

**THEORIZING FACTORS INFLUENCING MISSILE TRANSFERS: A CASE STUDY
OF SINO-IRANIAN MISSILE TRANSFERS AND IMPLICATIONS FOR REGIONAL
SECURITY**

by

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ABSTRACT

Scholars suggest missiles have become the weapon of choice in modern warfare. Missiles are effective against a variety of targets, can travel long distances, and can decrease the need for troops to be engaged in conflict. Nations unable to mobilize large amounts of troops may depend on missiles to equalize military capabilities. Missile stockpiling also serves as a conflict deterrent. What factors influence missile sales between nations and what are the implications of those sales on regional security? This research broadly analyzes the effects of political, socioeconomic, conflict, temporal, and regional factors on global missile sales between 1980 and 2009, while specifically focusing on the implications of Sino-Iranian missile sales on regional security.

Among factors contributing to instance and quantity of missile sales, scholars argue economic factors are most salient. However, this research questions that supposition and analyzes a host of hypotheses to determine the importance of a variety of factors influencing missile transfers. Tests of several models confirm a number of factors influence missile transfers, the most influential being whether or not the receiving country is in the Middle East. Economic factors, as expected, influence missile purchasing behavior. Countries with an overall high total GDP but low GDP per capita purchased more missiles than countries with low GDPs and high GDPs per capita. China exports fewer missiles to nations in the midst of conflict, or to nations bordering other nations in conflict, which challenges conventional wisdom.

The People's Republic of China, as a major world proliferator, contributes to the security dilemma in the Middle East by supplying Iran with missiles and related technology. Through improving relations with Iran, China solidifies a trading partner to satiate its growing demand for oil while also developing a new market in which to sell Chinese

products. Iran gains an economic powerhouse and member of the UN Security Council as an ally from the relationship.

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Introduction

Since China's Reform and Opening Up in 1978, the economy of the People's Republic of China has grown rapidly. China became the largest world exporter in 2010 and continues to expand its global presence. Scholars argue China's expanding Middle East strategy focuses on economic gains rather than political power exertion. China's past and possible future sales of military goods threaten both regional and global security. This study focuses on China's missile sales and poses two main questions:

- 1) From a quantitative standpoint, what are the most important factors in missile sales by China to other nations, and;
- 2) What are the implications on missile proliferation from those sales on regional security?

Data used in this thesis comes from document review and a number of databases. Data collection from a variety of sources guarantees data reliability and validity. Following collection, the data and documents will be analyzed using analytical techniques used by the Intelligence Community and statistical analysis used in the field of political science. Finally, conclusions will be drawn based on the empirical evidence. The structure of this research follows that of the Intelligence Community's National Intelligence Estimate (NIE) model supplemented with a quantitative section. The qualitative portion specifically focuses on missile sales from China to Iran and the subsequent effects on regional security.

Study Background

Barry Rubin, director of the Global Research in International Affairs Center, and Dr. Subhash Kapila, author and strategic affairs analyst, both have written on the importance of the Sino-Iranian relationship. Rubin argues that China seeks to increase economic

relationship with Iran, while Kapila suggests the relationship hinges on political and military cooperation.

According to Rubin, in 1990 the Middle East became China's fourth largest trading partner. Arms sales to the Middle East have proved particularly lucrative for China. Despite the potential economic gains from selling missiles to Iran, China runs major political risks from missile proliferation. Rubin suggests four major problems with the Sino-Iranian relationship. First, Iran threatens regional security. By selling missiles to Iran, China increases Iran's ability to coerce and threaten Middle Eastern states, thereby contributing to conflict in the Middle East. Second, since the United States considers Iran a nation that harbors terrorism, the US strongly discourages China from selling arms to Iran. Third, Iran seeks to develop and build arms, and encourages China to provide Iran with arms, thereby pressuring China to violate international nonproliferation treaties and commitments. Finally, China serves as Iran's primary supplier of unconventional arms.¹

According to Kapila, Iran likely stands as China's only "worthwhile" political and military ally in the Middle East.² Considering the historically amicable relationship between the two nations, as well as Iran's aggressive nature, the relationship between the nations in dealing with missiles will likely be a growing and continuing threat to regional stability. Since 2006, the UN Security Council has passed three resolutions requiring Iran to suspend all nuclear enrichment-related activities. Two of those resolutions imposed economic sanctions against Iran. The sanctions include constraints on Iran's arms exports, restrictions on nuclear trade with Iran, and bans on financial dealings with entities connected to Iran's

¹ Rubin, Barry. "China's Middle East Strategy." *Middle East Review of International Affairs*. 3,1. Mar 1999. <<http://meria.idc.ac.il/JOURNAL/1999/issue1/rubin.pdf>>

² Kapila, Subhash, Ph.D. "Iran in the Strategic Matrix of Russia, China, and India: An Analysis." South Asia Analysis Group. 2005. <<http://www.southasiaanalysis.org/papers13/paper1284.html>>

nuclear and missile programs.³ However, Saudi Arabia has surpassed Iran as China's largest trading partner in the Middle East, according to a 2012 China Daily report.⁴

Purpose and Scope of the Study

As technology has developed, nations have implemented new technologies to more effectively conduct war. Missiles have increasingly become one of the most desired weapons to both conduct and deter war. Both developed and developing nations seek to acquire missiles for both offensive and defensive purposes. The importance of missile proliferation in relation to international security leads to a vast amount of qualitative research on the subject, though a paucity of literature on statistical analysis of weapons proliferation exists. Most related research focuses on qualitative analysis to formulate policy and determine security implications of missile sales. Scholars have suggested a number of factors influencing global missile transfers, but few have tested these empirical relationships between these factors and missile proliferation. Formulating a product that combines both quantitative and qualitative analysis, which will arguably make the conclusions more robust, serves as a main focus of this paper. Thus, this research seeks to bridge the gap between these two approaches of studying weapons proliferation.

Overview of Methodology

This thesis consists of two portions: the first part contains a quantitative analysis of factors that influence missiles sales and analysis of prior missile sales and their usage in order to extrapolate the implications of possible future missile transfers from China to Iran. The

³ Gordon, Philip H. "Iran Sanctions and Regional Security." House Committee on Foreign Affairs. 23 October 2007. <<http://www.brookings.edu/testimony/2007/1023iran.aspx>>

⁴ Jing, Cai. "Chinese builders set vision on booming Saudi Arabia economy." 9 August 2012. <http://www.chinadaily.com.cn/hkedition/2012-09/08/content_15744475.htm>

second contains an NIE examining the factors that drive missile proliferation and effects of China's missile sales to Iran on regional security.

Quantitative Section

The statistical portion of the research investigates the correlations between China's exportation of missiles and social, economic, political, and conflict factors. The data will cover a period of thirty years (1980 to 2009) to take into account the effect historical events may have had on the missile transfers from China, Israel, and the USSR/Russia to other nations. Several databases were combined into a more concise database used in this analytical paper.

In setting up a theoretical framework for explaining missile proliferation, social, economic, political, and conflict factors alone indubitably cannot fully explain missile sales. There are factors not included in this analysis that affect the export and import of missiles. This product attempts to analyze a variety of independent variables that influence China's missile transfers including GDP, GDP per capita, total population, major episodes of political violence, regional conflict, and historical events. The *instance* of missile sales (defined as the country-year in which missiles were transferred) and the *volume* of missiles imported/exported will serve as the dependent variables. Data categorized by year forms a time series ranging from 1980 to 2009. Past pertinent events will be included as independent variables in the creation of a time series analysis to account for major shifts in global political structure and international conflict, most notably the Iran-Iraq War and the Cold War. These factors will be discussed more in-depth in the qualitative portion.

Qualitative Section

The qualitative portion of this research focuses on tailoring the statistical analysis into an actionable form of intelligence for policymakers. The section will be structured in the

form of a National Intelligence Estimate (NIE) with a scope note, key judgments, and an in-depth discussion of Iran's missile purchases from China.

Stages of Research

First, a rigorous literature review was conducted on past research and historical information regarding missile proliferation. Scholars assert that the underlying factors affecting China's missile sales are primarily financial. This product will evaluate the role of economic factors in comparison to political, social, and conflict factors in order to either validate or invalidate prior literature and research on the subject.

The first section of this research consists of a number of subsections. The first subsection contains a statistical analysis of the internal political, social, and economic factors of recipient and seller nations and their correlations with missile transfers. The second subsection focuses on regional and historical factors, including major episodes of political violence, number of bordering states involved in conflict, and the role of historical events (including the end of the Cold War and the Iran-Iraq War) in determining missile transfers.

The second section analyzes the effects on Middle Eastern security of missile sales from China to Iran. The scope note addresses the key questions of the assessment. The key judgments section makes predictions of how Iran's developing missile program affects regional security and the likelihood of those predictions coming to fruition, as well as justifications of each judgment. Finally, the discussion focuses on historical trends and economic data and possible future implications of Chinese missile sales to Iran, and predicts major suppliers of missile to Iran using an analysis of competing hypotheses (ACH). Conclusions are then drawn based on the prior analysis of data as to the implications for regional stability.

Missile Proliferation and the Role of Missiles in Modern Warfare

This section gives a brief history of the role of missiles in modern warfare and discusses drivers of missile proliferation. Since World War II, missiles have been an integral weapon of national militaries and non-state actors.⁵ Blanton suggests that, after the Vietnam War, sending missiles to various nations throughout the world was a better policy than putting US troops in danger worldwide.⁶ Soon after, arms spread into Eastern Europe and Israel, and finally to the Middle East.⁷ During the 1980s, the US began using missiles as a deterrent against the Soviet Union.

During the Cold War, the USSR and the US amassed stockpiles of nuclear weapons, ultimately to the level that a nuclear war would have rendered the earth uninhabitable, leading to formation of the idea of “mutually assured destruction.”⁸ After the dissolution of the Iron Curtain, the arms control community shifted its focus from nuclear disarmament to limiting missile and small arms transfers.⁹ A number of nations possess the materials and technology required to produce missiles and many nations possess both offensive and defensive missile capabilities. Since the fall of the Soviet Union, developing nations, most notably China, have become involved in the international arms trade.¹⁰

Dinshaw Mistry, associate professor of political science at the University of Cincinnati, discusses five reasons states seek nuclear and missile programs:

1. Technology Pull, or Availability of Technology

⁵ Project of the Nuclear Age Peace Foundation. “Missile Proliferation and Missile Defenses.” Nuclearfiles.org <<http://www.nuclearfiles.org/menu/key-issues/missile-defense/basics/missile-proliferation-defenses.htm>>

⁶ Blanton, Shannon Lindsey. “Foreign Policy in Transition? Human Rights, Democracy, and U.S. Arms Exports.” *International Studies Quarterly*. Vol. 49, No. 4 (Dec., 2005), pp. 647-667. <<http://www.jstor.org/stable/3693504>>

⁷ Said, Mohammed Kadry. “Missile proliferation in the Middle East: a regional perspective.” *Disarmament Forum*. 2001. 54. <<http://www.unidir.org/pdf/articles/pdf-art75.pdf>>

⁸ Parrinton, Alan J., Colonel, USAF. “Mutually Assured Destruction Revisited.” *Airpower Journal*. Winter 1997. <<http://www.airpower.maxwell.af.mil/airchronicles/apj/apj97/win97/parrin.html>>

⁹ Issa, Alaa. “The Drivers Behind Missile Proliferation.” *Missile Proliferation and Defences: Problems and Prospects*. Center for Nonproliferation Studies. Monterey Institute of International Studies. 2009. 3-5. <http://www.mcis.soton.ac.uk/publications/missile_proliferation.pdf>

¹⁰ Bitzinger, Richard A. “Arms to Go: Chinese Arms Sales to the Third World.” *International Security*. 17,2: 1992. <<http://www.jstor.org/stable/i323299>>

2. Bureaucratic Political Pressure
3. Prestige Considerations
4. Security Threats
5. Economic Motivations

Mistry warns that not all factors drive each nation's desire for these programs, and factors vary from state to state.¹¹

According to Alaa Issa, counselor with the Permanent Mission of Egypt to the United Nations, four factors drive missile proliferation: (1) Technical Drivers; (2) Coercion/Deterrence; (3) Military/Strategic factors; and (4) Political factors. Missiles are desirable weapons for a number of reasons. Compared to the speed of aircraft, missiles prove particularly advantageous. The use of missiles assures target destruction. Despite the advent of advanced PATRIOT missiles and missile defense systems, missile defense remains sophisticated, expensive, and not completely effective. Issa suggests the proven effectiveness of cruise missiles will make them the choice of weapons in the future.¹² Missiles provide military and strategic roles that other weapons cannot. They travel at high speeds over long distances fairly accurately and are effective against a variety of targets, notably structures and cities. In 1988, roughly 190 ballistic missiles fired from Iraq hit Iranian cities. About 100 of these missile strikes hit Baghdad alone.¹³ According to Issa, "in some cases the political considerations alone can be the primary driver for missile acquisition."¹⁴ Though Issa's paper lists a number of factors driving missile proliferation, the lack of empirical evidence backing his suggestions undermines his estimation of *to what extent* these factors play in missile proliferation.

¹¹ Mistry, Dinshaw. *Containing Missile Proliferation: Strategic Technology, Security Regimes, and International Cooperation in Arms Control*. University of Washington Press, 2003. 6-7.

¹² Ibid 5.

¹³ Ibid 5-6.

¹⁴ Ibid 8.

The proliferation of weapons of mass destruction (WMDs) and transfer of WMDs between states stands as “one of the principal security challenges facing the United States in the twenty-first century.”¹⁵ Peppi DeBiaso of the Office of Missile Defense Policy in the Department of Defense (DoD) assesses that the accelerating growth of proliferation gives an increasing number of states offensive missile and WMD capabilities, thereby reshaping the nature of conflict. As a result of American dominance in traditional forms of warfare, “potential adversaries” seek “to shift the military competition away from traditional forms of warfare and adopt weapons and methods of asymmetrical conflict.”¹⁶ DeBiaso cites ten instances of ballistic missile warfare since 1980 in his analysis, eight of which took place in the Middle East, solidifying his claim that missiles are used for “increasing the strategic capabilities of states, including small and weak powers, by giving them the means to threaten or strike a wide range of vital targets, both locally and at great distances.”¹⁷ DeBiaso’s work gives a qualitative analysis of how proliferation of ballistic missiles has redefined modern warfare. He draws conclusions strictly based on qualitative evidence and historical precedent. The research suggests new patterns in proliferation, as Russia and China provide missile acquisition assistance to third parties, but does not provide a model to predict future proliferation.

Future Ballistic Missile Threat: National Intelligence Estimate

National Intelligence Estimates (NIEs), the U.S. Intelligence Community’s (IC) most “authoritative and coordinated written assessment[s] of a specific national-security issue,”

¹⁵ DeBiaso, Peppi. “Proliferation, Missile Defense and the Conduct of Modern War.” *Comparative Strategy*, 25: 157-171, 2006.

¹⁶ Ibid. 158

¹⁷ Ibid. 159

must be speculative to some extent.¹⁸ Therefore, NIEs are subject to scrutiny, as evidenced by the failed 2002 Iraq NIE. The “Foreign Missile Developments and the Ballistic Missile Threat Through 2015,” a partly declassified NIE reporting “intelligence on ballistic missile developments and threats” as of December 2001, focuses on projecting “possible and likely ballistic missile threats to the United States [...], discusses the proliferation environment; and provides a summary of [...] cruise missiles.”¹⁹

The authors of the estimate admit their assessments are “inexact and subjective because they are often based on fragmentary information” and furthermore admit they have not “attempted to address all of the potential political, economic, and social changes that could occur.”²⁰ Nonetheless, the authors give a number of key judgments. The most relevant to this paper include: (1) Most IC agencies project that before 2015, the U. S. will face ICBM threats from North Korea and Iran; (2) Proliferation of technologies by countries such as China have enabled more states to accelerate missile development; and (3) Iran is pursuing missile capabilities. Since 2001, the United States has indeed been increasingly threatened by North Korea and Iran’s growing ballistic missile capabilities. China, both directly and indirectly, has supplied missiles to nations in regions all over the world. China has been instrumental in helping Iran to develop ballistic missiles by providing materials, technology, and guidance. Iran has continued to develop its weapon programs since 2001. Policymakers and intelligence analysts are worried Iran is not only developing missile capabilities, but also nuclear weapon capabilities.

The discussion section of the National Intelligence Council’s NIE details the stockpiles of missiles possessed by Iran and their specifications and capabilities. The NIE does not, however, take into account the effects domestic and international factors might play

¹⁸ Bruno, Greg and Sharon Otterman. “National Intelligence Estimates.” Council on Foreign Relations. <<http://www.cfr.org/iraq/national-intelligence-estimates/p7758>>

¹⁹ Foreign Missile Developments and the Ballistic Missile Threat Through 2015. National Intelligence Council. December 2001. <<https://www.fas.org/irp/nic/bmthreat-2015.htm>>

²⁰ Ibid. 1

into foreign missile development and proliferation. However, the NIE does assess with high confidence that the development of missile programs will affect regional stability.

Non-Proliferation Policy

Non-proliferation focuses on limiting the spread of CBRNe weapons (Chemical, Biological, Radiological, Nuclear, and explosive), particularly nuclear weapons and associated technologies.

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) contractually obligates the recognized five nuclear weapon states (China, the US, the Russian Federation, the UK, and France) not to “transfer nuclear weapons, other nuclear explosive devices, or their technology to any non-nuclear-weapon state.”²¹ Non-nuclear-weapon states agree not to purchase or produce nuclear weapons or nuclear explosives. In order to ensure this does not happen, the International Atomic Energy Agency (IAEA) inspects the facilities of these nations. The NPT, currently the most widely signed nonproliferation agreement, has not been signed by a handful of nations. Only Jordan, India, and Pakistan have never signed the NPT, though North Korea withdrew its signature in 2003. Though no illegal transfers of banned materials or technology from signatory states have been confirmed, some states have been able to obtain technology and equipment from private parties within signatory states.

The Missile Technology Control Regime (MTCR), a voluntary agreement between 34 nations sharing the goals of “non-proliferation of unmanned delivery systems capable of delivering weapons of mass destruction” was established in 1987 by the G-7.²² Nations that have signed the MTCR share goals of preventing the unauthorized transfer of unmanned weapons delivery systems, including rockets and other equipment, materials, and technology. The regime’s objectives specifically refer to restricting proliferation of “missiles, complete

²¹ “Treaty on the Non-Proliferation of Nuclear Weapons.” *The Federation of American Scientists*.

