

All along, the Iranians were working hard to achieve the stated goal of "self-sufficiency." One intelligence report revealed that in 1994, 350 Iranians studied flight theory at the Khrunichev State Research and Production Space Center in Moscow. U.S. intelligence sources named the Russian firm Polyus, which specialized in missile guidance systems, as assisting the Iran missile programs. These efforts seemed to have paid off, as by 1998 Ali Shamkhani, told the *Kayhan* newspaper that Iran reached self-sufficiency in missile production and would be able to operate without outside assistance.[14] Whether Shamkhani could be taken at his face value is not entirely clear. To increase its deterrence posture, Iran was known to rename missile programs, exaggerate their performance, and declare untested technologies as operations. Still, Moghaddam's steady progress attested to a measure of success which took many by surprise.

Following important breakthroughs in solid fuel technology and multistage missile assembly under the consolidated leadership of the Missile Corps, Iran went on to produce a variety of new missiles. Shahab-3 modification, Ghadr 110, and its variants, Emad, Shahab-4, Shahab-5 (Kosar), Shahab-6 (Toqyān), and Sejjil followed down the line. Reportedly, these missiles could all carry a nuclear warhead. The Sanam Industries Group, also known as the Parchin Missile Industrial Group, located on the sprawling Parchin base, had a role in the new push. Sanam engineers were reported to develop the solid fuels line. The group's name first surfaced in 1993 when its collaboration with the Russian Central Aerodynamic Institute (TsAGI) was announced. Given the operating protocols of the Revolutionary Guards, the Sanam complex had probably existed well before that.[15]

On October 28, 1997, it was announced that Iran had developed the Shahab-4 with a range of between 2,000 to 4,000 km, capable of carrying a 1,200-kg payload and successfully tested in May and June 2002 in the Semnan region. The Iranians used parts of Soviet R-12 – missile, designed to have a range based on the Russian SS-4. Western intelligence suggested that the missile was designed to use a variant of the RD-216 liquid-propellant rocket motor originally developed for the Russian SS-5 Skean missile.[16] The RD-216 was an Energomash engine originally used on the Skean/SS-5/R-14, a single-stage, storable liquid-propellant Intermediate-Range Ballistic Missile (IRBM), Saddler/SS-7/R-16, a two-stage, tandem, storable liquid-propellant Intercontinental Ballistic Missile (ICBM) and Sasin/R-26 ICBM missiles, one of the first strategic missiles of the second generation with integrated fuel tanks developed by KB Yuzhnoye (OKB-586) during the Cold War.[17] Russia was reported to be the primary contractor of the Shahab-4, whereas China denied any involvement in developing Iran's missile program.[18]

Following India's nuclear tests on May 11 and 13, 1998, and Pakistan's nuclear tests on May 28, the regime accelerated its own ballistic efforts. On June 16,

1998 Iran purchased telemetry equipment[19] for missile testing from China's Great Wall Industries for its Shahab missile programs.[20] On September 29, 1998 Shamkhani announced that Iran was developing the Shahab-5 ballistic missiles, also known as Kosar. Not yet operational, the Shahab-5 is the two stage version of the North Korean Taep'o-dong-2 expected to have a range of 4,000-4,300 km with a 1,000 kg nuclear payload."[21] On November 3, 1998 Rajab Safarov, member of the political consultation committee for the Russian President and vice president of the coordination center for the Russian-Iranian program described the Shahab-5 as an ICBM with a range of up to 10,000 km, which can carry chemical, bacteriological, or nuclear warheads. Reportedly, China cooperated with Russia to complete the Shahab-5 missile.[22]

In December 1998, an Israeli intelligence report claimed that Iran is developing a new ballistic missile called Shahab-6 as an ICBM with the help of China, North Korea and Russian aerospace technicians and state-run entities. On October 16, 2002, the National Council of Resistance of Iran (NCRI), an opposition group, announced the existence of Iran's Shahab-6. Renamed Toqyān, it is yet to become operational and has a range of 3,000-5,000 km with a 1,000-750-500-kg nuclear warhead, according to Israeli intelligence sources. Toqyān is said to be a reconfigured version of North Korean Taep'o-dong-2 powered with a version of Russia's storable liquid fuel RD-216. According to intelligence analysts, "this suggests that Iran has obtained the blue prints of both the SS-4, RD-214 and the SS-5, RD-216 storable liquid fuel rocket engines through illicit means."[23]

Variations of the Shahab-3, including the Ghadr-1, have a range of almost 2,000+ km with a higher maneuverability than the Shahab-3. Ghadr-1 – a liquid-fueled medium range ballistic missile with approximately 1,950 km range – began flight tests in 2004, a version with a dramatically modified nose and, as with other Shahab-3 designs, capable of carrying a nuclear warhead.[24]

Sejjil-1, a solid-fueled, two-stage ballistic missile with an estimated range of over 2,000 km, and its more advanced version, Sejjil-2, were important addition to the arsenal. The latter would give Iran greater flexibility in hitting targets such as Israel. The missile has a length of 17.6 m, a diameter of 1.25 m, and an overall launch weight of 23,600 kg capable of carrying a payload of 500 to 1,000 kg and nuclear warheads. Because of its solid propellant, the missile needs less time and fewer support vehicles for launching as opposed to liquid-fuel missiles. Rapid relocation of the launcher vehicle makes it hard to destroy the system on the ground. Uzi Rubin, the former director of Israel's Ballistic Missile Defense Organization noted that the Sejjil had a truly original design bearing no resemblance to foreign missiles. Rubin added that the Sejjil put Iran on the path of developing an intercontinental ballistic missile (ICBM).[25]

Iran's rapid and successful development in missile expertise has led to increased concern of the United States and its allies about the country's intentions

Arguably, the Ashoura missile is Iran's most advanced example of indigenous research and development efforts. Ashoura is a three-stage solid-fuel IRBM with an estimated range of estimated 2,500 to 3,000 km and capable of carrying a nuclear warhead.[26] On November 27, 2007 the Iranian Defense Minister Mostafa Mohammad-Najjar reported the building of the Ashura missile, with a range of 2,000 km, anti-armor missiles, a range of rockets, anti-air defense missiles, building tanks, a range of vehicles and personnel carriers, and building surface vessels and submarines as among the steps taken by his agency. It is not known when the Ghadr project was started, but on December 2, 2004 NCRI revealed its existence.[27]

Emad (Pillar) – an improved version of Shahab-3 – is another Iranian long range ballistic missile capable of carrying a nuclear warhead, specifically designed to evade missile defenses. According to military experts, the specific design and alterations to this finned Reentry Vehicle (RV) give it greater stability, increased maneuverability, and a high degree of accuracy. A report by the autoactivate *Jane's Defence Weekly* indicates that the Emad RV has a greater volume than previous RV's enabling it to carry heavier warheads. Iran's defense minister Brigadier Gen. Hossein Dehghan asserted that "this is the first ballistic missile developed by Iran that can be precision-guided until it reaches its target."[28]

A detailed report produced by the Center for Strategic and International Studies (CSIS) cites that the Emad has a 1,700 km range, 500 m accuracy, and a 750 kg payload capacity. Israeli missile expert Uzi Rubin noted that the Emad was "representing a major leap in terms of accuracy, advanced guidance and control system in its nose cone." However, given its range, the missile does not qualify for the IRBM or ICBM classification that the Defense Minister might have sought.[29]

Another Iranian ballistic missile known as Fajr-3 is a multiple independently targeted reentry vehicle (MIRV) that reportedly can carry several warheads, and evade most sensitive radar systems as well as anti-missile systems. Unveiled during the Holy Prophet war-games on March 31, 2006 the missile successfully tested and is believed to be a medium-range ballistic missile with an estimated range of 2,000 km.[30]

In addition to a successful ballistic missile program, Iran has also placed several satellites into orbit using its own two-stage launch vehicle. Iran has

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also built and tested multi-stage ballistic missiles, and successfully improved their guidance along with improving and diversifying the fuel used to propel its ballistic missiles. These developments are significant because it allows the Iranians to deploy and fire the missiles more quickly and to extend their range. The survivability of the ballistic missiles has also been improved; the missiles now can be mounted on mobile launchers and deployed to newly built silos.[31]