<<http://www.fas.org/nuke/control/npt/>>

²² The Missile Technology Control Regime. <<http://www.mtcr.info/english/index.html>>

rocket systems, unmanned air vehicles, and related technology [...] capable of carrying a 500 kilogram payload at least 300 kilometers.”²³ China has considered becoming a partner of the agreement in both 2000 and 2004, but so far has declined to join and instead simply agreed to adhere to the stipulations without signing the agreement.^{24,25}

Reports indicate China has not ceased from selling missiles and missile technology to nations such as Pakistan.²⁶ In fact, in a Congressional Research Service paper, Shirley Kan, specialist in Asian Security Affairs, suggests China’s proliferation activities “have continued to raise questions about China’s commitment to nonproliferation and the need for U.S. sanctions.”²⁷ One of the most egregious examples of illegal sales of banned materials comes from China. According to a Reuter’s report published on March 1, 2013, Li Fangwei, the owner of the LIMMT steel company, has made approximately \$10 million from selling banned materials to Iran since 1999, when he was indicted for selling components that can be used to “enrich uranium and [develop] guidance devices suitable for missiles.” In 2011, Li agreed to provide gyroscopes, a key component in missiles and a controlled item under the MTCR, to Iran.²⁸

Signatory states hope nonproliferation treaties will reduce the volume and instances of missile transfers and development of weapons programs in states unauthorized to develop such programs. However, nonproliferation treaties do not completely prevent the transfer of restricted materials and technology. Though China has signed some nonproliferation agreement, it is clear private parties within China have violated these agreements.

²³ Ibid.

²⁴ Arms Control Association. “The Missile Technology Control Regime at a Glance.” <<http://www.armscontrol.org/factsheets/mtcr>>

²⁵ Joseph, Anil K. “China ready to join MTCR to control missile proliferation”. *Rediff: India Abroad*. Jun 2004. <<http://www.rediff.com/news/2004/jun/03mtcr.htm>>

²⁶ Ibid.

²⁷ Kan, Shirley A. “China and Proliferation of Weapons of Mass Destruction and Missiles: Policy Issues.” *Federation of American Scientists*. 9 November 2011. <<http://www.fas.org/sgp/crs/nuke/RL31555.pdf>>

²⁸ Maclean, William and Ben Blanchard. “Exclusive: Chinese trader accused of busting Iran missile embargo.” Reuters. 1 March 2013. <<http://www.reuters.com/article/2013/03/01/us-china-iran-trader-idUSBRE9200BI20130301>>

A Similar Study: Nuclear Weapon Proliferation

Jo and Dartzke's "Determinants of Nuclear Weapons Proliferation" paper uses a quantitative approach to explain nuclear weapons proliferation.²⁹ They assess the effects of domestic and international factors that influence a nation's decision to develop a nuclear weapons program and to produce nuclear weapons between 1939 and 1992. The authors clarify that the current nuclear weapon states obtained their "arsenals [...] through the step of a nuclear weapons development program."³⁰ Jo and Dartzke argue that most nuclear proliferation research focuses on analysis of cases. They agree that there are few examples of statistical analysis being applied to the problem of nuclear weapon proliferation.³¹ The authors consider multivariate regression models as an important way to understand nuclear proliferation. Jo and Dartzke develop a conceptual framework based on the ideas of "willingness" and "opportunity" discussed by Most and Starr.³² Basically, willingness refers to a state being eager to pursue a weapons program. Opportunity refers to the "possibilities [...] available to any entity [...] representing the total set of environmental constraints and possibilities."³³ These factors serve as a framework to develop testable models explaining the interactions between their variables.

The research focuses on estimating the "effects of measures of opportunity and willingness on nuclear weapons programs and [...] possession."³⁴ The dependent variables in the study are NWEAPON and NPROGRAM. NWEAPON identifies whether or not a state possesses weapons in a given year. NPROGRAM identifies whether the state has an active nuclear weapons program in a given year. The dependent variables used included opportunity

²⁹ Jo, Dong-Joon and Erik Gartzke. "Determinants of Nuclear Weapons Proliferation." *Journal of Conflict Resolution*. 2007; 51, 167: 167-194.

³⁰ Ibid. 168

³¹ Ibid. 167

³² Most, Benjamin A. and Harvey Starr. *Inquiry, Logic, and International Politics*. 1989.

³³ Jo, Dong-Joon and Erik Gartzke. "Determinants of Nuclear Weapons Proliferation." *Journal of Conflict Resolution*. 2007; 51, 167: 167-194.

³⁴ Ibid. 172

variables and willingness variables. Opportunity variables are broken into *latent nuclear weapons production capability*, *economic capacity*, and *diffusion*, or the spreading of knowledge of how to construct nuclear weapons over time. Willingness variables are subdivided into 3 categories: (1) International Security; (2) Domestic Politics; and (3) Status. International security focuses on a *conventional threat* measure, a *nuclear threat* dummy variable, the presence of a *nuclear defense pact*, and *diplomatic isolation*. Domestic politics are defined by measures of domestic unrest, democracy scores on a political thermometer, and membership in the NPT. The status portion is separated into global power status and regional power status.

Analysis of the data shows *diffusion* increases the “predicted probability of a state developing a nuclear weapons program and also raises the risk of nuclear weapon proliferation.”³⁵ *Economic capacity* only increased the predicted probability of possession of nuclear weapons. *Latent nuclear weapons production capability* showed a positive and significant relationship with the presence of nuclear weapons programs. *Conventional threat* was calculated using a summation of Composite Index of National Capabilities (CINC) score, which was then divided by the state’s CINC score and finally transformed into a natural log. The conventional threat variable showed a positive correlation with the dependent variables, indicating insecurity is a factor in encouraging proliferation. Domestic unrest was not statistically significant. Democracy score played only a small role in explaining the predicted nuclear proliferation. Major power status and regional power status both showed a positive and statistically significant correlation in the outcome.

This research allows for predictions about nuclear proliferation trends through the use of statistical analysis and sets a promising precedent for using the concept, though not necessarily the same model, to assess determinants of missile proliferation. It provides an

³⁵ Ibid. 176

important example of research bridging the gap between political science research and the Intelligence Community analysis.

Missile Proliferation and Usage: Sino-Iranian Relations

The Cold War significantly affected the relations between Iran and China. In the mid-20th Century, China held an anti-Shah position. The PRC viewed the Shah as a puppet of the United States' interests in the Middle East. However, following the split in ideology between China and the Soviet Union, China and Iran saw the Soviet Union as a common enemy. In the 1970s, Iran supported China's entry into the UN, though their relationship was still largely based on mutual animosity towards the Soviet Union as opposed to a cultural and economic relationship. After Khomeini took power, China took steps to increase its relations with Iran. Though many communists were executed in Iran under Khomeini's regime and China persecuted Chinese Muslims in its eastern provinces, the two nations remained on mutually cordial terms. Sino-Iranian military cooperation began with the Iran-Iraq War. Initially, Iran's arsenal consisted of primarily US-provided weaponry. After the USSR and Western Europe restricted arms sales to Iran, as supplies dwindled, China became a major arms provider for Iran.³⁶ However, as Beijing had taken a "strong moral stance" on the war, the PRC "decided that Chinese entities should not sell directly to either side."³⁷

Consequently, Syria and North Korea became the "major intermediaries for the sale of Chinese military goods."³⁸ In 1986, China provided Iran with 200 HY-2 "Silkwork" anti-ship cruise missiles. Beijing claims North Korea sold these missiles to Iran, but US intelligence sources indicate that China sold some of the HY-2 missiles directly to Iran.³⁹ In the early months of 1988, Iraqis launched 160 SCUD missiles toward Tehran, just a

³⁶ Davis, Marybeth, et al. "China-Iran: A Limited Partnership." Centra Technology, Inc. US-China Economic and Security Review Commission. October 2012. 35 <http://www.uscc.gov/researchpapers/2012/USCC_China-Iran-Nov--28.pdf>

³⁷ Ibid 35

³⁸ Ibid 35

³⁹ Ibid 36

miniscule portion of the vast quantities of missiles fired between the two countries during the Iran-Iraq War.⁴⁰ During the war, China sold at least 8,400 missiles to Iran and 1,200 missiles to Iraq. Though China supplied arms to both sides, China viewed Iraq as loyal to the Soviet Union. After turbulent events in both nations in the late 1980s, Iran relied on supplies from China to rebuild its military prowess.⁴¹ According to Davis et al, Iran purchased an “estimated \$400 million worth of weapons from the PRC between 1993 and 1996.” In 1999, the PRC agreed to help Iran modify a Chinese FL-7 missile anti-ship missile.⁴²

Between 2002 and 2005, missiles sales from China to Iran dropped roughly 50%, from around \$100 million to \$50 million, largely due to sanctions.⁴³ Davis et al. argue sanctions have primarily affected Iran’s energy sector, banking institutions, imports, and business, though reports conflict as to whether or not sanctions have affected Iran’s development of weapons programs. Some reports indicate that Iran “manages to bypass UN sanctions” though information about Iran’s weapons trade proves difficult to garner.⁴⁴

Theoretical Framework

What factors influence missile proliferation? This analytical research specifically investigates the relationships between China’s missile outflow with social, economic, political, and conflict factors, and compares those factors to missile transfers made by Russia and Israel. Between 1980 and 2009, the People’s Republic of China (PRC) is confirmed to

⁴⁰ McNaughter, Thomas L. “Ballistic Missiles and Chemical Weapons: The Legacy of the Iran-Iraq War.” *International Security*. 15,2: 1990. <<http://0www.jstor.org.umiss.lib.olemiss.edu/stable/2538864>>

⁴¹ Gentry, Brandon J. “The Dragon and the Magi: Burgeoning Sino-Iranian Relations in the 21st Century.” *The China and Eurasia Forum Quarterly*: 3,3. Nov 2005. <http://se2.isn.ch/serviceengine/Files/RESSpecNet/32217/ichaptersection_singledocument/65148D33-C647-4825-81B4-6562E919FD30/en/12_Dragon_Magi_Burgeoning.pdf>

⁴² Davis, Marybeth, et al. “China-Iran: A Limited Partnership.” Centra Technology, Inc. US-China Economic and Security Review Commission. October 2012. 38 <http://www.uscc.gov/researchpapers/2012/USCC_China-Iran-Nov--28.pdf>

⁴³ Ibid. 38

⁴⁴ Ibid 45-47

have exported 17,857 missiles to nations around the world.⁴⁵ Although scholars and government agencies cite China as one of the world's greatest weapon proliferators, little research has been done to determine the factors that drive missile proliferation. The former USSR and today's Russia have continued to be a provider of missiles to other nations. In 2000, President Clinton met with Vladimir Putin to discuss the threat of growing missile proliferation, particularly in regards to delivery mechanisms for weapons of mass destruction.⁴⁶

Social, economic, political, and conflict independent variables were included in the regression analysis. The following section describes in detail the measurements and aspects of each of the independent and dependent variables, and how the variables are expected to interact.

Theorizing Missile Transfers from China

Missile sale instance and volume serve as the dependent variables on which the two distinct models of this study are based. This two-fold measure allows for a more complete view of China's missile transfers. A time frame of 30 years was analyzed to take into account a number of factors, particularly the fall of the Soviet Union and the end of the Cold War in 1990. Consequently, the number of missiles imported by other countries between 1980 and 2009 was analyzed in order to gain a clear picture of both pre- and post-Cold War imports. Missile sales from Russia and Israel were also analyzed to make the final analysis more robust and to look at competition between nations.

⁴⁵ SIPRI Arms Transfer Database. <http://armstrade.sipri.org/armstrade/page/trade_register.php>

⁴⁶ Smith, Mark. "The MTCR and the Future of Ballistic Missile Non-Proliferation." *Disarmament Diplomacy*. Issue No. 54, February 2001. The Acronym Institute for Disarmament Diplomacy. <<http://www.acronym.org.uk/dd/dd54/54smith.htm>>

Hypothesis 1: China sells more missiles to countries with similar polity levels.

Hypothesis 2: China sells missiles more frequently to countries with similar polity.

As far as the trends in polity changes and conflict data is concerned, Marshall published “Global Report 2009: Conflict, Governance, and State Fragility” using the Polity IV Project research data. Since the fall of the Soviet Union, he points out a number of trends that have emerged, including the decrease of armed conflicts and an increase in the number of democracies since 1991.⁴⁷ Both of these factors will presumably affect global missile transfers. According to Kinsella, the end of the Cold War brought with it a worldwide decrease in arms transfers, though in recent years, trade has once again increased.⁴⁸ According to Blanton, “linking democracy...to the transfer of arms may also enhance efforts to promote a more stable and peaceful world.”⁴⁹ Blanton suggests it is logical for the US to send missiles to democratic countries, thereby reducing the potential for conflict.⁵⁰

One of the main theories explaining the connection between politics and conflict is the democratic peace theory. The assumption that democratic nations are less likely to go to war than autocratic nations forms the basis of this theory.⁵¹ The theory’s premise leads to the assumption that democratic nations are less likely to sell missiles to other nations. However, when democratic nations do sell missiles, they are more likely to provide other democratic nations with missiles, primarily as a deterrent against conflict, as opposed to providing missiles to autocratic nations. On the other hand, the theory can also be interpreted to suggest

⁴⁷ Marshall, Monty G. and Benjamin R. Cole. *Global Report 2009: Conflict, Governance, and State Fragility*. Center for Systemic Peace. 2009. 5, 11.

⁴⁸ Kinsella, David. “Rivalry, Reaction, and Weapons Proliferation: A Time-Series Analysis of Global Arms Transfers.” *International Studies Quarterly*. Vol. 46, No. 2 (Jun., 2002), pp. 209-230. <<http://www.jstor.org/stable/3096069>>

⁴⁹ Blanton, Shannon Lindsey. “Foreign Policy in Transition? Human Rights, Democracy, and U.S. Arms Exports.” *International Studies Quarterly*. Vol. 49, No. 4 (Dec., 2005), pp. 650.

⁵⁰ *Ibid.* 650.

⁵¹ Zinnes, Dinna A. “Constructing Political Logic: The Democratic Peace Puzzle.” *The Journal of Conflict Resolution*.” Vol. 48, No. 3 (Jun., 2004). 430.

<<http://www.jstor.org/discover/10.2307/3176216?uid=3739760&uid=2129&uid=2&uid=70&uid=4&uid=3739256&sid=21101799050823>>

that autocratic nations are more likely to be involved in conflict. Thus, autocratic nations are likely to provide other autocratic nations with arms. Furthermore, democracies may either buy more missiles for deterrence purposes instead of going to war, or democracies may buy fewer missiles because they do not utilize missiles since they are more peaceful.

One of the main hypotheses of this research is that nations generally sell to nations with a similar polity level. In other words, autocratic nations will sell to other autocratic nations and democratic nations will sell missiles to other democratic nations. More specifically, nations with polity levels similar to China's polity level will consider China as a potential missile supplier. Ostensibly, supplier nations will more often than not share political ideology with recipient nations. Since China is an autocracy, theoretically China will sell missiles to autocratic nations.

Conflict variables must be taken into account to assess the drivers behind missile sales. This paper quantifies conflict by examining contiguous nations involved in conflict. Ostensibly, nations bordering other nations in the midst of conflict will seek to purchase missiles. Bordering nations with dissimilar political regimes engage in conflict frequently, leading to an increase in missile use. If polity level of a nation corresponds with China's polity level, and that state is involved in conflict, they will consider China as a potential missile supplier. More conflict between nations naturally leads to an increase of purchased weaponry.

Hypothesis 3: China sells more missiles to countries with contiguous countries in conflict.

Hypothesis 4: China sells missiles more frequently to countries with contiguous countries engaged in conflict.

Economic factors also play a role in missile proliferation. Nations with higher GDPs will purchase missiles from China, as these nations have the financial resources to purchase arms. Among high-GDP nations, China will sell more missiles to nations with a similar polity level.

Hypothesis 5: Countries with higher GDPs are more likely to buy more missiles more often from China than countries with lower GDPs.

Hypothesis 6: Countries with a low GDP per capita are more likely to buy more missiles more often from China than countries with a high GDP per capita.

On a global scale, being in the same region as one or more major episodes of violence will lead to an increase in missile importation into that region. Since the Middle East has the highest levels of conflict of all global regions, I theorize that more missiles will be imported into that region as opposed to regions such as Latin America or Western Europe.

Hypothesis 7: Countries in times or areas of high conflict potential import more missiles more often and in larger volumes than countries not in times or areas of high conflict potential.

Variables

The database used in this research is a conglomeration of several other databases including the Missile Trade Registers of the *SIPRI Arms Transfer Database* compiled by Stockholm International Peace Research Institute, *Major Episodes of Political Violence (MEPV)* and *Conflict Regions, 1946-2008* and *Political Regime Characteristics and*

Transitions, 1800-2009 compiled by Monty G. Marshall at the Center of Systemic Peace,⁵² and population and GDP data from the *World Development Indicators & Global Development Finance* report from the World Bank December 2010 report.⁵³

The main dependent variables analyzed are the number of missiles sold by China, Russia/USSR, and Israel to various countries ten years prior to the fall of the Soviet Union and twenty years afterwards, or in other words, 1980 to 2009, giving a total of 4,583 cases. The proliferation data was compiled from the SIPRI Arms Transfer Database. The types of missiles vary widely, ranging from portable Surface-to-Air (SAM) missile systems to BVRAAM (Beyond Visual Range Air-to-Air) missiles.

The independent variables used to explain the dependent variable span a number of categories, including economic and social condition, political ideology, national and international conflict level, and relevant historical events.

A number of variables were included in the economic and social condition category in order to make the analysis more robust. These indicators include GDP in billions for each nation-year and population in millions. Moreover, a GDP per capita variable was calculated by dividing the total GDP by the total population of each nation for each year. Sherwin and Laurance stress that military expenditure is not a reliable measurement of arms transfers, particularly in the Middle East, though analysis of military expenditure data and analysis is included in the second section of this thesis. A number of factors contribute to the lack of reliability of the data, including illegal trafficking, unreliable figures on military spending, and unclear allocation of military resources.⁵⁴

⁵² Integrated Network for Societal Conflict Research. Center for Systemic Peace
<<http://www.systemicpeace.org/inscr/inscr.htm>>

⁵³ The World Bank. "GDP (Current US\$)" <<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>>

⁵⁴ Sherwin, Ronald G. and Edward J. Laurance. "Arms Transfers and Military Capability: Measuring and Evaluating Conventional Arms Transfers." *International Studies Quarterly*. Vol. 23, No. 3 (Sep., 1979), pp. 360-389. <<http://0-www.jstor.org.umiss.lib.olemiss.edu/stable/2600173>>

Two main types of political variables are used to determine the effect of political ideology on missile proliferation. First, a thermometer of the level of polity of 163 nations from 1800 to 2009 is included from the *Polity Project IV: Political Regime Characteristics and Transitions, 1800-2009*. The project judges the polity level of all major independent states in world, placing each nation on a scale from -10 to +10, with -10 indicating the highest level of autocracy and +10 indicating the highest level of democracy in each year. The thermometer polity variable was then binned to create a three-category ordinal variable separating each nation into one of three categories: “autocratic”, “democratic”, and “mixed” for purposes of visualization and ease of presentation. Dummy variables for each of the categories were created for use in a logistic regression.