In January 2004, Iran announced that it would launch a satellite on a Russian rocket and allocated 500 million dollars for its space programs. Keeping to the schedule, in February 2008 the Iranians successfully launched a research rocket into orbit in preparation for satellite launching in the future. Six months later, in August 2008, Iran launched a rocket with the capability of carrying its first satellite, but U.S. intelligence and defense officials claimed that the test was unsuccessful and failed shortly after the launch. Soon after in early February 2009, Iran launched its Omid satellite11 on a Safir-2 rocket, with a range of 155 miles. A Pentagon spokesman noted that it was "clearly a concern of ours" because "there are dual-use capabilities [in the rocket] which could be applied toward the development of long-range missiles."[32]

Iran's rapid and successful development in missile expertise has led to increased concern of the United States and its allies about the country's intentions. Israeli intelligence analysts held that "Iran could be building a fleet of long-range missiles that, armed with conventional warheads, might serve a 'saturation' strategy." As Rubin put it, "a salvo of such conventionally-armed missiles against an Israeli city, for example, could substitute for Iran's skeletal air force. Since many of Iran's ballistic missiles can carry a nuclear warhead, the country may also develop a long-range nuclear weapon delivery system."[33]

Iran's impressive progress had rattled the American intelligence community. As early as 1999 it was assessed that in the "near future" the United States will face ICBM or long-range threats from Iran. Two years later, in 2001, the intelligence community predicted that the Islamic Republic will have long-range missiles by the end of the year 2015. These and other experts had urged U.S. officials to design a proper response to such a threat. Since then, this assessment has been the U.S. official position, that "Iran could test an ICBM in the last half of the next decade," threatening the United States and its allies.[34]

A long-range Qadr ballistic missile is launched in the Alborz mountain range in northern Iran on March 9, 2016.

AFP PHOTO / TASNIM NEWS / MAHMOOD HOSSEINI

Reviewing the history of the ballistic missiles program confirms that Rationalist and Neonationalist assumption had guided the Iranians. Struggling to rebuild a traditional army and air force in a "dangerous neighborhood," they opted for a ballistic "shortcut." Technologically, missile production, as Moghaddam envisaged, was close to ideal for a country that had enshrined "self-sufficiency" in its security doctrine. A ballistics arsenal was also a rational response to Washington's long standing policy to arm and protect its allies in the region.

The Arms Race in the Middle East: The United States and Its Allies *vs.* Iran

Even for a region known for its epic conflicts, the prodigious spending on arms stands out. Most strikingly is the growing level of sophistication in arms and related weapons technology of the Arab Gulf states.[35] For instance, the Gulf Corporation Council (GCC) spends approximately 98.5 billion dollars on its militaries annually, compared to Iran's 10.6 billion dollars. Data released by the U.S. Congressional Research Service (CRS) indicate that the GCC took possession of 38.5 billion dollars' worth of new arms between 2004 and 2011, 35 times more than Iran's acquisition of 1.1 billion dollars for the same period. Similarly, data released by the Stockholm International Peace Research Institute (SIPRI) indicate that the Gulf States have a massive lead over Iran in terms of spending on military munitions. According to SIPRI

"the GCC countries lead over Iran by approximately 7:1 in 1997 to 2007, almost 10:1 during 2004-2008, nearly 33:1 from 2009 to 2013, and about 27.5:1 in 2007-2014."[36]

As the data indicates, the Arab Gulf states had a clear advantage over Iran in terms of total spending on purchasing weapons, in addition to access to modern U.S. and EU weapons and military technology. The military expenditure of Iran's arch rival, Saudi Arabia, was twice as large as Iran's military outlays, and that of the United Arab Emirates (UAE) was almost seven times larger than Iran's. The gap between Iran and its Arab neighbors had widened rapidly from 2009 to 2014. During this period, Saudi's imports of weapons and military technology were 18 times larger than that of the Islamic Republic; arms imports of the UAE were 16 times larger compared with the Islamic Republic.[37]

One report indicates that between October 2010 and October 2014, Saudi Arabia ordered 90,435 billion dollars worth of weapons in a major new arms transfer from the United States alone including some of the most modern weapons in the U.S. inventory. The SIPRI recently announced that Saudi Arabia alone spent 85.3 billion dollars in 2015, to advance its military ammunition, compared to Iran's 10 billion dollars. Best underscoring Saudi Arabia's willingness to win the arms race in the region was Riyadh's decision to spend 30 billion dollars on advanced jets and helicopters in 2011. Saudi Arabia ordered four larger surface warships and six smaller corvette-class ships at the same time. The deal also involved a 1.9 billion dollar contract for an unrevealed amount of MH-60R Sikorsky helicopters in addition to some smaller ships and aircraft which are part of an upgrade to Saudi's Fleet in the Persian Gulf. Even after the JCPOA was announced, Saudi Arabia signed up to buy 600 Patriot missiles from the U.S. at 5 billion dollars, and it is expected to purchase 10 more Sikorsky MH-60R naval helicopters.[38]