The third category of independent variables relates to international conflict. The data comes from the MEPV database. The author MEPV database defines major episodes of political violence as “systematic and sustained use of lethal violence by organized groups that result in at least 500 directly-related deaths over the course of the episode.”⁵⁵ The database breaks conflict into seven different categories. The variables used in this research include the number of bordering countries involved in any type of national or international conflict, the number of conflicts of bordering countries, the total number of conflicts in each region, and the number of conflicts of surrounding nations divided by the number of bordering nations.

In transitioning from the USSR to the Russian Federation, Russia underwent significant political and economic change, which affected global missile proliferation. Globally, a significant change in the regime type of many nations occurred after the Cold War. The number of global democracies increased in conjunction with a decrease in global autocracies. A final dummy variable is a regional code, controlling for whether or not the importer country is in the Middle East.

⁵⁵ Marshall, Monty G. and Benjamin R. Cole. “Global Report 2009: Conflict, Governance, and State Fragility.” Center for Systemic Peace. 2009. 5, 11.

Some of the possible caveats of this research are unreported and illegal transfer of weapons. Non-state actors were not accounted for in the SIPRI database and were therefore not included in the analysis.

Quantitative Analysis

General Trends:

This section provides a general overview of missile exports from China, Israel, and Russia between 1980 and 2009. In this thirty-year time span, China exported 17,857 various types of missiles to nations across the globe. Israel exported 34,522 missiles and Russia exported 126,117 missiles.

The sums of the total number of missiles transferred from China, the USSR/Russia, and Israel will serve as one of the baseline dependent variables in the test models. Since the 1980s, the number of missiles exported from China has generally decreased from year to year. A large decrease occurred from the 1980s to the 1990s. In the 1980s, China sold 12,285 missiles. The decrease from the 1990s to the 2000s has less pronounced. The number of missiles China sold decreased from 3,555 in the 1990s, to 2,017 in the 2000s.

Although Kay suggests China does not sign some international non-proliferation treaties and violates those it does sign, China sold significantly less missiles after the Cold War and during a period of time in which many non-proliferation treaties were ratified. The following table shows the missile sales before and after the Cold War.

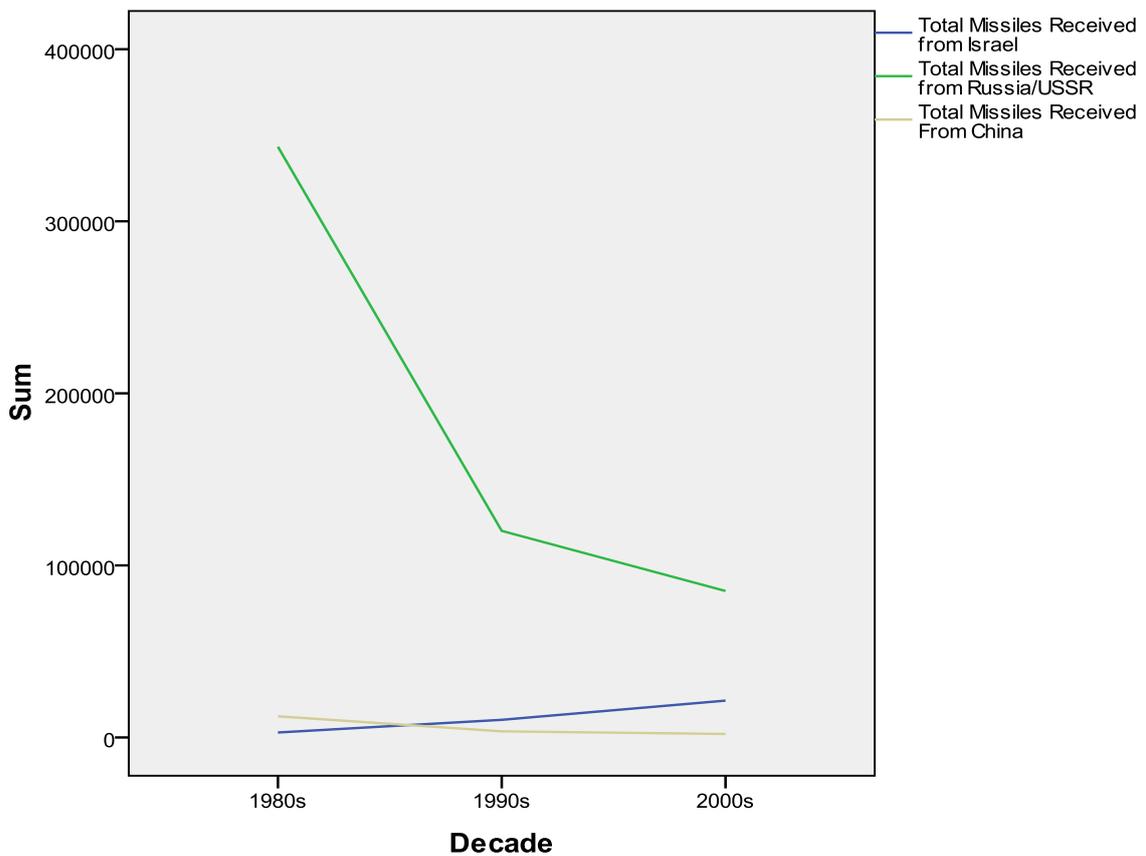
Table 1: Missiles Sold During/After the Cold War Era

	Total Received from China	Total Received from Russia	Total Received from Israel
Cold War Era	12610	73626	6129
Post-Cold War Era	5247	52491	28393

Conversely, the general decrease in missile exports out of China could suggest China in fact does adhere to international treaties and non-proliferation ideology.

In comparison, missile exports from the Soviet Union decreased drastically after its transition to the Russian Federation. Missile transfers from Israel increased roughly threefold from the 1980s to the 1990s, shown in the chart below.

Figure 1: Total Missiles Received from Israel, Russia, and China by Decade



Russia, China, and Israel are three of the world’s largest missile providers. In the observed time period, Russia exported nearly five times as many missiles as Israel and almost ten times as many missiles as China.

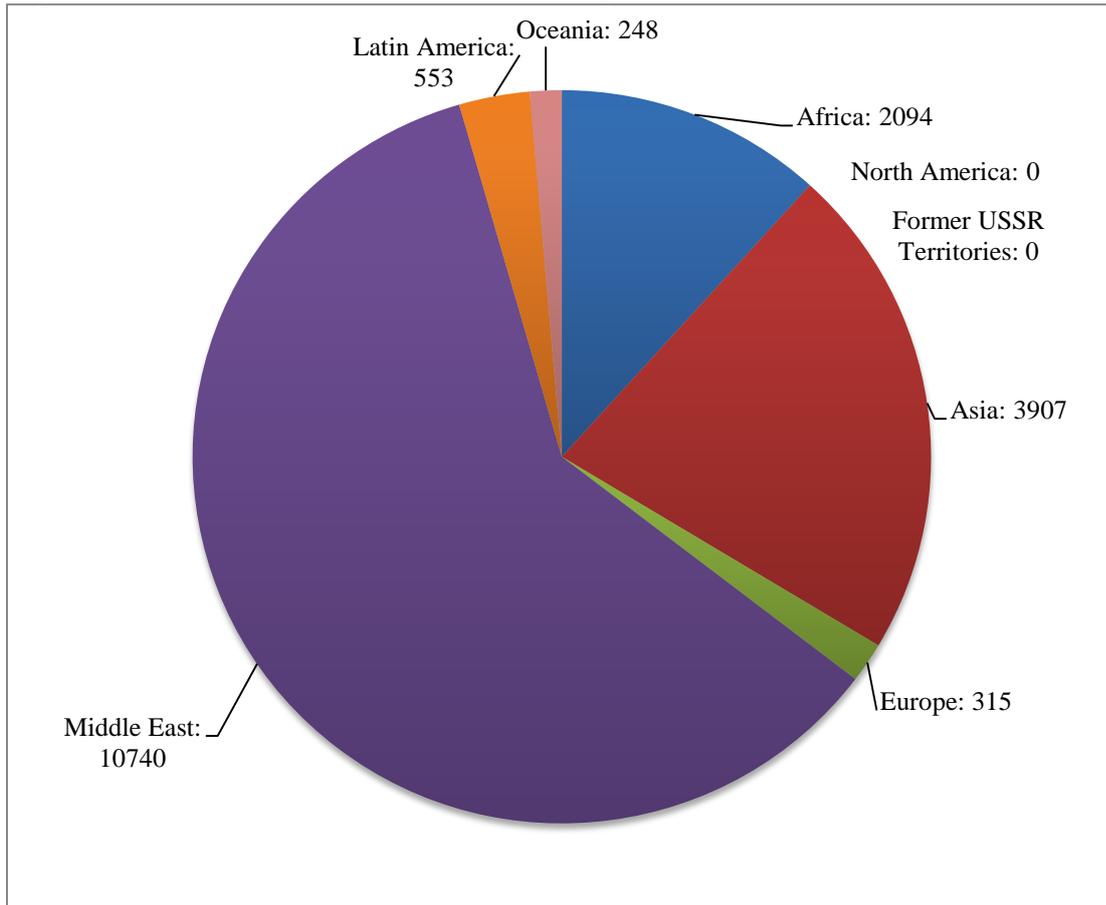
In order to clarify the analysis in the theoretical model, the number of missile transfers must also be taken into account. The following descriptive statistic table shows the number of missile transfers from China, Israel, and the USSR/Russia from 1980 to 2009 and then breaks the sales down by decade in a means comparison.

Table 2: Number of Missile Sale Transfers from China, Israel, and Russia by Decade

Decade	Missile Transfers from China	Missile Transfers from Israel	Missile Transfers from Russia
1980s	23	15	1237
1990s	16	25	1353
2000s	18	34	1403
Total	57	74	3993

The data shows that, over time, the actual instances of missile transfers from China decreased from the 1980s to the 1990s but increased in the 2000s. Although the number of transfer instances has fluctuated, the number of total missiles exported has decreased, indicating that China is still supplying missiles to several nations, but in smaller volumes. The missile transfers from Israel have increased incrementally by roughly ten more instances each decade. Likewise, the number of missiles exported by Israel has increased over time. Not only is Israel exporting to a wider array of recipients, but also it is also supplying more missiles. The number of missile transfer instances from the USSR/Russia increased steadily from the 1980s to the 2000s, but at a gradually decreasing rate. However, the number of missiles exported decreased. Although Russia increased the number of supply instances, the amount of missiles the country supplied decreased. The following chart shows global missile transfers from China by region.

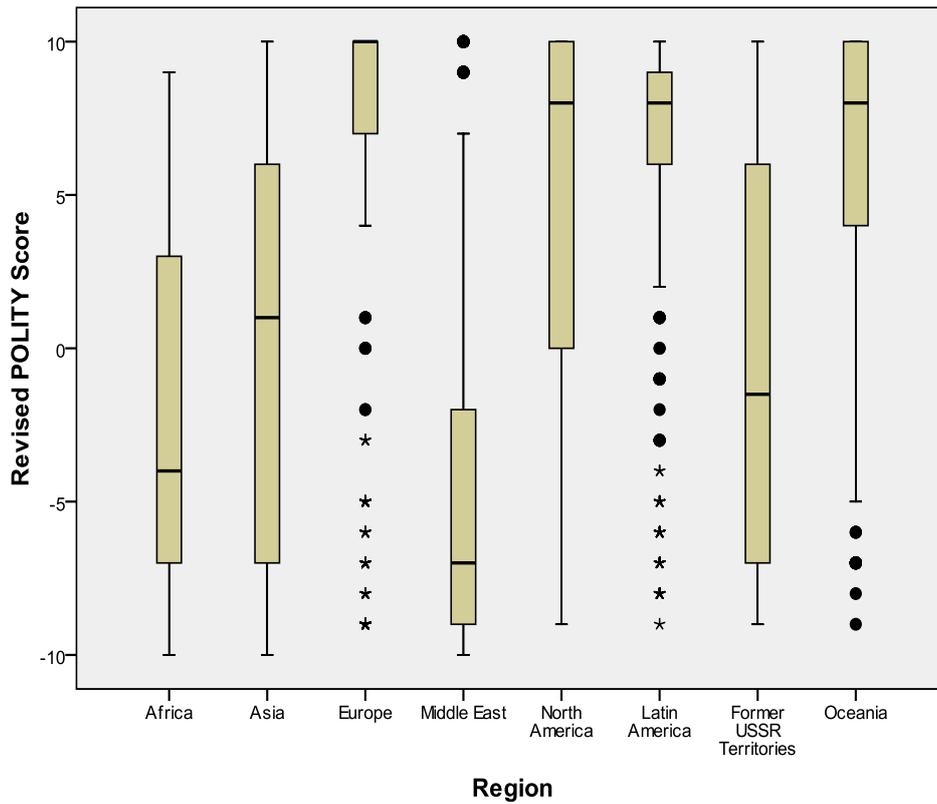
Figure 2: Missile Sales from China to Other Regions



Over half of missiles transfers by China during 1980 and 2009 were to nations in the Middle East. If the theory that China sends missiles to nations with similar polity levels is correct, then China will send missiles to regions with countries with a mean autocratic polity level. The following chart shows each region in the left-hand column and the mean polity score of that region in the right-hand column.

The following box plot shows the polity ranges and means for each region.

Figure 3: Polity Score Range of World Regions



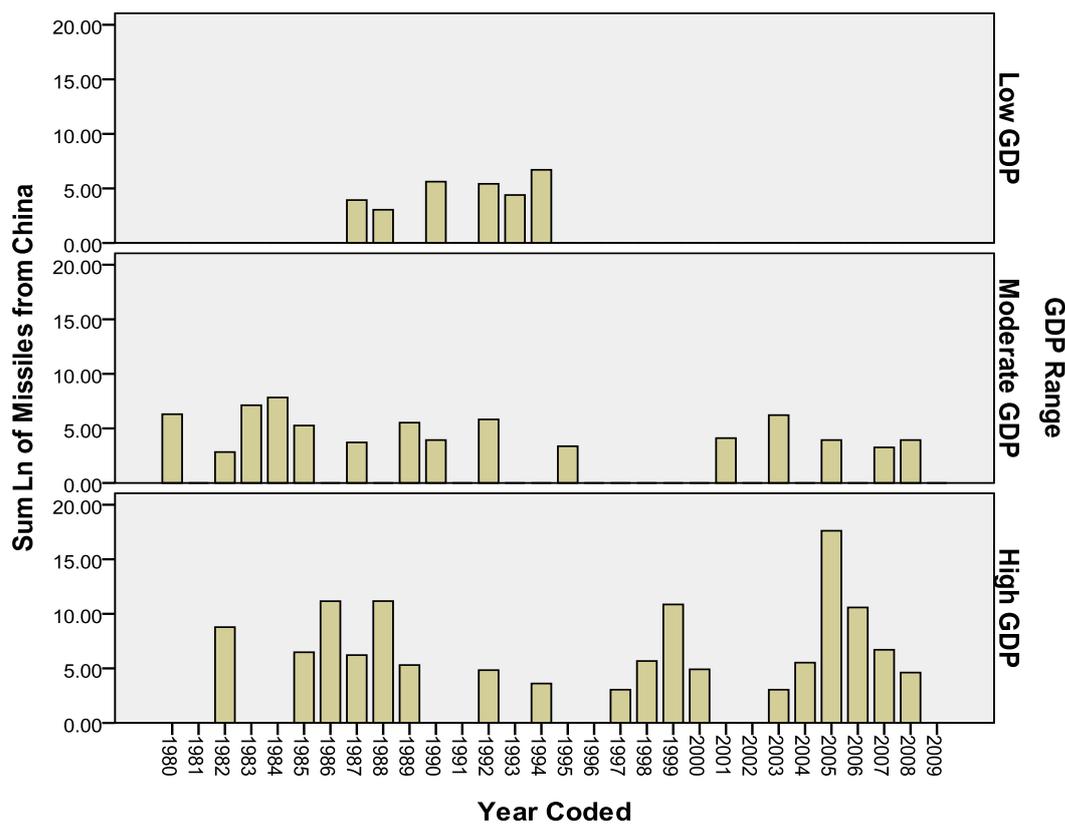
The three regions with negative polity scores are therefore more likely than regions with positive polity scores to receive missiles from China. As the means chart shows, the Middle East, Africa, and the Former USSR territories have the highest autocratic scores. The Middle East, Asia, and Africa are the largest importers of missiles from China. The Middle East and Africa share polity scores similar to China’s score. Conversely, the mean polity score among Asian nations is positive, so missile imports to those nations from China could be due to another factor, perhaps proximity or trade agreements.

Although Israel and China are two of the world’s largest missile suppliers, it is clear the USSR/Russia engages in more transfer instances. The following sections delve into the specific factors affecting missile proliferation.

Social and Economic Factors

Population data and various measures of GDP were used to determine the general effects of socioeconomic factors on volume and instance of missile transfers from China, Russia, and Israel. These factors include a measure of total GDP, per capita GDP, and population. The following chart shows the distribution of missile transfers from China based on three categories of GDP over time.