Qatar, another GCC member state, has signed a contract worth 17 billion dollars with France for Rafale fighter jets, and plans to purchase Boeing F-15s. Kuwait, another GCC member recently struck a deal with Boeing worth 3 billion dollars, purchasing Boeing 28 F-18 Super Hornets, a rapid response, dependable tactical fighter jet with twin-engine carrier-based multirole with capability of carrying air-to-air missiles and air-to-surface weapons. In 2013, the UAE signed a contract worth 200 million dollars with General Atomics Predator drones delivered in April 2016. According to SIPRI, the combined expenditure of UAE and Saudi Arabia is six times higher than that of Iran.[39]

By all measures, Saudi's drive to amass a ballistic arsenal is particularly striking. In 1987 the Royal Saudi Strategic Missile Force secretly bought dozens of CSS-2 ballistic missiles from China. The inventory has been gradually

replaced with the more advanced CC-5 model. In the 2000s, Saudi Arabia bought several Storm Shadow missiles which were co-developed by the British and French. A land-attack cruise missile with a range of 500 km would be able to hit infrastructure while operating outside the range of the Iranian defenses. The missiles are housed in the al Jufayr base (which lies approximately 90 km south of Riyadh) and the al Sulayyil base (450 km southwest of the capital). A third complex, al Watah, is configured in a different way, but experts assume it has a missile inventory. The missiles are conventional but could be modified to carry nuclear warheads should it be required.[40]

The Obama administration, under pressure from the Israel lobby concerned about the negotiations with Iran, granted 619.8 million dollars for the joint U.S.-Israel missile defense programs designed to protect Israel from potential threats from its enemies

In addition to cutting-edge military wares, the Gulf countries enjoy access to superior American training, Intelligence, Surveillance, and Reconnaissance (ISR) systems as well as its Command, Control, Communications, Computer, and battle management capabilities (C4I/BM). Because of U.S. C4I/BM, the Gulf countries face virtually no technological risks when choosing combat systems. The Iranians, on the other hand, face risks in performance, delivery delays, and unanticipated costs in their self-produced systems.[41]

For example, to dissuade Riyadh from taking the nuclear path after the nuclear deal with Iran was reached, the Obama administration agreed to upgrade the Patriot anti-missile defense system operating in the Kingdom. In the same month, the State Department approved the sale of 600 Lockheed Patriot Advanced Capability (PAC-3) missiles, the newest version of the Patriot system. Saudi Ballistic Defense System (BDS) has been supplemented by the Terminal High Altitude Area Defense, (THAAD) a Lockheed made interceptor, powered by the Raytheon AN/TPT-2 E-Band radar. THAAD has a flawless performance record against a variety of short and medium-range missiles. Some military experts have suggested the United States link the Saudi BDS to that of the Gulf States, Jordan, and Israel into a single and effective response command.[42]

Israel, the only country in the Middle East believed to possess nuclear weapons, can fit out its ballistic missiles with nuclear payloads, a great concern for the Iranians. Since the October War in 1973 until 2003, the United States has supported Israel with total direct aid of over 140 billion dollars.[43] Since the early 2000s, a joint American-Israeli project estimated at some 3 billion dol-

From the perspective of Tehran, Washington's policy of arming its allies with long-range ballistic missiles, advanced fighters, and other military equipment has threatened its security interests, not to mention its deterrent power

lars, resulted in an integrated multilayered, anti-ballistic system: the short-range Iron Dome, the mid-range Jericho, and the long-range Arrow. Linked to the FBX-T Raytheon radar systems, known popularly as the ex-band, it is part of the Joint Tactical Ground Station Theater Warning System (JTGS) based in Europe but operated by American personnel in Netivot in the Negev. To increase combat preparedness, the United States and Israel hold the biannual joint exercise codenamed Juniper Cobra, a five-day combined military exercise against regional threats, including missile attacks.[44]