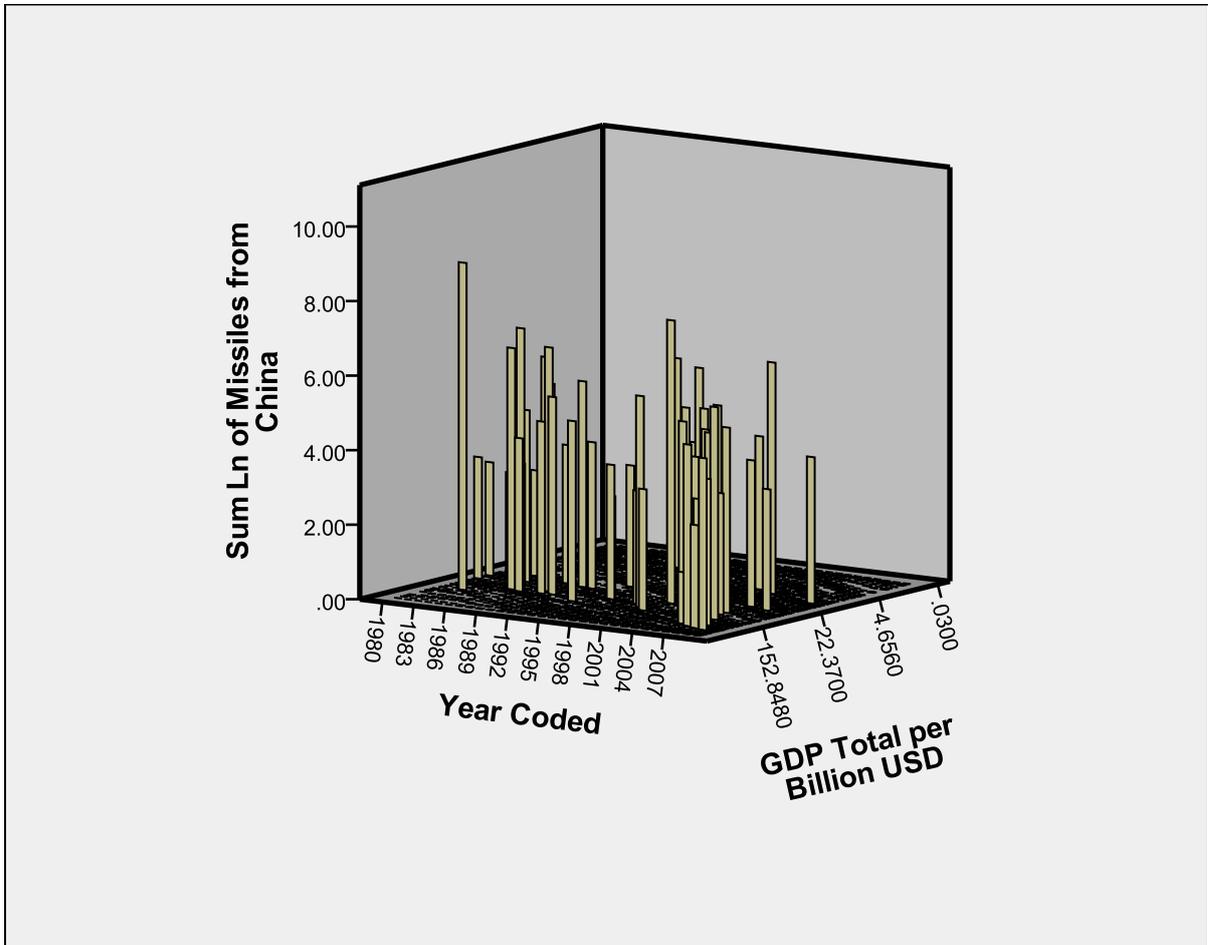
Figure 4: Missile Volume of Missiles Received from China (Ln Sum) by GDP Range



As the chart indicates, countries with higher GDPs not only import missiles more frequently, but also import more missiles by volume than nations with lower GDPs between 1980 and 2009. Poor nations imported missiles from China shortly before and shortly after the fall of the Soviet Union in 1991. The following chart is a three dimensional representation of the missile transfers from China in relation to GDP per billion USD. The x axis shows the

log change in missile imports while the z axis shows the total GDP in billions in 2010 US dollars. Missile sales to high GDP nations increased during the 2000s.

Figure 5: Volume of Missiles Received from China (Ln Sum) by GDP total (in Billions of USD) between 1980 and 2008



Delving deeper into the data reveals less of a trend across nations in the relationship between missile transfer instances and GDP per capita.

Table 3: Number of Missile Transfer Instances by Level of GDP per Capita (1980-2009)

Level of GDP of Recipient Nation	From China	From Israel	From Russia
Low GDP per Capita	23	7	1217
Moderate GDP per Capita	29	27	1220
High GDP per Capita	1	40	1225

Poorer nations importing missiles are more likely than richer nations to import missiles from China. Israel’s case is the opposite. Rich nations constitute over half of missile imports from Israel. Nations across all three categories buy missiles from the former USSR/Russia. Next, the volume of missiles transferred in relation to GDP per capita will be analyzed. The following descriptive table lists the amount of missiles sent from China, Israel, and the USSR/Russia to nations with low, moderate, and high levels of GDP per capita.

Table 4: Number of Missiles Sold by Level of GDP per Capita(1980-2009)

Level of GDP of Recipient Nation	From China	From Israel	From Russia
Low GDP per Capita	2133	4010	7646
Moderate GDP per Capita	13764	6943	62417
High GDP per Capita	60	23569	3437

Countries with moderate levels of GDP per capita imported a larger total volume of missiles than the other categories of GDP per capita. However, the categories varied widely among the three supplier nations. China and Russia supplied missiles to poorer recipients whereas Israel provided missiles to richer recipients. Chinese missiles are generally less sophisticated and cheaper than Israeli missiles or even Russian missiles, and so countries with high GDPs almost never buy missiles from China whereas countries with lower GDPs are more likely to consider China a potential missile supplier. Interestingly, China and Israel sell many more missiles to nations with high GDPs as opposed to Russia, which sells a large quantity to high GDP nations, but a larger quantity to nations with moderate GDPs. Russia, China, and Israel sell relatively few missiles to nations with low GDPs. It is likely these nations are concerned with other matters, or lack the necessary capital, so they do not prioritize purchasing missiles. The following chart shows the instance of missile transfers from the three supplier nations based on GDP level. As GDP level increases, the instance of missiles sales from China and Israel increase. Half of China’s missile transfer deals were with

high GDP nations. Over 80% of Israeli missile transfer instances were to high GDP nations. However the USSR/Russia engaged in approximately equal amounts of arms transfers among low, moderate, and high GDP nations.

Breaking GDP per capita into three categories reveals interesting results. The following report shows the number of missiles transferred to nations with low to high Gross Domestic Products.

Table 5: Total Missiles Received by GDP Range (1980-2009)

Recipient Nation	From China	From Israel	From Russia
Low GDP	715	130	3055
Moderate GDP	1555	2366	46502
High GDP	13687	32026	23943

The following chart shows the correlation between the number of missiles sold by China to other nations with economic and social factors.

Table 6: Missile Sales Volumes from China and Socioeconomic Factors (1980-2009)

		Ln of Missiles from China	Ln GDP	GDP per Capita	Ln of Population in Millions
Ln of Missiles from China	Pearson Correlation	1	.035*	-.053**	.121**
	Sig. (2-tailed)		.022	.001	.000
	N	4583	4258	4180	4339
Ln GDP	Pearson Correlation	.035*	1	.596**	.685**
	Sig. (2-tailed)	.022		.000	.000
	N	4258	4258	4180	4180
GDP per Capita	Pearson Correlation	-.053**	.596**	1	.023
	Sig. (2-tailed)	.001	.000		.143
	N	4180	4180	4180	4180
Ln of Population in Millions	Pearson Correlation	.121**	.685**	.023	1
	Sig. (2-tailed)	.000	.000	.143	
	N	4339	4180	4180	4339

*. Correlation is significant at the 0.05 level (2-tailed).

**.. Correlation is significant at the 0.01 level (2-tailed).

All of the above variables are statistically significant in relation to the natural log of missiles exported by China. Both the natural log of population and GDP per capita are

significant at the 0.05 level and the natural log of GDP is significant at the 0.01 level. Per capita GDP has a negative relationship with the volume of missile sales from China, indicating that as GDP per capita increases, missile transfer amounts decrease. A similar relationship is observed when comparing the three socioeconomic factors with the instance of missile transfers from China.

Table 7: Socioeconomic Effects on Missile Sales From China

Dependent Variable = Number of Instances of Missile Sales from China

	Pearson Correlation	Significance	N
Ln of GDP	0.034*	.028	4258
GDP per Capita	-0.056**	.000	4180
Ln of Population	0.127**	.000	4339

*. Correlation is significant at the 0.05 level (2-tailed)
 **. Correlation is significant at the 0.01 level (2-tailed)

Again, total GDP and population variables show positive statistically significant relationships with missile transfer instances from China, whereas GDP per capita has a negative relationship with missile transfer instances. Therefore, as population and GDP increases, missile transfer instances increase. However, as GDP per capita increases, missile transfer instances decrease, which could indicate that nations with high GDP per capita choose to buy more expensive and sophisticated missiles from other nations.

Socioeconomic factors thereby are shown to play a role in influencing not only the volume of missile transfers, but also the number of instances of arms sales.

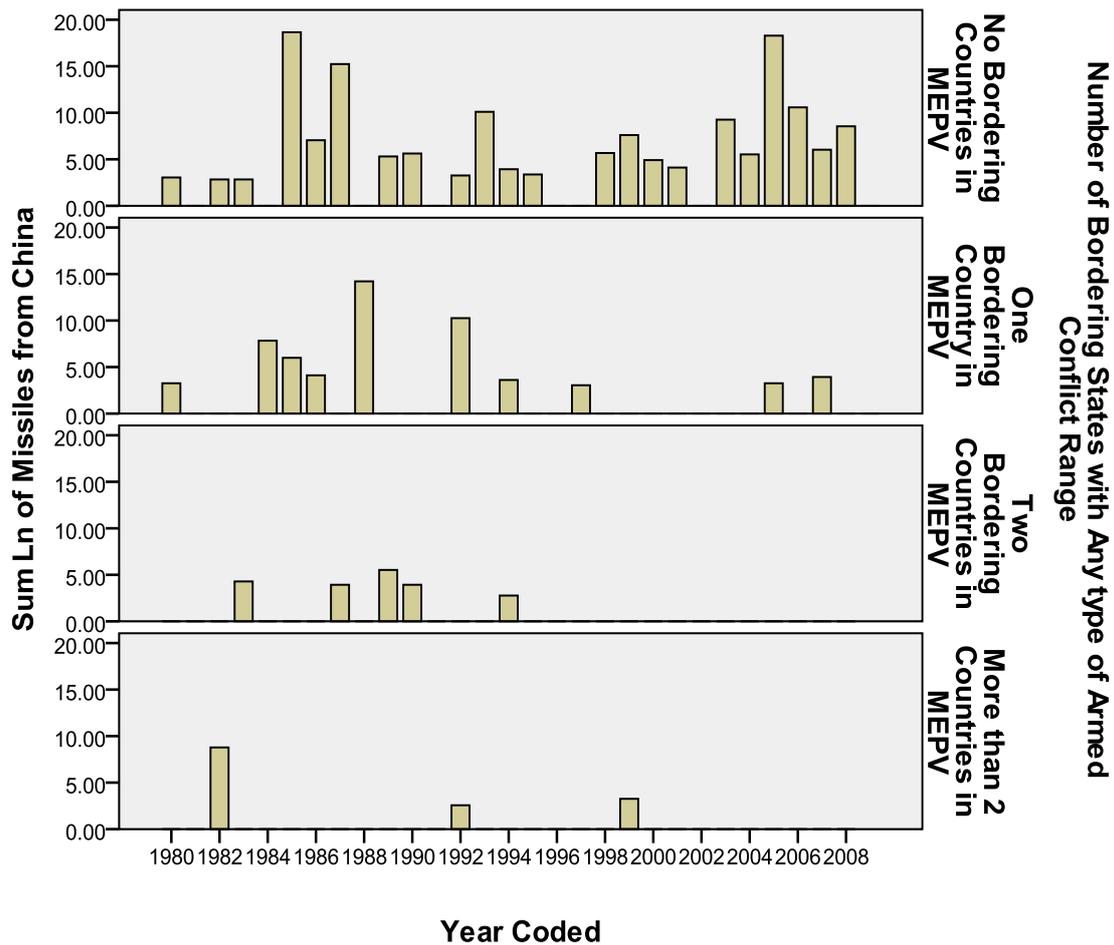
Conflict Factors

Due to the changing nature of global conflict, missiles are being used more often on the battlefield as well as a defensive deterrent against foreign aggression. A number of conflict variables are used in this analysis to clarify the role of conflict in missile

proliferation. The role of bordering nation's conflict will be analyzed on the missile proliferation first. Nations not involved in conflict often import missile for deterrence purposes as well as stockpiling weapons for possible future warfare. During times of war, it may be difficult to acquire missiles. The armed conflict category will then be broken into two distinct categories in order to examine more closely the effect of internal and external conflict on the volume of missile transfers. Increasing levels of border conflict may not accurately explain the volume of missile transfers, so the effect of bordering nations involved in conflict will be used to examine the instances of missile transfers.

As the chart below shows, most missiles were sold to countries not involved in a major episode of political violence (MEPV). Although 6,537 missiles were sold to nations bordering two nations involved in armed conflict, 6,500 of those missiles were sent to Iran in 1982. During that time, Iran was in the midst of an extended war with Iraq. Likewise, in 1982, 6,930 missiles were sent to Yugoslavia from the USSR and in 1980, 7,650 missiles were sent to Afghanistan from the Soviet Union, both of which bordered two nations in the midst of armed conflict. These three cases seem to be outliers in the general trend of missile proliferation during times of conflict. The following chart is a visual breakdown of global missile sales based on bordering nations involved in any type of conflict over time.

Figure 6: Volume of Missiles Received from China (Ln Sum) by Number of Bordering States in the midst of Major Episodes of Political Violence between 1980 and 2009.



The chart shows countries with no bordering nations in conflict tend to import high quantities of missiles and purchase missiles more frequently. This could be due to nations building a defensive arsenal of missiles or that the nation is preparing for future conflict. China sold nearly 6,612 missiles to nations involved in international conflict. Of those 6,612, 6,500 were sent to Iran during the Iraq-Iran War. Consequently, Iran may be an extraneous outlier and it seems countries involved in international conflict do not buy missiles from China in large quantities.

Countries involved in internal conflict imported more missiles from China than countries involved in international conflict. Thus, internal conflict is suspected to play a larger role in missile transfer amounts. The following table shows the total number of missile

transfer instances between 1980 and 2009 by China, Israel, and Russia to nations with border nations in the midst of conflict.

Table 8: Number of Missile Transfers by Number of Bordering States involved in Major Episodes of Political Violence

Recipient Nation		China Transfers	Israel Transfers	Russia Transfers
No Bordering Countries in MEPV	Sum	35	28	1715
	% of Total Sum	61.4%	40.6%	44.7%
One Bordering Country in MEPV	Sum	14	25	1122
	% of Total Sum	24.6%	36.2%	29.2%
Two Bordering Countries in MEPV	Sum	5	9	579
	% of Total Sum	8.8%	13.0%	15.1%
More than 2 Countries in MEPV	Sum	3	7	422
	% of Total Sum	5.3%	10.1%	11.0%
Total	Sum	57	69	3838

As the number of conflicts of bordering states increases, the number of missile sale instances from each of the three supplier nations decreases. The following bivariate correlation shows the relationship between missiles transfers from China based on border conflict.

Table 9: Border Conflicts and Natural Log of Missiles Received from China Crosstab

	Ln of Missiles from China	Total Number of Border Wars divided by Total Bordering Nations	Number of Bordering States with Any type of Armed Conflict Range
Ln of Missiles from China	Pearson Correlation	1	-.035*
	Sig. (2-tailed)		.027
	N	4583	4004
Total Number of Border Wars divided by Total Bordering Nations	Pearson Correlation	-.035*	1
	Sig. (2-tailed)	.027	.000
	N	4004	4004
Number of Bordering States with Any type of Armed Conflict Range	Pearson Correlation	-.038*	.779**
	Sig. (2-tailed)	.012	.000
	N	4412	4004

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Two similar variables are used to make the analysis more robust. The independent variables are statistically significant at the 0.05 level and have a negative correlation with the number of missiles imported from China. The following chart shows the comparison of

missile transfers from Russia and Israel based on border conflicts. Thus, as the number of countries with border conflicts increases, the number of missile imports by volume decreases.

Correlation 1: Correlation between Conflict Factors and Missiles Received from Israel and China

T		Total Number of Border Wars divided by Total Bordering Nations	Number of Bordering States with Any type of Armed Conflict Range	Ln of Missiles from Israel	Ln of Missiles Received from Russia
Total Number of Border Wars divided by Total Bordering Nations	Pearson Correlation	1	.779**	-.009	-.009
	Sig. (2-tailed)		.000	.575	.571
	N	4004	4004	4004	4004
Number of Bordering States with Any type of Armed Conflict Range	Pearson Correlation	.779**	1	.001	.015
	Sig. (2-tailed)	.000		.923	.326
	N	4004	4412	4412	4412
Ln of Missiles from Israel	Pearson Correlation	-.009	.001	1	-.016
	Sig. (2-tailed)	.575	.923		.288
	N	4004	4412	4583	4583
Ln of Missiles Received from Russia	Pearson Correlation	-.009	.015	-.016	1
	Sig. (2-tailed)	.571	.326	.288	
	N	4004	4412	4583	4583

** , Correlation is significant at the 0.01 level (2-tailed).

There is no statistical significance between the number of bordering countries involved in conflict and the number of missiles received from Russia or Israel. Therefore, border conflicts of recipient nations may only be an indicator of missiles supplied by China.