Under a 10-year deal signed in 2007 (for the FY2009 to FY2018), Israel has received $3 billion annually in direct foreign assistance from the United States, approximately one-fifth of the U.S. foreign aid budget. The only stipulation attached is that over 70 percent of this sum has to be spent on U.S. military hardware. The 2015 report by the Congressional Research Service entitled "U.S. Foreign Aid to Israel," indicates that the White House gave 3.1 billion dollars to Israel in direct bilateral military aid for the Fiscal Year 2015. The Obama administration, under pressure from the Israel lobby concerned about the negotiations with Iran, granted 619.8 million dollars for the joint U.S.-Israel missile defense programs designed to protect Israel from potential threats from its enemies. *De facto*, this has increased the amount of U.S. military aid to Israel from 3 billion dollars to 3.7 billion dollars annually. However, some observers put the cumulative total much higher.[45]

Moreover, as part of a "compensation package" for the JCOPA, Israel demanded a squadron of advanced F-15 Strike Eagles and V-22 Osprey tilt-rotors planes, reportedly worth more than 3.1 billion dollars. It was reported that the Israelis asked for Boeing's F-15SE Silent Eagle derivative equipped with Radar Cross Section (RCS) reduction features and internal weapons bays housed inside the jet's conformal fuel tanks.[46]

Israel allegedly plans to incorporate its own system of Israeli-made weapons, such as the Python-5 missile, into the F-15SE version that it would buy from Boeing including the electronic warfare systems, communications suite as well as helmet mounted cueing systems.[47] An extension of the 2007 agreement, running to the year 2028, was principally agreed on by Washington during a 2013 visit by President Obama to Israel, but Yedioth Ahronoth reported that talks on its terms have been "preliminary and unofficial."[48]

The deal covered several advanced items. One was the Bell Boeing V-22 Osprey tilt-rotor multi-mission military aircraft with capability of both vertical takeoff and landing (VTOL) which the U.S. has refused to export to any other country. Another one was some 75 fifth-generation F-35 joint strike jet fighters, the most advanced jet fighters in the world. Lockheed Martin, which manufactures the aircraft, described it as "having all-aspect stealth even when armed, low probability of intercept radar (LPIR), high-performance airframes, advanced avionics features, and highly integrated computer systems capable of networking with other elements within the battle space for situation awareness." Washington has also provided rockets, technology, and parts for Israel's missile defense systems such as Arrow 3 and the Iron Dome.[49]

From the perspective of Tehran, Washington's policy of arming its allies with long-range ballistic missiles, advanced fighters, and other military equipment has threatened its security interests, not to mention its deterrent power. Seen within this context, Iran's effort to develop a nuclear arsenal was, as noted, a rational response to a security dilemma. Suffering from extreme sanctions which eroded the economy and put the very legitimacy of the regime at peril, the leadership decided to sign a rollback on its nuclear vision. With the nuclear option gone, at least for the duration of the accord, the importance of the ballistic missiles for defense and for projecting power has increased.[50] But Iran's missile program has been proving to be virtually more contentious than the nuclear project.

The Joint Comprehensive Plan of Action: Implication for Iran's Ballistic Missiles

Since the nuclear accord, Iran has launched ballistic missiles on several occasions. For example, in December 2015 and in early March 2016, the Guards test-fired the mid-range Emad missiles and the Qhadr-H and Qhadr-F with an estimate range of 2,000 km, reportedly capable of carrying a nuclear payload.[51] Following the test, Brigadier General Ali Abdollahi, the head of the ballistic program was quoted as stating at a Tehran science conference. "We test-fired missiles with a range of 2,000 km and a margin of error of eight meters which can easily reach Israel." Arguably, it was not helpful that the missiles were marked with a slogan "Israel must be wiped out." After President Hassan Rouhani intervened, the offensive slogan was deleted. Still, despite considerable criticism Iran strongly insists that it has a right to develop a defensive missile capability.[52]