Political Factors

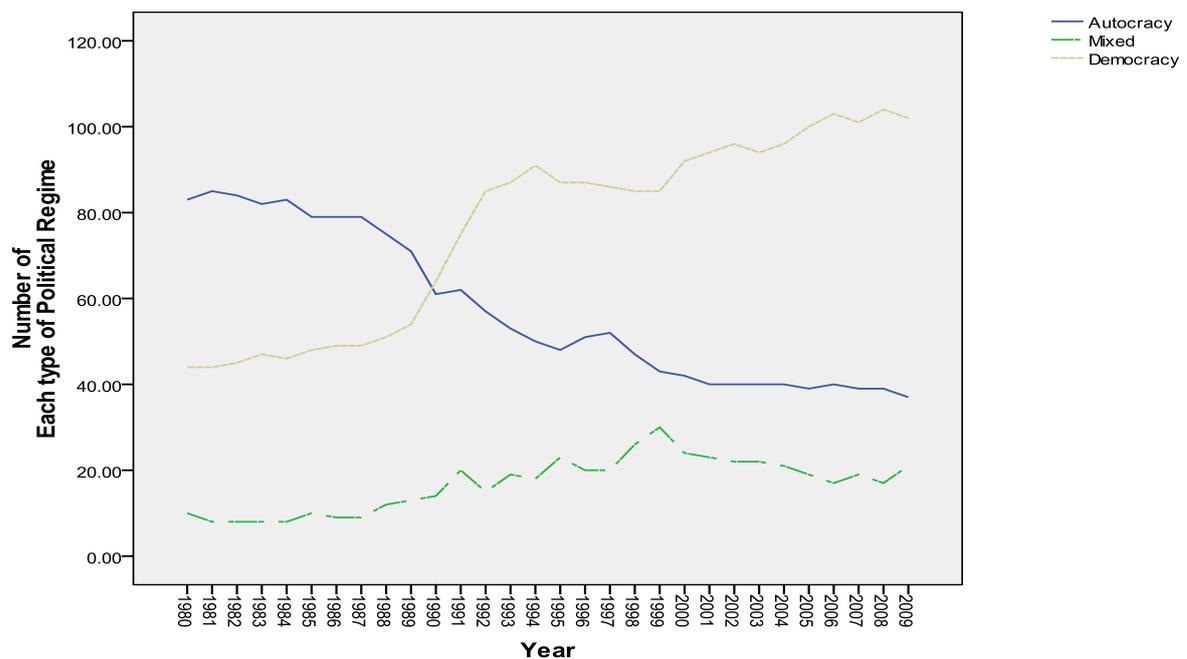
Finally, the role of polity in determining missiles transfers will be analyzed. Two main polity variables will be used: first, a three-category variable of regime type and second, a thermometer of polity level. Again, the dependent variables to be analyzed are (1) the number and instance of missiles transferred from China, USSR/Russia, and Israel; and (2) the

number of missile transfer instances from these three nations. Before getting into specifics about missile transfers, global trends in polity changes will be analyzed.

The chart above explains not only the change in the number of autocratic, mixed, and democratic nations, but also shows an increase in the number of nations between 1980 and 2009. Over half of the nations in the world were autocracies in the 1980s but by the end of the 2000s, half had converted to democracies. Likewise, the number of democracies approximately doubled after the 1980s to the 2000s. The following line graph shows China's polity score between 1980 and 2009. No change occurred in China's polity level over these years as China remained at a polity score of negative 6.

The following line graph shows the global trends in regime change between 1980 and 2009.

Figure 7: Global Change in Political Regimes between 1980 and 2009



After the fall of the Soviet Union, autocratic regimes began converting to democratic regimes and the number of democracies increased due to the breakup of the former Soviet Union. The sales of missiles from autocratic nations to democratic may show a complex

relationship involving not only the fall of communism but also the increasing number of democracies. Thus, an independent t-test is needed to determine the mean change in polity between decades.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Revised POLITY Score	Equal variances assumed	41.958	.000	-12.820	2931	.000	-3.446	.269	-3.973	-2.919
	Equal variances not assumed			-12.746	2797.854	.000	-3.446	.270	-3.976	-2.916

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Revised POLITY Score	Equal variances assumed	37.728	.000	-5.735	3142	.000	-1.375	.240	-1.845	-.905
	Equal variances not assumed			-5.733	3120.780	.000	-1.375	.240	-1.846	-.905

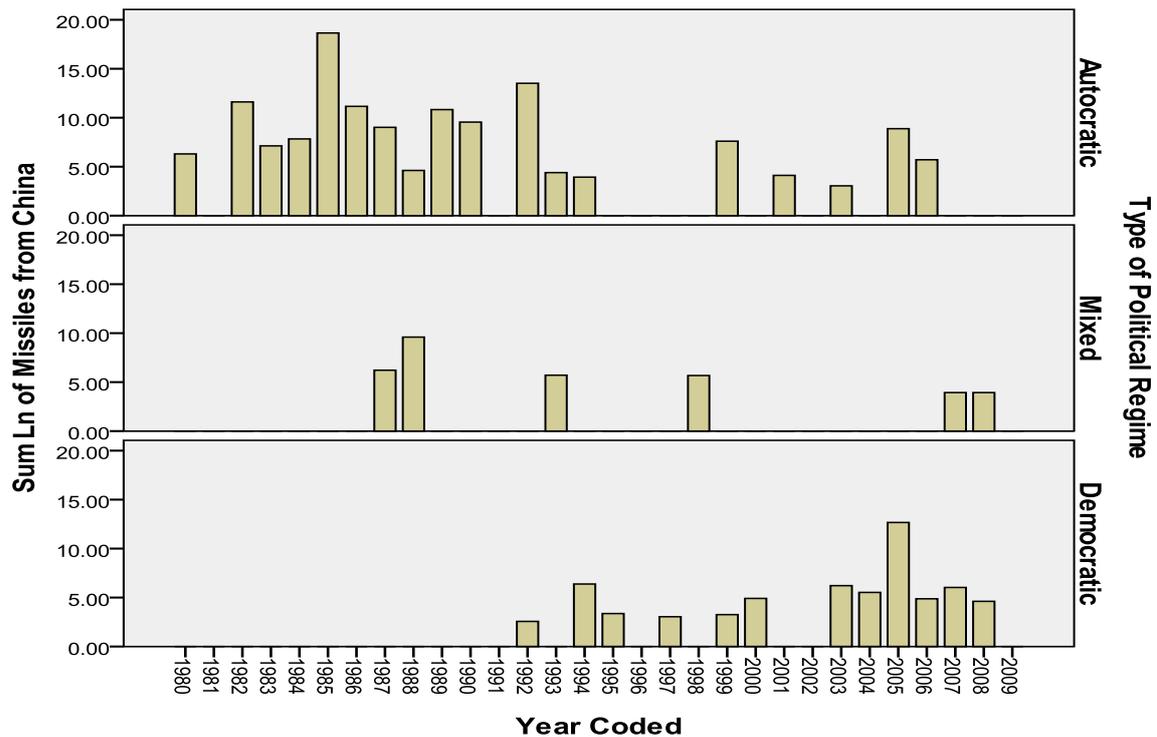
The independent t-tests show that there is a statistically significant relationship between each decade and the global mean polity score. During the 1980s, the mean polity score was negative. During the 1990s and 2000s, the mean polity score was positive. The means comparison shows the total number of missiles sold by China to various regime types globally. The mean change from the 1980s to the 1990s was greater than the mean change from the 1990s to the 2000s. It is clear the change in decades influenced missile transfers, rejecting the null hypothesis that time has no effect on missile sales from China.

The following chart shows the amount of missiles sold based on political regime type. Political regime is separated into three categories based on polity level. China and the former USSR/Russia both sent between approximately between 75% and 80% of missiles by volume to autocratic nations, whereas Israel sent almost 80% of its missile sales by volume to democratic nations. A logical implication of this trend over time, following the global trend of democratization, is that Israel would be expected to increase missile sales, whereas conversely, China and the USSR/Russia would be expected to sell fewer missiles.

Table 10: Missile Sales Volume by Political Regime Type: 1980-2009

Polity of Recipient	From China	From Israel	From USSR/Russia
Autocratic	14014	4954	373766
Mixed	1910	2384	15451
Democratic	1483	27184	116397

Figure 8: Volume of Missiles Received from China (Ln Sum) by Nations with Autocratic, Mixed, and Democratic Polity Levels between 1980 and 2009



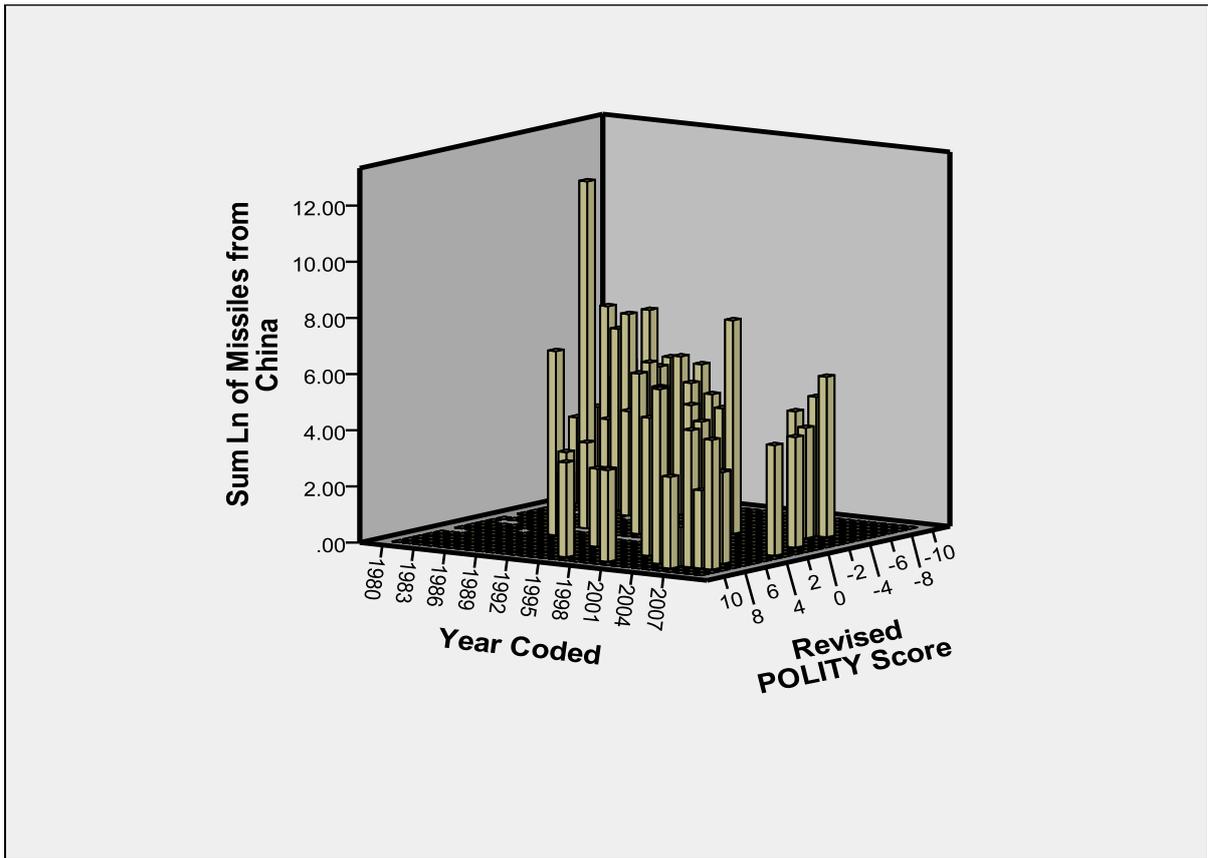
The year 1992 marks a transition year in China's arms transfer pattern, in which China sold 12 missiles to Bangladesh. In 1991, China sold missiles to Bangladesh, which is the same year Bangladesh transitioned to a democracy.⁵⁶ However, by 1991, Bangladesh was already an established purchaser of Chinese missiles, having purchased more than 400 missiles from China between 1982 and 1989.⁵⁷ Since 1991, Bangladesh has again purchased more than 400 missiles from China. In 1992, China began shifting its missile sales from autocratic nations to democratic nations. Around the same time, some autocracies began transitioning to democracies.

After the Cold War, the number of democracies and mixed political regimes drastically increased while the number of autocracies slightly decreased. The following three-dimensional bar graph shows the trends in missile sales from China based on the recipient nation's polity score. Although, China sold primarily to autocratic nations during the Cold War, after the fall of the Soviet Union, China began to sell to nations with more democratic polity scores. China continued to sell missiles to previous purchasers, regardless of whether they underwent a policy change.

⁵⁶ Marshall, Monty G. "Authority Trends, 1972-2010: Bangladesh. Polity IV Project: Political Regimes Characteristics and Transitions, 1800-2011. <<http://www.systemicpeace.org/polity/bng2.htm>>

⁵⁷ "Transfers of major conventional weapons: sorted by recipient. Deals with deliveries or orders made for year range 1980 to 2009." SIPRI Arms Transfer Database. <http://armstrade.sipri.org/armstrade/page/trade_register.php>

Figure 9: Volume of Missiles Received from China (Ln Sum) by Polity Score 1980 to 2009



The final section of the analysis includes a logistic regression and a linear regression analyzing the correlation between the socioeconomic, political, and conflict as independent variables the volume of missile sales from China. First, a bivariate correlation was calculated to determine the possible significance of polity to missile transfers from China, Israel, and USSR/Russia.

Correlation 2: Correlation between Polity Scores and Missile Sales from China, Israel, and Russia

		Revised POLITY Score	Ln of Missiles from China	Ln of Missiles from Israel	Ln of Missile Received from Russia
Revised POLITY Score	Pearson Correlation	1	-.046**	.070**	-.110**
	Sig. (2-tailed)		.002	.000	.000
	N	4516	4516	4516	4516
Ln of Missiles from China	Pearson Correlation	-.046**	1	.041**	.023
	Sig. (2-tailed)	.002		.005	.112
	N	4516	4583	4583	4583
Ln of Missiles from Israel	Pearson Correlation	.070**	.041**	1	-.016
	Sig. (2-tailed)	.000	.005		.288
	N	4516	4583	4583	4583
Ln of Missile Received from Russia	Pearson Correlation	-.110**	.023	-.016	1
	Sig. (2-tailed)	.000	.112	.288	
	N	4516	4583	4583	4583

** . Correlation is significant at the 0.01 level (2-tailed).

The chart above reflects a statistically significant correlation between the natural logs of the missiles received from each of the selected suppliers at the 0.01 significance level. This indicates the recipient nation’s polity level affects the volume of missile purchased from suppliers. China and the USSR/Russia are likely to provide missiles for countries with negative polity levels whereas Israel is more likely to provide a larger volume of missiles to countries with positive polity levels.

To justify these results, the instances of missile transfers need to be compared with the polity levels of each of the three supplier nations, which are shown in the bivariate correlation on the next page.

Correlation 3: Correlation between Polity Score and Instances of Missile Transfers from China, Israel, and Russia

		Revised POLITY Score	Instances of Missile Sales from China	Instances of Missiles Sales from Israel	Instances of Missile Sales from Russia
Revised POLITY Score	Pearson Correlation	1	-.041**	.070**	-.048**
	Sig. (2-tailed)		.006	.000	.001
	N	4516	4516	4516	4516
Were Missiles Received from China?	Pearson Correlation	-.041**	1	.017	.000
	Sig. (2-tailed)	.006		.254	1.000
	N	4516	4583	4583	4583
Were Missiles Received from Israel?	Pearson Correlation	.070**	.017	1	-.007
	Sig. (2-tailed)	.000	.254		.653
	N	4516	4583	4583	4583
Were Missiles Received from Russia?	Pearson Correlation	-.048**	.000	-.007	1
	Sig. (2-tailed)	.001	1.000	.653	
	N	4516	4583	4583	4583

** . Correlation is significant at the 0.01 level (2-tailed).

The correlation reflects a statistically significant relationship between polity score and instances of missile sales from each of the three supplier nations at the 0.01 level. As polity score of the recipient nation increases, China and the USSR/Russia are less likely to supply that nation with missiles, as exemplified by the negative relationship between polity score and instances of missile sales from China and Russia. Conversely, a positive relationship exists between instance of missile sales from Israel and polity score, which indicates Israel is less likely to sell missiles to autocratic nations.

Final Models

Four different models show the influence of sets of aggregating factors influencing missile transfers from China using linear and logistic regressions. The first two models use linear regressions to analyze the relationship of various social, political, economic and conflict independent variables and missile transfer volumes. The second two models show the influence of these factors on missile transfer instances.

Model I

Model I shows the influence of several baseline key factors in determining if missiles were received from China by nation R. The following linear regression shows a culmination of the relationships of political, socioeconomic, and conflict factors in determining missile transfer volume from China. The regression analysis shows each of the independent variables is statistically significant when determining missile sale volume from China from 1980 to 2009. GDP per capita, polity, and conflict measurements all show negative relationships whereas total GDP shows a positive relationship. Overall, about 1.5% of the variation is attributable to these factors.

Thus, the following model can be used to as a prediction model for determining the natural log of missiles received from China by a particular nation with varying levels of GDP per capita, GDP, Polity Score, and average number of wars of bordering countries. The model is as follows:

$$\begin{aligned} \text{Number of missiles received from China} &= \beta_0 + \beta_1 \ln(\text{GDP}) \\ &+ \beta_2 (\text{GDP per capita}) \\ &+ \beta_3 (\text{Polity Score}) \\ &+ \beta_4 (\text{Number of Border Wars divided by Total Bordering Nations}) \end{aligned}$$

Results of Model I

Analysis of the model yields the following prediction model for assessing the natural log of missiles received from China by other nations:

$$\begin{aligned} \text{Ln of missiles received from China} &= .029 + (.032 * \text{Ln GDP}) \\ &- (.006 * \text{GDP per capita}) \\ &- (.005 * \text{Polity Score}) \\ &- (.057 * \text{average border wars of bordering countries}) \end{aligned}$$

Model II

Model II takes into account whether the receiving country is in the Middle East.

The Model II regression shows that each of the independent variables in Model I are still statistically significant, but the most important factor driving missile sales is whether or not the receiving country is in the Middle East. Therefore, countries in the Middle East are likely to receive a higher volume of missiles than countries not in the Middle East. The model is as follows:

$$\begin{aligned} \text{Number of missiles received from China} &= \beta_0 + \beta_1 \ln(\text{GDP}) \\ &+ \beta_2 (\text{GDP per capita}) \\ &+ \beta_3 (\text{Polity Score}) \\ &+ \beta_4 (\text{Number of Border Wars divided by Total Bordering Nations}) \\ &+ \beta_5 (\text{Is recipient in the Middle East?}) \end{aligned}$$

Results of Model II

Statistical analysis of Model II yields the following prediction model for assessing the natural log of missiles received from China by other nations:

$$\begin{aligned} \text{Natural log of Missiles received from China} &= 0.22 - (.056 * \text{border wars/border countries}) - \\ &(0.030 * \ln \text{ of GDP}) - (.006 * \text{GDP per capita}) - (.003 * \text{Revised Polity Score}) + (.118 * \text{Is recipient} \\ &\text{in the Middle East?}) \end{aligned}$$

About 1.8% of the variation can be explained by Model II.

The following chart gives a summary of the Model I and II regression.