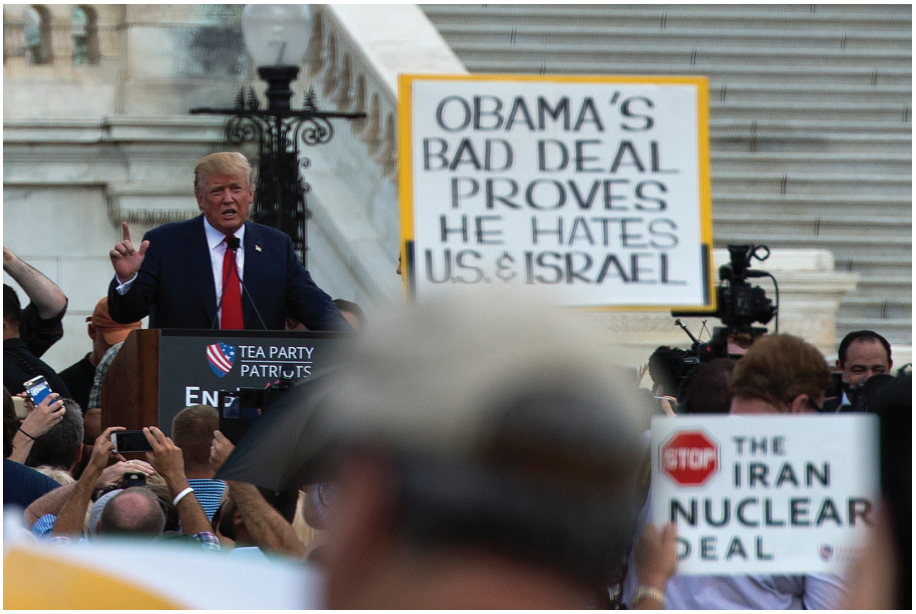
To understand why the missiles tests are contentious, it is imperative to revisit the JCPOA negotiations. For the most part, the parties avoided negotiating on Iran's ballistic missiles in the belief that resolving the nuclear issue was a top

Since ballistic missiles capable of carrying a nuclear warhead are an integral part of the nuclear arsenal, critics argue that Iran's efforts to develop its ballistic missile capabilities may reflect its desire to continue with the nuclear weapons program

global security priority and incorporating other issues could jeopardize the agreement. Iran posited that the talks should be limited to the nuclear program, and fiercely objected to any restriction on its ballistic missile activities because of their defensive use.[53] In a compromise solution, the Iranian officials sought to soften the Security Council Resolution 1929 of 2010 which stipulated that "Iran shall not undertake any activity related to ballistic missiles capable of delivering nuclear weapons." The UNSC Resolution 2231 of July 20, 2015, which endorsed the nuclear pact was more permissive: "Iran is called upon not to undertake any activity related to ballistic missiles designed to be capable of delivering nuclear weapons."[54]

Essentially, the new resolution, which does not have the legal status of the JCOPA and cannot be enforced with punitive measures, has created a legal loophole. The resolution stopped short of calling the Iranian launches a "violation," but complicated efforts to define what kind of missiles can carry a nuclear payload.[55] Since "there is no universally accepted definition of what constitutes a nuclear capable missile," in the words of one arms control expert, the United Nations Security Council relies on panels of experts for evaluation. The procedure is straightforward; pursuant of a Security Council resolution regarding a country posing a nuclear threat, a Panel of Experts is appointed to study its ballistic missiles tests. Based on the report of the Panel, the Security Council declares whether the missiles are nuclear capable. While the Panels consider several indicators, range is a primary consideration.[56] According to the Missile Technology Control Regime (MTCR), an informal group that assesses nuclear-capable missile technology, a missile with a range of 300 km and a payload of 500 kg can deliver a nuclear payload.[57] Still, the MTCR has no legal power to enforce its definition.

Since ballistic missiles capable of carrying a nuclear warhead are an integral part of the nuclear arsenal, critics argue that Iran's efforts to develop its ballistic missile capabilities may reflect its desire to continue with the nuclear weapons program. This is a justifiable suspicion because of Iran's record of conducting covert nuclear activities in its nuclear sites namely Parchin and Kolahdouz military complexes. The final report of the International Atomic Energy Agency (IAEA) concluded that such work raises the tests to the category of Potential Military Dimension (PMD), that is efforts to weaponize its nuclear project.[58]



Donald Trump speaks to his supporters during a Tea Party rally against the international nuclear agreement with Iran outside the U.S. Capitol, on September 9, 2015.

AFP PHOTO/ ANDREW CABALLERO-REYNOLDS

But defining ballistic missiles tests a PMD, however, is more difficult because they can be used in both a defensive and offensive capacity, the MTCR notwithstanding. Although it is assumed that in long range missiles a conventional warhead is not cost effective, medium range however pose a dual use problem. Both intelligence analysts who probe them and politicians who must devise ways to respond to them have struggled with the dual use issue.