Linear Regressions	Model I	Model II
Explanatory Variables	Coefficient (Significance)	Coefficient (Significance)
Natural Log of GDP	.032** (.000)	.030** (.000)
GDP per Capita	-.006** (.000)	-.006** (.000)
Revised POLITY Score	-.005** (.001)	-.003* (.034)
Total Border Wars/Border Countries	-.057* (0.042)	-.056* (.046)
Is Recipient in the Middle East?	N/A	.118** (.000)
Number of Observations	4583	4583
R-Square	.015	.018
*Significant at the 0.05 level **Significant at the 0.01 level		

Model III

Model III includes the same independent variables used in Model I, but uses a logistic regression to analyze whether a missile sale took place in a given country-year.

The logistic regression shows significant relationships between the instance of missile sales from China and the economic factors of GDP per capita and total GDP. However, the conflict factor and polity score are not statistically significant. Other than the total GDP, the other independent variables all show negative relationships with missile transfer from China to other nations. 2.3% of the variation in the relationship can be attributable to these four factors.

Although the relationship between polity and missile transfer instances is not statistically significant, it still shows a negative relationship. The most important factors determining whether or not missiles were imported from China appear to be primarily economic. The logistic regression model tested is as follows:

$$P(\text{Logged Odds of Nation X receiving Missiles from China}) = \beta_0 + \beta_1 \ln(\text{GDP}) + \beta_2(\text{GDP per capita})$$

$$+\beta_3(\text{Polity Score})$$

$$+\beta_4(\text{Number of Border Wars divided by Total Bordering Nations})$$

Results of Model III

Statistical analysis of Model III yields the following prediction model for assessing the logged odds of whether Nation X received missiles from China:

$$\text{Logged Odds} = -4.692 - (\text{polity2} * .029) - (1.058 * \text{Number of Border Wars divided by Total Bordering Nations}) - (.514 * \text{GDP per capita}) + (.561 * \text{natural log of GDP})$$

The predictive results for if Nation X received missiles from China is:

$$\text{Probability} = \frac{\text{Exp}(-4.692 - (\text{polity2} * .029) - (1.058 * \text{border wars/border countries}) - (.514 * \text{GDP per capita}) + (.561 * \text{natural log of GDP}))}{1 + (-4.692 - (\text{polity2} * .029) - (1.058 * \text{Number of Border Wars divided by Total Bordering Nations}) - (.514 * \text{GDP per capita}) + (.561 * \text{natural log of GDP}))}$$

Model IV

The final model takes into account the same independent variables used in Model II, and apply those factors to instances of missile sales from China, while specifically focusing on missile transfers to recipient nations in the Middle East.

In addition to the factors in Model III, the Model IV regression shows a statistically significant relationship at the 0.01 between missile transfer instances from China and with “Is the recipient nation in the Middle East?”. The magnitude of “Is the recipient nation in the Middle East?” is positive and relatively high, indicating that countries in the Middle East are more likely to receive missiles than nations not in the Middle East. Overall, 2.6% of the variation can be explained using these independent variables.

The following model was analyzed:

$$P(\text{Logged Odds of Nation X receiving Missiles from China}) = \beta_0 + \beta_1 \ln(\text{GDP})$$

$$+\beta_2(\text{GDP per capita})$$

$$+\beta_3(\text{Polity Score})$$

+ β_4 (Number of Border Wars divided by Total Bordering Nations)

+ β_5 (Is recipient in the Middle East?)

Results of Model IV

Statistical analysis gives the following results:

*Logged odds of whether missiles were received from China = -4.800+(.558*Natural Log of GDP)-(.608*GDP per Capita)-(.006*polity score)-.875*Total Border Wars/Bordering countries)+(1.347*Is R in the Middle East)*

Logistic Regressions	Model III	Model IV
Explanatory Variables	Coefficient (Significance)	Coefficient (Significance)
Natural Log of GDP	.561** (.000)	.558** (.000)
GDP per Capita	-.514** (.000)	-.608** (.000)
Revised POLITY Score	-.029** (.219)	-.006* (.824)
Total Border Wars/Border Countries	-1.058* (0.051)	-.875* (.109)
Is Recipient in the Middle East?	N/A	1.347** (.000)
Number of Observations	4583	4583
R-Square	.023	.026
*Significant at the 0.05 level **Significant at the 0.01 level		

Discussion and Conclusion

This work bridges a gap between historical and quantitative explanations for missile proliferation, as well as a gap between statistical analysis and intelligence analysis. The results support some of my hypotheses and disprove others.

As expected, economic factors play a key role in determining missile transfers from China. Following the dissolution of the Soviet Union and consequent global democratization trend, China began selling missiles to democratic nations in 1992, while sales to autocratic

nations declined after 1992. China sold missiles to nations with relatively high GDPs, indicating these nations have sufficient financial resources to dedicate to offensive/defensive missile purchases. Nations with low GDPs per capita (a characteristic generally indicative of developing nations and most autocratic nations) were more likely to buy missiles from China than nations with high GDPs per capita.

Polity level affects volume of missile transfers from China between 1980 and 2009, albeit polity plays a smaller role than economic factors. Countries with negative polity scores not only purchased more missiles from China, they purchased missiles more often from China. As predicted, China indeed sent more missiles more often to autocratic nations and countries with a similar polity level. Therefore, the first hypothesis was not disconfirmed. The analysis of the data did not support the second hypothesis. China did not send missiles more often to autocratic nations, as was expected. In the 1980s, China sold missiles more often to autocratic nations. Among the observed years, China did not sell missiles to a democratic nation until 1991. Sales to Bangladesh constitute most of China's missile sales to democracies. In 1991, Bangladesh transitioned from an autocracy to a democracy. By then, however, Bangladesh was already one of China's main missile purchasers. These sales to Bangladesh skew the data somewhat, which could account for the disparity between the expectations for hypothesis 2 and the findings. Furthermore, following the democratization trend in the 1990s, the pool of potential buyers with polity levels similar to the PRC shrank, leading China to sell missiles to more democratic nations.

The independent variable in hypotheses 3 and 4, the conflict level of each nation, does not appear to play a statistically significant role in determining the role of conflict involvement of a nation's bordering countries on missile imports from China. The results of the analysis disproved both hypothesis 3 and 4. Although China exports fewer missiles to a nation as the number of border state conflicts around that nation increases, this is just one

measure of how conflict affects missile transfers. Being contiguous to a nation in conflict seems to be a disincentive for missile purchases. Nations in the midst of conflict could consider missile purchases of a bordering state as a threat, thereby exacerbating relations between the two nations, and could possibly lead to a security dilemma and subsequent arms race. Of course, these are merely speculative possible reasons that nations that are contiguous with states in the midst of conflict generally do not purchase large volumes of missiles. Other factors should be taken into account, including the conflict level of the region.

Based solely on the bordering conflict factor, China exports missiles to countries not bordered by nations in conflict. Thus, Hypothesis 5 and 6 were not disconfirmed. The data show that nations contiguous to states in conflict are less likely to stockpile missiles than nations whose contiguous nations are not involved in conflict. Rather, when a nation A's bordering states are at peace, nation A is more likely to buy missiles than when nation A's bordering states are at war. Perhaps if nation A were to buy missiles when contiguous nations were at war, it would incite an arms race, with contiguous nations viewing nation A's arms amassment as a threat.

This research shows that as GDP increases, nations are more likely to buy missiles from China. On the other hand, as GDP per capita increases, nations are less likely to buy missiles from China. Countries in the Middle East received more missiles, more often from other countries in the world. The Middle East is an area with a large conflict potential given the presence of unstable regimes. Many nations in the Middle East have high GDPs, due to the lucrative oil trade; though they generally have low GDPs per capita. The economic monocultures in the Middle East feel more threatened to encroachments on territory and resources as opposed to nations with diversified economies. Shutting down oil production in an oil-dependent nation is economically much more devastating than shutting down oil production in a nation with a diversified economy.

Models II and IV show countries in the Middle East tend to buy more missiles more often. Simply being in the Middle East greatly increases the probability of a nation receiving missiles from China. The data from the Iraq-Iran war does not skew these results. Between 1980 and 2009, China also sold missiles to Pakistan, Egypt, Bangladesh, Afghanistan, Saudi Arabia, and Yemen.

The low R-square found in each of the models leads to the assumption that there are many underlying unobservable and idiosyncratic factors affecting missile proliferation. Thus, these models cannot be used to predict future proliferation. It is also possible there are factors not included in this analysis.

This research is just the tip of the iceberg in determining underlying reasons behind China's missile transfers to other nations. Future exploits might narrow down each factor into more robust and thorough analyses of varying measures of socioeconomic, political, and conflict factors affecting missile transfers. The models show that although political and conflict factors play a role in explaining missile proliferation, economic and regional factors are more salient.

National Intelligence Estimate: Qualitative Section

Scope Note

The National Intelligence Estimate (NIE) portion of this paper assesses Iran's missile capabilities, why Iran purchased missiles from China and implications for the next five years, assesses China as a continuing proliferator of missiles and related technology, and discusses implications of Sino-Iranian missile sales for US security interests.

The Estimate focuses on the following questions:

1. What factors will play a role in China's decisions to sell arms and related technology?
2. Will Iran continue to rely upon China as a source of missiles and missile technology?
3. What are the potential capabilities of Iran's missiles in the next 10 years?

This Estimate incorporates open source information available as of 3 March 2013.

Key Judgments

- We judge with high confidence that the PRC's desire for economic profit drive their missile and missile technology proliferation. China has sold arms to the Middle East in order to establish and gradually increase economic ties with these nations. Statistical analysis shows the PRC sells missiles to countries with relatively high GDPs, but low GDPs per capita, such as Iran. Nations with higher GDPs have more financial resources to spend on missiles. We judge with high confidence that although polity influences missile proliferation, economic factors prove more influential.

The quantitative analysis of this paper indicates that China sells missiles to nations with high GDPs, but to low GDPs per capita. According to the CIA World Factbook, Iran's GDP was the 18th largest globally in 2012 (\$997.4 billion), but Iran's GDP per capita lagged at 97th place (\$13,100).⁵⁸ In 2011, 1/5th of Iran's exports were to China. In the same year, imports from China comprised roughly 17.4% of Iran's total imports.⁵⁹ However, the number of missiles sold to Iran by China has gradually decreased since the 1980s. This is likely due to Iran's developing indigenous missile production capability. In the 1980s, Iran possessed neither adequate infrastructure nor technology to produce missiles domestically, and therefore relied on imported missiles. According to Dr. John Chipman, Director General and Chief Executive of the International Institute for Strategic Services, Iran began developing an indigenous ballistic missile program in the early 2000s, namely in order to become independent of foreign sources of missiles.⁶⁰

⁵⁸ Iran. CIA World Factbook. < <https://www.cia.gov/library/publications/the-world-factbook/geos/ir.html>>

⁵⁹ Ibid

⁶⁰ Chipman, John. "Iran's Ballistic Missile Capabilities: A net assessment – Press Statement." 10 May 2010. <<http://www.iiss.org/publications/strategic-dossiers/irans-ballistic-missile-capabilities/press-statement/>>

China sees arms transfers as a conduit for expanding trade with Middle Eastern nations, as evidence by the examples of Pakistan and Saudi Arabia. Afridi and Bajoria suggest China established relations with Pakistan in the 1950s, initially seeing one another as a “strategic hedge” against India.⁶¹ China began providing weapons to Pakistan in the 1960s. The authors assess that Pakistan has both short-range and medium-range ballistic missiles that are “modifications of Chinese imports” and obtained “nuclear technology and assistance” from the PRC.⁶² In the 1980s, China sold between thirty-six and fifty CSS-2/DF-3 IRBMs to Saudi Arabia.⁶³ Yoel Guzansky, research fellow at the Institute for National Security Studies in Tel Aviv, suggests Pakistan and Saudi Arabia have formed a strategic partnership to curb Iran’s influence in the region. On the one hand, Saudi Arabia’s weapons production infrastructure remains relatively undeveloped, but has a steady flow of income; on the other hand, Pakistan has both the infrastructure and required technology to produce nuclear weapons.⁶⁴

- We judge with high confidence that nations will seek to obtain missiles and missile technology from other sources following the decline of Russia’s role in the arms trade. China and North Korea are sources of relatively cheap weapons and weapons technology that nations are likely to consider as potential arms providers. For Iran, China is a particularly valuable ally in its political, economic, and military pursuits.

⁶¹ Afridi, Jamal and Jayshree Bajoria. “China-Pakistan Relations.” 6 July 2010. *Council on Foreign Relations*. <<http://www.cfr.org/china/china-pakistan-relations/p10070>> Accessed 21 April 2013.

⁶² Ibid.

⁶³ “Transfers of major conventional weapons: sorted by recipient. Deals with deliveries or orders made for year range 1980 to 2009.” SIPRI Arms Transfer Database. <http://armstrade.sipri.org/armstrade/page/trade_register.php>

⁶⁴ Guzansky, Yoel. “Questioning Riyadh’s Nuclear Rationale.” *Middle East Quarterly* 20.2 (2013): 59-64. *Political Science Complete*. Accessed 21 April 2013.

Iran and China are mutually invested in the other's success. China plays a crucial role in developing Iran's missile arsenal and aspirations to become a nuclear weapon possessing state.

China sees Iran as a key source of oil and a potential market in which to sell its products. For China, investing in Iran is a win-win scenario, often characterized in Chinese literature as a “双赢” (*shuangying*) or “dual-win” relationship. Iran's oil satiates China's need for fossil fuels, while Iran's population provides potential customers for China's expanding market. Iran gains a powerful political ally from the relationship, an ally that forces the United States to constantly evaluate foreign policy. Iran can sell vast quantities of oil to China, allowing China to secure its economic prosperity, and in return buy China's cheap missiles and related technology.

- We judge with moderate confidence that Iran will depend on China for missile related technologies, and China may play a covert role in helping Iran's reach its goal of an indigenous nuclear program, if the PRC decides to help Iran attain nuclear weapons at all.

Given recent sanctions, China will find directly transferring arms to Iran increasingly more difficult, and may choose to use North Korea as a conduit for arms transfers. China has historically helped other nations develop nuclear weapons, notably Pakistan and North Korea.⁶⁵ Garver asserts that China's geopolitical gains “from a nuclear Iran simply outweigh the losses to China from further fraying of the NPT regime.”⁶⁶ The PRC views Iran as a political, economic, and military stronghold in the Middle East. According to Chinese

⁶⁵ Garver, John W. “Is China Playing a Dual Game in Iran?” *The Washington Quarterly*, Winter 2011. 34:1. 75-85

⁶⁶ Ibid 80

sources, increasing relations with Iran will bolster future diplomacy with other nations in the Middle East. At the same time, solidifying relations with Iran would secure China's energy needs.⁶⁷

Nonetheless, China will have to balance its arms trade relationship with Iran and with responsibilities of being a world power on the UN Security Council. PRC views Iran as an important source of oil and natural gas, as well as a market for selling arms. If Iran were to pursue a nuclear weapons program, China could be a primary supplier of materials and related technology. However, supplying arms comes with a cost. According to Wu Lei, a professor at Yunnan University's International Relations Research Institute, China's growth and development depends on oil. Since China satisfies its oil demands primarily by buying from Middle Eastern suppliers, China's economic security depends upon political stability in the Middle East. Wu Lei suggests the structured energy cooperation plan between China and the Middle Eastern already has significance, though the nations lack energy security cooperation.⁶⁸ Securing stability and peace in the Middle East is in line with the PRC's two-fold Middle East strategy. First, China wants to secure the influx of oil from the Middle East. Second, China seeks to enter the markets new markets in the Middle East. Helping Iran obtain nuclear weapons would be detrimental to China's plans for expansion and security in the Middle East. If China helps Iran develop an independent indigenous missile MRBM and LRBM production base, then China will no longer be able to continue to sell MRBMs and LRBM to Iran. Thus, from an economic standpoint, it behooves China to limit Iran's

⁶⁷ 陈俊华，新时期中国—伊朗关系的战略定位分析。西南大学伊朗研究中心副教授。10 February 2009. 71-76.

⁶⁸ 吴磊。关于中国—中东能源关系发展的若干思考。阿拉伯世界研究。January 2007.
<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CDUQFjAA&url=http%3A%2F%2Fresearch.shisu.edu.cn%2Fpicture%2Farticle%2F33%2Fef%2Fba%2F51fe76294a5bb2823bca420260c3%2F3e71c33a-cde5-4545-8e1f-f2ab112fb7bb.pdf&ei=UbMdUdK8Navh0wHZ84CIDQ&usg=AFQjCNF94BkIp_HnDQtDxNWdbVc_qvE7YQ&sig2=0RZpJ6RHWJgdqp-68R9g_A&bvm=bv.42553238,d.dmQ>

indigenous production capabilities, thereby continuing Iran's dependence on foreign sources of missiles.

- We judge with moderate confidence that Iran will be unable to develop a nuclear-capable ballistic missile in the next five years without extensive cooperation with a nuclear weapon state.

According to Karp, states can spend five to ten years to develop a nuclear warhead capable ballistic missile after a state's nuclear test.⁶⁹ Seeing as though Iran has yet to test a nuclear weapon, according to Karp's logic, Iran's missile arsenal will not be capable of delivering a nuclear warhead via ballistic missile for at least five years. However, if the PRC assists Iran in developing such a warhead, this timeframe could potentially shorten significantly. According to a report published by the Arms Control Association, Iran's "strategic missiles" program is "emerging more slowly than previously projected, if they are emerging at all."⁷⁰

Discussion

Iran's Military Expenditure History

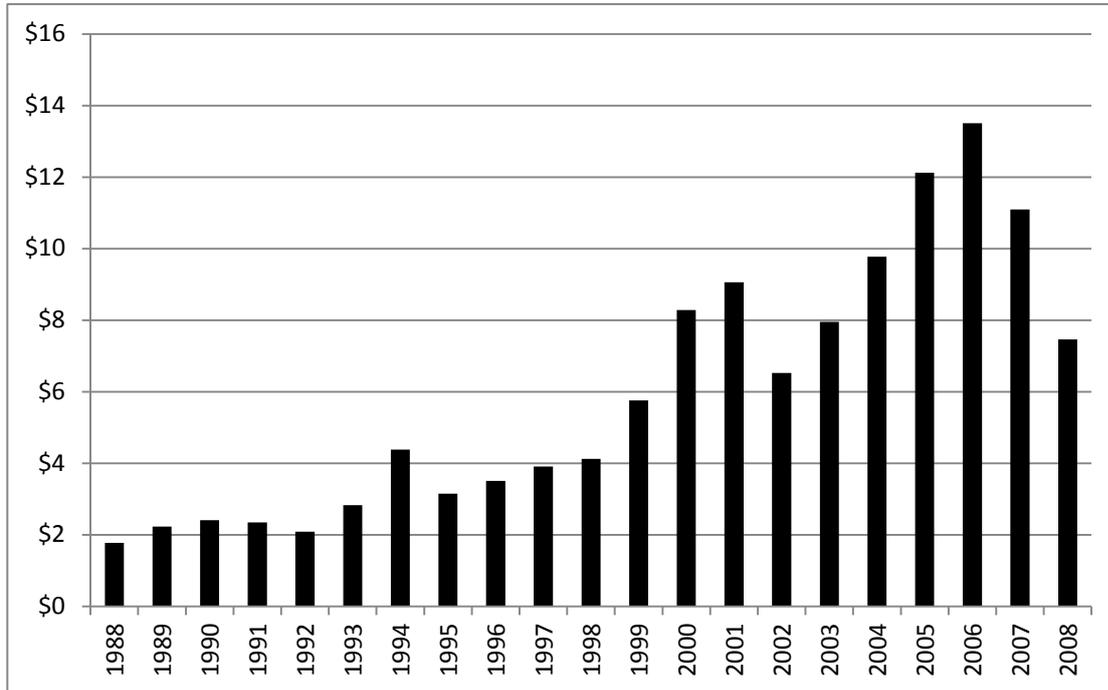
Analysis of SIPRI's Military Expenditure Database shows Iran's military expenditures increased from slightly less than \$2 billion (2010 USD) in 1988, peaked at

⁶⁹ Karp, Aaron. *Ballistic Missile Proliferation: The Politics and Technics*. 1996. 179-185.

⁷⁰ Theilmann, Greg. "Iran's Missile Program and Its Implications for U.S. Missile Defense." Threat Assessment Brief. Analysis on Effective Policy Responses to Weapons-Related Security Threats. 5 February 2013. 1-2. <<http://www.armscontrol.org/threats/Irans-Missile-Program-and-Its-Implications-for-US-Missile-Defense>>

\$13.5 billion (2010 USD) in 2006, and decreased to nearly the approximate military spending level of Iran in 2000.⁷¹

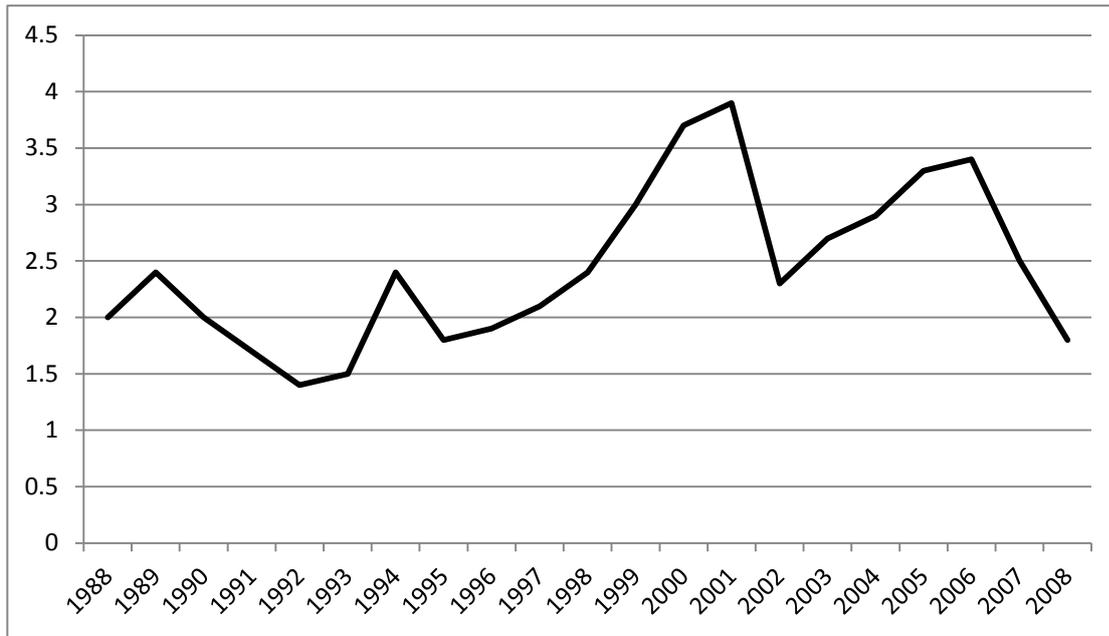
Figure 10: Military Expenditures of Iran: 1988-2008 (in Billions of 2010 USD)



A higher ratio between military expenditure and GDP indicates that a nation dedicates larger amount of resources to military buildup or maintenance. Thus, though Iran's military spending peaked in 2006 at roughly the equivalent \$14 billion USD to the military in 2006, military spending comprised less than 3.5% of Iran's total GDP.

⁷¹ SIPRI Military Expenditure Database. Stockholm International Peace Research Institute. <http://milexdata.sipri.org/>

Figure 11: Iran's Military Expenditures as a Percentage of GDP: 1988-2008



At the end of the Iraq-Iran War, military spending constituted approximately 2% of Iran's GDP. Military spending as a percentage of GDP peaked in 2001 at almost 4%, but fell sharply in 2002. Military spending as of 2008 was roughly the same level as spending twenty years earlier in 1988. Missile purchases comprised a fraction of Iran's total military expenditure.

Compared to nations near or bordering Iran, Iran contributes a relatively low percentage of GDP to military spending. The following table compares the estimate 2012 GDP and military spending as a percentage of GDP of nations bordering or close in proximity to Iran.

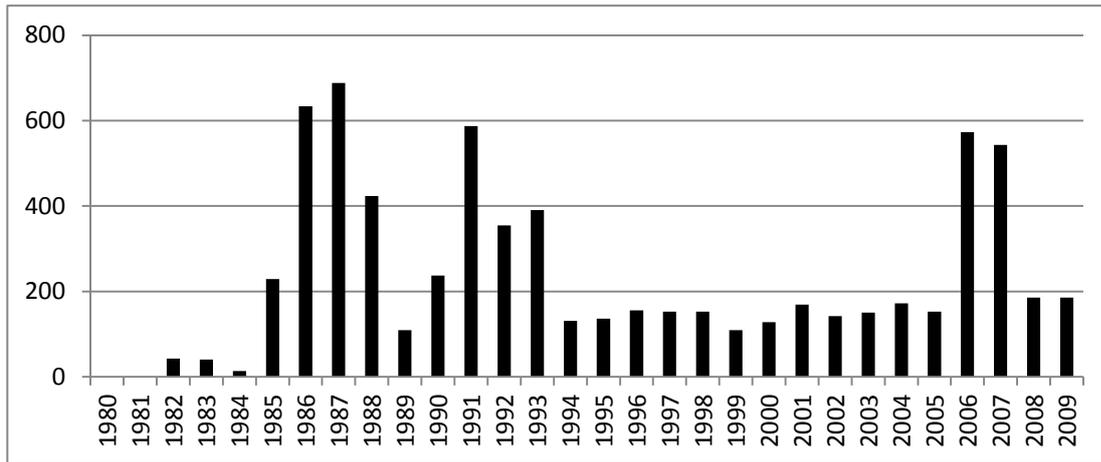
Table 11: Estimated 2012 GDP and Most Recent Military Expenditures of Nations Bordering Iran

Country	GDP (2012 Estimate in 2012 US\$, in millions)	Military Expenditures as a Percentage of GDP	Year of Mil. Expenditure %
Saudi Arabia	657,000	10	2005
Iraq	130,600	8.6	2006
Israel	249,900	7.3	2006
Syria	64,700	5.9	2005
Turkey	1,125,000	5.3	2005
Egypt	255,000	3.4	2005
Turkmenistan	47,550	3.4	2005
Pakistan	230,500	3	2007
Armenia	18,950	2.8	2010
Azerbaijan	71,040	2.6	2005
Iran	483,300	2.5	2006
Afghanistan	33,550	1.9	2009

(Source: CIA World Factbook <<https://www.cia.gov/library/publications/the-world-factbook/index.html>>)

Saudi Arabia spends nearly 1/10th of its GDP on its military, four times what Iran spends on its military as a percentage of GDP. Although Iran's military spending as a percentage of GDP remains relatively low, Iran's GDP is higher than most nations in the Middle East, so Iran has resources to increase military spending if the leaders of the Islamic Republic feels threatened.

Figure 12: Iran's Military Expenditures on Missiles: 1980-2009 (in millions of 2010 USD)



Iran's military spending on missiles peaked in 1986 and 1987, at the end of the Iraq-Iran war. Spending on missiles spiked again in the early 1990s, around the time of the Gulf War. Spending then decreased substantially from 1994 to 2005. In 2006, Iran began purchasing missiles again, possibly related to the 2006 Lebanon-Hezbollah conflict. According to Kreps, Hezbollah was "able to galvanize support from the Shia Iranians" by portraying the conflict as a "pan-Islamic fight against Israel."⁷² Spiegel and King write that the nearly 4,000 missiles used by Hezbollah to bombard Israel came from Syrian and Iranian sources.⁷³

In recent years, inefficiency has plagued Iran's economy. Estimates show that, in 2012, Iran ran a budget deficit of 5%. Industrial production in Iran decreased by nearly 2.7% in the same year.⁷⁴ Unemployment and inflation in Iran remain high. However, despite Iran's recent economic downturn, according to a DefenseNews report published in February 2012, Iran's Ahmadinejad said he planned to "more than double military spending" in the next year.⁷⁵ In the 2012 fiscal year, which ended in March, Iran's defense budget was

⁷² Kreps, Sarah E. "The 2006 Lebanon War: Lessons Learned." *Parameters*. Spring 2007. 9.

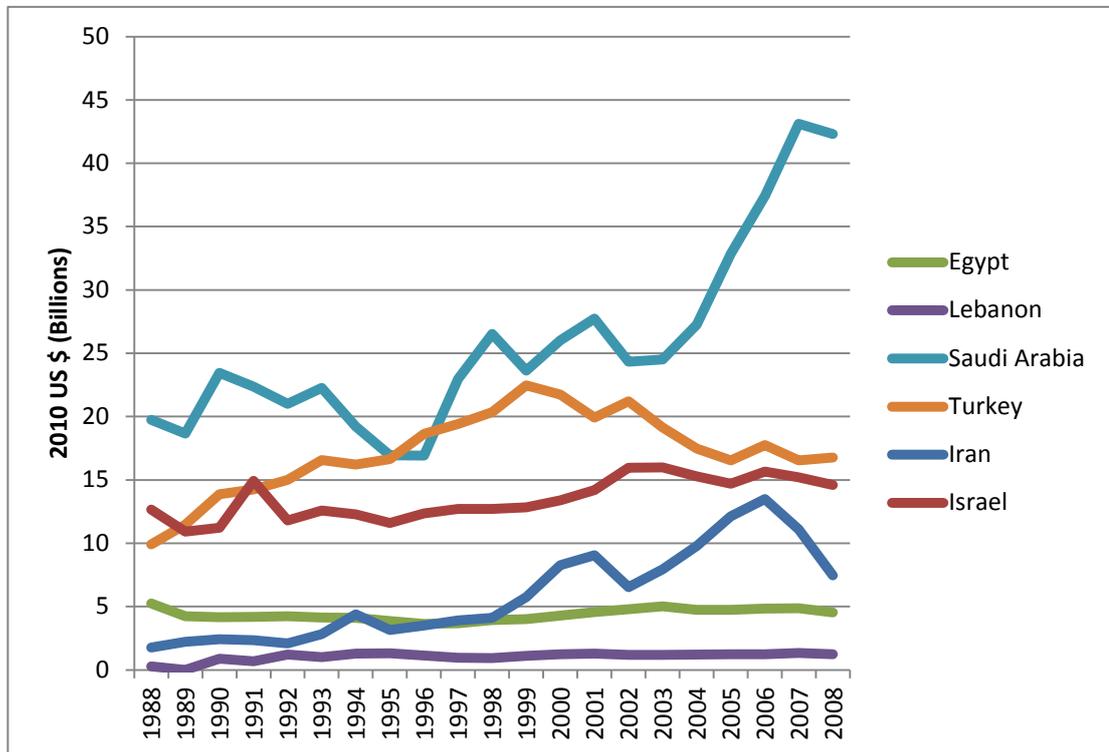
⁷³ Spiegel, Peter and Laura King. "Israel Says Syria, Not Just Iran, Supplied Missiles to Hezbollah." *Los Angeles Times*. 31 August 2006. <<http://articles.latimes.com/2006/aug/31/world/fg-hezbollah31>>

⁷⁴ Iran. CIA World Factbook. <https://www.cia.gov/library/publications/the-world-factbook/geos/ir.html>

⁷⁵ "Iran Plans 127 Percent Defense Budget Increase." *DefenseNews*. 2 February 2012. <<http://www.defensenews.com/article/20120202/DEFREG04/302020003/Iran-Plans-127-Percent-Defense-Budget-Increase>>

approximately \$12 billion.⁷⁶ It is unlikely that Iran’s military spending will double in 2013, though there is certainly potential for Iran to divert financial resources to military spending.

Figure 13: Military Expenditures of Middle Eastern Nations (in Billions of 2010 USD: 1988-2008)



Compared to other major nations in the Middle East, Iran’s military expenditures remained low between 1988 and 2008, though periodically went through periods of growth. Iran’s military expenditures peaked in 2006, but remained below the military spending totals of both Israel and Turkey. Iran’s military expenditures dropped approximately 21.7 percent from 2006 to 2007, and dropped roughly 32.7 percent from 2007 to 2008. However, Iran’s economy has grown steadily since 2002, giving the nation the economic potential to increase military capacity.

⁷⁶ Ibid

Iran's Estimated Current Missile Arsenal and Capabilities

Iran's missile arsenal contains a combination of outdated Soviet missiles, missiles provided by China and North Korea, as well as indigenously produced missiles. Iran's leaders focus Iran's indigenous weapons program on the production of "cruise missiles, ship-to-ship missiles, and surface-to-air weapons."⁷⁷ Andrew Ross explains a five-stage process for development of a nation's defense industry. In the first stage, components from foreign countries are imported and assembled by the buyer nation. In the second, nations begin production of weapons components under "license agreements with foreign suppliers." Next, "complete foreign-designed weapons are produced under license." In the fourth stage, nations are able to "modify, redesign, and reproduce" weapons imported from foreign nations. Finally, "domestically designed arms" are produced without foreign assistance.⁷⁸ Since 1998, Iran has not ordered missiles from China, but Iranian missiles are still based on Chinese, North Korean, and Soviet weapons, indicating Iran has entered the fourth stage of national defense industry development.

Iran has the largest arsenal of ballistic missiles in the Middle East.⁷⁹ According to Steven A. Hildreth, Specialist in Missile Defense, most of Iran's ballistic missiles are short-range ballistic missiles (SRBMs) with a range of less than 500 kilometers, though the Islamic republic is developing a mid-range ballistic missile (MRBM) program.⁸⁰ The following chart shows missiles supplied to Iran by China recorded by SIPRI.

⁷⁷ Cordesman, Anthony H., Alexander Wilner, Michael Gibbs, and Scott Modell. "US-Iranian Competition: The Gulf Military Balance –I. The Conventional and Asymmetric Dimensions." Tenth Edition. Center for Strategic and International Studies. 6 January 2013.

⁷⁸ Ross, Andrew L. "Do-It-Yourself Weaponry." *Bulletin of Atomic Scientists*. 1 May 1990. 1. <<http://0-web.ebscohost.com.umiss.lib.olemiss.edu/ehost/pdfviewer/pdfviewer?sid=0fb73fb2-018e-4d11-ac3b-1cdafdc5b090%40sessionmgr112&vid=1&hid=128>> EBSCOHost. University of Mississippi. Accessed 16 April 2013.

⁷⁹ Hildreth, Steven A. "Iran's Ballistic Missile and Space Launch Programs." *Congressional Research Service*. 6 December 2012. 3. <<http://www.fas.org/sgp/crs/nuke/R42849.pdf>>

⁸⁰ Hildreth, Steven A. "Iran's Ballistic Missile and Space Launch Programs." *Congressional Research Service*. 6 December 2012. 20. <<http://www.fas.org/sgp/crs/nuke/R42849.pdf>>

Missile Transfers from China to Iran, 1980-2009				
Missile Specification	Quantity	Missile Type	Year of Order	Year(s) of Delivery
Red Arrow-73	6500	Anti-tank	1982	1982-1988
HN-5A	500	Portable SAM	1985	1986-1988
HQ-2/CSA-1	150	SAM	1985	1985-1986
C-801/CSS-N-4	100	Anti-ship	1986	1987
HY-2/SY-1A/CSS-N-2	75	Anti-ship	1986	1986-1987
PL-2	600	SRAAM	1986	1986-1988
PL-7	400	SRAAM	1986	1986-1988
HY-2/SY-1A/CSS-N-2	100	Anti-ship	1988	1988-1994
HQ-2/CSA-1	200	SAM	1989	1989-1991
C-801/CSS-N-4	125	Anti-ship	1992	1995-1998
C-701/FL-8	40	Anti-ship	1998	2001-2004
R-440 Crotale	250	SAM	1998	1999-2004

Source: "Transfers of major conventional weapons: sorted by recipient. Deals with deliveries or orders made for year range 1980 to 2009." SIPRI Arms Transfer Database. 25 January 2013. <http://www.sipri.org/contents/armstrad/at_data.html>

Note that none of these missiles are ballistic missiles. According to a CRS Report for Congress on Iran's ballistic missile capacities, Iran reportedly purchased an estimated 200 CSS-8 SRBMs from China in 1989.⁸¹ SIPRI reports that an estimated 30 of the CSS-8 TEL launcher systems were sold by the PRC to Iran in 1989.⁸² The Chinese CSS-8 is known as the

⁸¹ Feickert, Andrew. "Iran's Ballistic Missile Capabilities." CRS Report for Congress. 23 August 2004. 1. <<http://fpc.state.gov/documents/organization/39332.pdf>>

⁸² "Transfers of major conventional weapons: sorted by recipient. Deals with deliveries or orders made for year range 1980 to 2009." SIPRI Arms Transfer Database. 25 January 2013. <http://www.sipri.org/contents/armstrad/at_data.html>

Tondar-69 in Iran.⁸³ Cordesman and Kleiber report that the CSS-8 missiles are “Chinese modifications of the surface-to-air missile [HQ-2] for use as a surface-to-surface system.”⁸⁴ Since 1992, Iran has “been building a self-sufficient military,” but as of early 2013, Iran has still been unable to domestically produce long-range ballistic missiles.⁸⁵ While unable to produce many ballistic missiles, Iran does have the technological capacity to modify pre-existing missiles to both increase range and payload. Soviet, Chinese, and North Korean missiles provide other nations with a “template” on which to base domestic weaponry.⁸⁶

Appendix 1 gives a map of the estimated ranges of Iran’s ballistic missiles. Given current capabilities, Iran’s missiles are capable of reaching as far as central Turkey to the west and as far as southwest Pakistan to the east.