Fortunately, the JCOPA and the highly stringent IAEA verifications process make virtually sure that Iran would not have enough highly fissile material to produce a nuclear warhead. The conventionally equipped missiles, which suffer from poor accuracy and unpredictable performance, should be of little threat to Iran's adversaries. Michael Elleman, an expert on missiles at the International Institute for Strategic Studies (IISS), noted that despite recent gains, Iranian missiles remain too inaccurate to reliably destroy specific military targets.[59] Ultimately, the function of the missiles may be more psychological than kinetic. If the regime believes that the missiles can deter and possibly intimidate its enemies, securing the continuation of the program may help the moderate President Hassan Rouhani and his followers to maintain support for the JCPOA.[60]

Conclusion

This article sets out to analyze Iran's development of ballistic missiles within the parameters of IR theories. Since motives are difficult to discern, ratio-

The Republican-dominated Congress presents even more of a challenge to the JCPOA. None of the Republicans voted in favor of the accord in 2015, and it was only the threat of a presidential veto that made its passage possible

nal choice theory which underlies Realism and Neorealism helps to structure the analysis.

The research confirms the assumption that Iran's motivation to develop ballistic arsenal comports with defensive Neorealism. Virtually all the original revolutionary leaders were convinced that Iran lived in a "dangerous neighborhood" and needed a powerful deterrence for protection of the regime. This rationale did not change after the Iran-Iraq war, since, as noted, Iran's neighbors, helped by the United States, expanded their ballistic arsenal and, more consequentially, could access the American anti-missile umbrella.

It is too early to speculate on the impact that the 2016 election in the United States will have on the future of Iran's missile program. The President-elect Donald Trump has harshly criticized the JCPOA, but also indicated he would not "tear it" up. Of course, the United States cannot unilaterally abrogate a multinational accord, but there are ways to tighten it. Most senior appointees in his administration, inducing the incoming National Security Adviser Michael Flynn, the CIA director Michael Pompeo, and John Bolton, a possible pick for Deputy Secretary of State, are bitter critics of the deal. There is little doubt that individually and collectively they would try to change the American terms of the accord. The Israeli Prime Minister Benjamin Netanyahu already signaled his plans to suggest to Trump ways to nix the accord altogether.

The Republican-dominated Congress presents even more of a challenge to the JCPOA. None of the Republicans voted in favor of the accord in 2015, and it was only the threat of a presidential veto that made its passage possible. The pro-Israel lobby which led the fight against the JCOPA in 2015 has already mobilized for a new round of actions. In July 2016, Mark Dubowitz, the executive director of the Foundation for the Defense of Democracies (FDD), the think tank which led the anti-JCOPA fight, testified before Congress on the need for wide ranging sanctions against Iran. Drafted by the FDD's Center on Sanctions and Illicit Finances, the proposal called to sanction the regime for human rights violations, terrorism financing, and expand sanctions against the Revolutionary Guards, among others.

In December 2016 Congress passed a ten-year extension to the Iran Sanctions Act. A new initiative known as the Iran Ballistic Sanctions Act of 2016 is also in the works. If approved, the new legislation would "impose tough primary

and secondary sanctions against any sector of the economy of Iran or any Iranian person that supports Iran's ballistic missile program, as well as any foreign person or financial institution that engages in associated transactions or trade." The proposed bill makes no distinction between the short and medium range missiles and the long range and intercontinental ones.

There are certainly some concerns about Iran's long range missiles since, as noted above, the cost-benefit analysis does not justify mounting conventional payloads. However, sanctioning the entire missile program violates Iranian right to self-defense, notably as it faces adversaries armed with cutting - edge ballistic hardware operating under an American military umbrella. Clarifying and tightening Resolution 2231 would be a good place to start. Blanketing Iran with new sanctions, on the other hand, may achieve the opposite. Having created a political momentum based on economic relief, President Hassan Rouhani is facing a tough reelection in 2017. His hardline opponents have already announced that they would make the "vanishing" economic benefits a major issue in the campaign. These hardliners have all but promised to abrogate the JCOPA, a development that may further destabilize the Middle East.

Appendix

Name	Range	Length	Payload	Propulsion	Diameter	Launch Weight	Warhead	Status
Shahab-1	300 km	10.94 m	Single warhead, 985 kg	Liquid propellant	0.88 m	5,860 kg	High Explosive (HE), Chemical	Operational
Shahab-2	500 km	10.94 or 11.5 m	770 kg	Liquid propellant	0.88 m	6,095 kg	HE or submunitions	Operational
Shahab-3	1,300	16.58 m	Single warhead, 1,200 kg	Single-stage liquid propellant	1.25 or 1.38 m	17,410 kg	Nuclear, HE, Chemical, or submunitions	Operational
Shahab-4	2,000~4,000 km	25 m	Single warhead, 1,200 kg	Heptyl	1.3/.88 m	22,000 kg	HE, Chemical, Nuclear	Unknown
Shahab-5 (Kosar)	4,000~4,300 (3-stages)	32 m	700~1,000	Solid motor	2.2/1.3 m	Unknown	HE, Chemical, Nuclear	Unknown
Shahab-6 (Toqyān)	3,000~5,000 km	Unknown	Unknown	Unknown	Unknown	Unknown	HE, Chemical, Nuclear	Unknown
Qiam	500~1,000 km	10.6 m	500~650 kg	Single-stage liquid propellant	0.88 m	6,155 kg	Nuclear	Operational
Qhadr	1,950 km	15.86 m	700~1,000 kg	Diesel	1.25 m	17,000 kg	HE, Cluster, Nuclear	Operational
Sejjil-2	2,000~2,500 km	17.6 m	two-stage 500~1,000 kg	Solid propellant	1.25 m	23,600 kg	Nuclear	Operational
Ashoura	2,500~3,000 km	19-20+ varies	760-650-550	Solid propellant	1.4 m	23,600 kg	Nuclear	Operational
Emad	1,700 km	16-6.5 m	750 kg	Liquid propelled	1.25/1.38 m	19,000 kg	Nuclear, Chemical, HE, submunitions	Operational
Fajr-3	2,000 km	Unknown	Multiple	Liquid propelled	2.2/1.3 m	Unknown	Nuclear, HE	Operational

Source: The data provided here are gathered from various sources namely: Arms Control Association, globalsecurity.org, Fars News Agency and Mehr News Agency.

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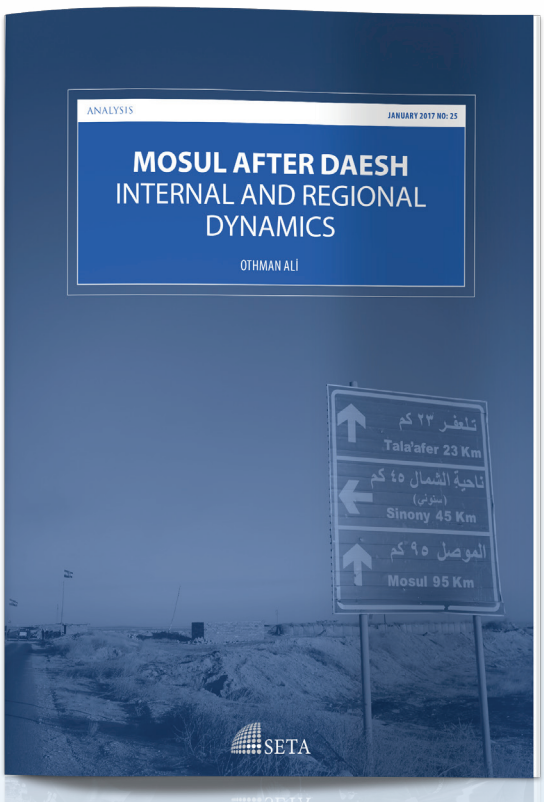

Mosul after DAESH
Internal and Regional Dynamics

Othman Ali

The Mosul Operation will have far-reaching consequences for Iraq and the Middle East. This analysis addresses the possible scenarios which might unfold in the post-DAESH era in Iraq and the Middle East. Though the U.S. has a clear role in planning and implementing the operation, we maintain that the Mosul Operation is being launched in a manner that will serve Iran and its Iraqi Shiite allies' interests. This analysis will demonstrate that the Iraqi government has deliberately avoided agreeing to a formula which will empower the Sunni Arabs in Mosul in the post-DAESH era and it intends to restore the regime which was in place before the DAESH takeover in 2014.