Appendix 2 shows Postol’s analysis of range versus payload of SRBMs and MRBMs. As a caveat, Western reports show wide-ranging discrepancies in relaying the estimated numbers of missiles in Iran’s arsenal. Furthermore, reports conflict on the range/payload capabilities of each type of missile. Iran most likely does not contain a functional BM-25 missile, but could have access to “some BM-25 technology.”⁸⁷

Appendix 4 gives details of Iran’s weapons arsenal, including those provided by China, the Soviet Union, and North Korea, and those which these nations assisted Iran in producing.

⁸³ M-7 (CSS-8/Project 8610). Missile Threat. <<http://missilethreat.com/missiles/m-7-css-8project-8610/>>

⁸⁴ Cordesman, Anthony H, and Martin Kleiber. *Iran’s Military Forces and Warfighting Capabilities: The Threat in the Northern Gulf*. 152. 2007.

⁸⁵ Karimi, Nasser. “Iran Launches Destroyer in Caspian Sea.” 17 March 2013. <<http://world.time.com/2013/03/17/iran-launches-destroyer-in-the-caspian-sea/>>

⁸⁶ Crail, Peter. “Iran Space Launch Raises Missile Concerns.” Arms Control Association. September 2008. <http://www.armscontrol.org/act/2008_09/IranSpace>

⁸⁷ Cordesman, Anthony H., Alexander Wilner, Michael Gibbs, and Bryan Gold. “US-Iranian Competition: The Gulf Military Balance – II. The Missile and Nuclear Dimensions.” Tenth Edition. 26 December 2012.

Short-Range Ballistic Missiles

SRBMs constitute the majority of missiles in Iran's arsenal, though a precise inventory of Iran's SRBM arsenal is not available, according to Hildreth.⁸⁸ Iran's SRBM arsenal includes the Shahab-1 and Shahab-2, Qiam, and Fateh-10. Iran likely possesses hundreds of SRBMs.

Medium-Range Ballistic Missiles

Iran's MRBM capabilities are not as developed as SRBM capabilities. According to Thielmann, the Sajjil MRBM, the "longest range and most survivable" missile tested by Iran, remains non-operational and has not been flown since February 2011.⁸⁹

Long-Range Ballistic Missiles

Iran does not currently possess any functional LRBM. Only China and Russia are current LRBM threats.⁹⁰ According to the International Institute for Strategic Studies, sanctions imposed in 2011 by the U. S. and the E. U. have helped slow Iran's development of LRBM.⁹¹

⁸⁸ Hildreth, Steven A. "Iran's Ballistic Missile and Space Launch Programs." *Congressional Research Service*. 6 December 2012. 20. <<http://www.fas.org/sgp/crs/nuke/R42849.pdf>>

⁸⁹ Theilmann, Greg. "Iran's Missile Program and Its Implications for U.S. Missile Defense." Threat Assessment Brief. Analysis on Effective Policy Responses to Weapons-Related Security Threats. 5 February 2013. 4. <<http://www.armscontrol.org/threats/Irans-Missile-Program-and-Its-Implications-for-US-Missile-Defense>>

⁹⁰ Ibid 5

⁹¹ "Iran sanctions halt long-range ballistic-missile development." The International Institute for Strategic Studies. <<http://www.iiss.org/publications/strategic-comments/past-issues/volume-18-2012/july/iran-sanctions-halt-long-range-ballistic-missile-development/>>

Future Potential External Sources of Missiles and Missile Technology for Iran				
	Current Proliferation Policy ^{92,93}	Recent Provider (Since 1991) ⁹⁴	Similar Polity ⁹⁵	Favorable Economic Relations
Russia	–	+	–	+
United States	–	–	–	–
North Korea	+	+	+	+
China	–	+	+	+
Israel	–	–	–	–

China and North Korea are likely to be major sources of missiles and related materials for Iran. Despite sanctions pressures on these two nations, both seek to maintain lucrative economic ties with Iran related to arms proliferation. China, as North Korea's only major ally and economic supporter, has "failed to enforce rigorously" sanctions on "trade in nuclear and missile technology with North Korea."⁹⁶ Although the chart above gives ascribes a negative sign to the relationship between sources of missiles and missile technology to Iran and the "Current Proliferation Policy," private parties within China have violated the NPT and MCTR.

Though Russia historically provided a huge quantity of arms to Iran, recent sanctions have stifled arms transfers to Iran. According to RIA Novosti, Russia is "losing arms markets in Asia and the Middle East [...] but gaining new ones in Latin American and Africa."⁹⁷

⁹² Non-proliferation Treaty. <<http://www.un.org/en/conf/npt/2005/npttreaty.html>>

⁹³ Missile Technology Control Regime. <<http://www.mtcr.info/english/>>

⁹⁴ "Transfers of major conventional weapons: sorted by recipient. Deals with deliveries or orders made for year range 1980 to 2009." SIPRI Arms Transfer Database.

⁹⁵ Marshall, Monty G. "Authority Trends, 1972-2010: Bangladesh. Polity IV Project: Political Regimes Characteristics and Transitions, 1800-2011. <<http://www.systemicpeace.org/polity/bng2.htm>>

⁹⁶ "China denies it is conduit for North Korea-Iran weapons trade." Reuters. 18 May 2011. <<http://www.reuters.com/article/2011/05/18/us-china-korea-north-idUSTRE74H0VV20110518>>

⁹⁷ "Russia Weapons Sales Shift Away From East—Arms Official." RIA Novosti. 2 February 2013. <http://en.rian.ru/military_news/20130205/179238309.html>

Alexander Fomin, head of Russia's Federal Military-Technical Cooperation Service, said arms trade with the Middle East has been affected by ongoing conflict.⁹⁸

Sino-Iranian Arms Trade Relations

Iran has become China's most significant arms trade partner in the Middle East, though during the Maoist era, the Middle East was of little consequence to China both economically and strategically. There was little China could provide in the way of goods to the Middle East, and vice versa.⁹⁹ However, as China's energy demands increased, Beijing shifted from focusing on domestic issues to becoming a global economic powerhouse. China, the world's fifth largest petroleum producer, depends on foreign sources of oil to satisfy energy demands.¹⁰⁰ China has also helped Iran develop its fiber optics network and an \$800 million subway system in Tehran.¹⁰¹

Historically, China has been one of Iran's major arms providers, whether the sales were made directly or through third parties such as Pakistan and North Korea. The PRC has provided Iran with various types of missiles and missile technology, assisted with Iran's LRBM development, and contributed to nuclear and chemical weapons programs.¹⁰² China has provided assistance building missile production facilities in Iran, particularly for the Nasr-1 anti ship cruise missile. According to Pham, China's involvement in Iran's arms acquisition is "good for business"¹⁰³

However, the PRC supplied only a fractions of the missiles delivered to the Middle East, peaking in the 1980s around 20% of total agreement and total delivery values.¹⁰⁴ China

⁹⁸ Ibid

⁹⁹ Shichor, Yitzhak. "China's Upsurge: Implications for the Middle East." *Israel Affairs*, Vol. 12, No. 4, October 2006. 665-683.

¹⁰⁰ Ibid

¹⁰¹ Pham, J. Peter. "China's 'Surge' in the Middle East and its Implications for U.S. Interests." *American Foreign Policy Interests*. 31: 177-193, 2009.

¹⁰² Pham, J. Peter. "China's 'Surge' in the Middle East and its Implications for U.S. Interests." *American Foreign Policy Interests*. 31: 177-193, 2009.

¹⁰³ Ibid

¹⁰⁴ Shichor, Yitzhak. "China's Upsurge: Implications for the Middle East." *Israel Affairs*, Vol. 12, No. 4, October 2006. 665-683.

sold \$8 billion worth of arms to Iran and Iraq during the 1980s.¹⁰⁵ According to Schicor, the poor quality of the PRC's missiles contributed to China's diminishing role in the arms trade after the 1980s. In 1994 and 1996 Iran purchased a majority of its weapons from China. Over the entire period between 1980 and 2009, China was the largest supplier of missiles to Iran.

According to SIPRI's databases, since 1998, Iran has not bought missiles from China. This could indicate Iran has developed its domestic missile production base to the point that the Islamic republic no longer needs foreign missile imports. However, continuing violations of sanctions related to the importation of missile related materials indicates that Iran has yet to develop an industrial base for producing some components essential for ballistic missile production. Continuing violations of nonproliferation treaties and sanctions, particularly by China, indicates that Iran depends on China for these components.

In March of 2013, the New York Times reported that an Iranian ship carrying Chinese anti-aircraft missiles was seized off the coast of Yemen. The report indicates that among the weapons seized were ten Chinese "heat-seeking anti-aircraft missiles" which were labeled QW-1M.¹⁰⁶ The missiles were produced by China Precision Machinery Import-Export Corporation, a company sanctioned by the U.S. government due to the company's sales of "missile technology to Iran and Pakistan," according to the NTI.¹⁰⁷ The company has also exported missiles with WMD capability.

Role of Sanctions in Sino-Iranian Counterproliferation

Capabilities required for an indigenous missile program include chemicals, materials and metals, electronics. Technologically "weaker" states including Pakistan, North Korea,

¹⁰⁵ Pham, J. Peter. "China's 'Surge' in the Middle East and its Implications for U.S. Interests." *American Foreign Policy Interests*. 31: 177-193, 2009.

¹⁰⁶ Worth, Robert F. and C. J. Chivers. "Seized Chinese Weapons Raise Concerns on Iran." 2 March 2013. The New York Times. <http://www.nytimes.com/2013/03/03/world/middleeast/seized-arms-off-yemen-raise-alarm-over-iran.html?pagewanted=all&_r=0> Accessed 21 April 2013.

¹⁰⁷ "China Precision Machinery Import-Export Corporation (CPMIEC)." The Nuclear Threat Initiative. 16 November 2012. <<http://www.nti.org/facilities/51/>>. Accessed 21 April 2013.

and Iran have advanced missile activity despite the MCTR's restrictions on the arms trade.¹⁰⁸ Though sanctions have limited China's weapons sales to Iran, China finds avenues to skirt sanctions. From May 2012 to February 2013, Iranian oil revenues dropped roughly 45% due to sanctions, according to Iranian officials.¹⁰⁹ As an economic monoculture dependant on oil production, Iran runs the risk of severe economic repercussions if it incites further sanctions.

Rubin puts forth that China has realized the importance with maintaining favorable bilateral relations with Israel, particularly in relation to Israel supplying high-tech equipment to China. To prevent relations with Israel from souring, China must be circumspect in selling arms to other nations in the Middle East. At the same time, China seeks to maintain substantive economic ties with countries having unfavorable relations with Israel.¹¹⁰

Implications of Iran's Missile Program Expansion and Potential for Conflict

Mistry argues two political factors affect missile proliferation: first, "security pressures from their regional system" and second, "political-economic pressures from the global system."¹¹¹ According to Mistry, an increase in regional security curbs the security-related demands for missiles. Likewise, international pressures could be used to decrease proliferation. However, Jervis provides a counterargument. He believes simply increasing the perceived security of states in the Middle East will not necessarily bring about a decrease in arms proliferation; conversely, the principles of the security dilemma suggest an "increase in one state's security decreases the security of others" unless the states cooperate in affairs regarding security, i.e., the increase in security of one state increases the security of another

¹⁰⁸ Mistry, Dinshaw. *Containing Missile Proliferation: Strategic Technology, Security Regimes, and International Cooperation in Arms Control*. University of Washington Press, 2003. 4.

¹⁰⁹ "US expands sanctions on Iran, targeting oil and media." BBC News. 6 February 2013. <
<http://www.bbc.co.uk/news/world-middle-east-21361798>>

¹¹⁰ Rubin, Barry. "China's Middle East Strategy." *Middle East Review of International Affairs*. 3,1. Mar 1999. <
<http://meria.idc.ac.il/JOURNAL/1999/issue1/rubin.pdf>>

¹¹¹ Mistry, Dinshaw. *Containing Missile Proliferation: Strategic Technology, Security Regimes, and International Cooperation in Arms Control*. University of Washington Press, 2003. 5.

state.¹¹² Given the contentious relationships between Iran and other nations in the Middle East, other nations will not likely perceive Iran's goals of a more powerful missile arsenal as increasing regional security.

However, Waltz presents a counterargument. He believes a nuclear-armed Iran would "restore stability to the Middle East." Waltz suggests Iran's pursuit of nuclear weapons could end in three ways. First, Iran could "abandon its pursuit of a nuclear weapon." Second, Iran could develop a nuclear program, but not produce a bomb. Third, Iran could continue to develop a nuclear weapon and publicize it by testing a nuclear weapon.¹¹³ Waltz argues that even if Iran were to acquire a nuclear weapon, the Islamic nation would not use it as a first strike weapon against Israel, citing past precedent of nuclear deterrence as evidence of validity.¹¹⁴ On the other hand, if Iran's acquisition of nuclear weapons might spark an arms race in the Middle East. Sherrill suggests Iran's acquisition of nuclear weapons would urge other nations to pursue nuclear weapons, most notably Saudi Arabia, Turkey, and Egypt.¹¹⁵ Kroenig argues that a nuclear Iran would hinder U.S. influence in the region.¹¹⁶

Rider's research shows that "rival states experiencing threat to territory are more likely to engage in an arms race than rival states experiencing threat to other types of stakes."¹¹⁷ He points out "there are economic costs associated with building arms" and "engaging in military build-up risks the escalation of hostilities."¹¹⁸ Currently, Iran does not face significant regional military competition. Though a degree of hostility exists between Iran and Israel, the two nations are not contiguous, so they do not share border disputes. In

¹¹² Jervis, Robert. "Cooperation Under the Security Dilemma". *World Politics*. Vol. 30, No. 2. (Jan., 1978), 174-186.

¹¹³ Waltz K. Why Iran Should Get the Bomb. *Foreign Affairs* [serial online]. July 2012;91(4):2. Available from: MasterFILE Premier, Ipswich, MA. Accessed February 11, 2013

¹¹⁴ Ibid.

¹¹⁵ Sherrill, Clifton W. "Why Iran Wants the Bomb and What it Means for US Policy." *Nonproliferation Review*, Vol. 19, No. 1, March 2012. <http://dx.doi.org/10.1080/10736700.2012.655084>

¹¹⁶ Kroenig M. Time to Attack Iran. *Foreign Affairs* [serial online]. January 2012;91(1):76-86. Available from: Political Science Complete, Ipswich, MA. Accessed February 11, 2013.

¹¹⁷ Rider, Toby J. "Understand Arms Race Onset: Rivalry, Threat, and Territorial Competition. *The Journal of Politics*. Vol. 71, No. 2. April 2009. 697.

¹¹⁸ Ibid. 695

the 1980s, Tehran perceived Iraq as a threat to its territory, driving border skirmishes between the two nations.

Iran views Saudi Arabia as its main economic competitor in the Middle East. According to the CIA World Factbook, Saudi Arabia holds roughly 17% of the world's oil reserves and constitutes the kingdom's main source of income. Saudi Arabia's estimated 2012 GDP reached \$740.5 billion, with an estimated growth rate of 6%.¹¹⁹ Though Saudi Arabia's estimated GDP in 2012 remains lower than Iran's GDP by roughly \$250 billion, Saudi Arabia's estimated growth rate for 2012 is 7% higher than Iran's growth rate. While Iran faces sanctions, Saudi Arabia enjoys preferential trade agreements with the United States and increasing relations with China. According to Henry Meyer of the New York Times, in December of 2009, China replaced the United States as the main importer of oil from Saudi Arabia.¹²⁰ China's developing relations with Riyadh will likely put a strain on U.S.-Saudi relations. Saudi Arabia depends on foreign sources of missile defense and missile weaponry. According to SIPRI databases, the United States has provided vast quantities of missiles to Saudi Arabia since 1979.¹²¹ However, the Chinese sold DongFeng CSS-2 ballistic missiles to Saudi Arabia, and remain in the kingdom to operate and maintain those weapon systems.¹²² Judging from the example of the Iraq-Iran War, if were to break out between Saudi Arabia and Iran, China could potentially provide both sides with weapons. However, a Saudi-Iranian war would be detrimental to China's aspirations for energy security in the long run, but could provide economic gains from weapons sales in the short run. By having an economic foothold in both Iran and Saudi Arabia, China can challenge the United States' authority in

¹¹⁹ "Saudi Arabia." CIA World Factbook. <<https://www.cia.gov/library/publications/the-world-factbook/geos/sa.html>> Accessed 16 April 2013.

¹²⁰ Meyer, Henry. "China and Saudi Arabia Form Stronger Trade Ties." *The New York Times*. 20 April 2010. <<http://www.nytimes.com/2010/04/21/business/global/21energy.html>>

¹²¹ SIPRI Arms Transfer Database. <http://armstrade.sipri.org/armstrade/page/trade_register.php>

¹²² Tomlinson, Hugh. "Saudi Arabia to acquire nuclear weapons to counter Iran." *The Australian*. 11 February 2012. <<http://www.theaustralian.com.au/news/world/saudi-arabia-to-acquire-nuclear-weapons-to-counter-iran/story-fnb64oi6-1226268171576>>

the region. Whether or not Iran's leaders are willing to run the risks associated with acquiring nuclear weapons merits an analysis of Supreme Leader Ali Khamenei's motivations.

In 2003, Ali Khamenei issued a fatwa "forbidding the production or use of WMD in any form."¹²³ However, fatwas can be "altered in response to changing conditions," according to Eisenstadt and Khalaji.¹²⁴ Before Khomeini's death, the Ayatollah asserted that Iran has the authority to disregard the tenets of Islam when determined to behoove the regime.¹²⁵ Thus, if the regime deems it necessary or in its own interest, Iran will have no issue in violating the Ayatollah's fatwa declaring acquisition or use of WMDs to be a violation of Islam. In Iran's cost-benefit analysis of nuclear weapon acquisition, religion indubitably plays a role; albeit granted the authority for the Supreme Leader to disregard tenets of Islam, he could ostensibly use religious justification for obtaining nuclear weapons or choose to continue to abide by the previous fatwa banning WMDs.

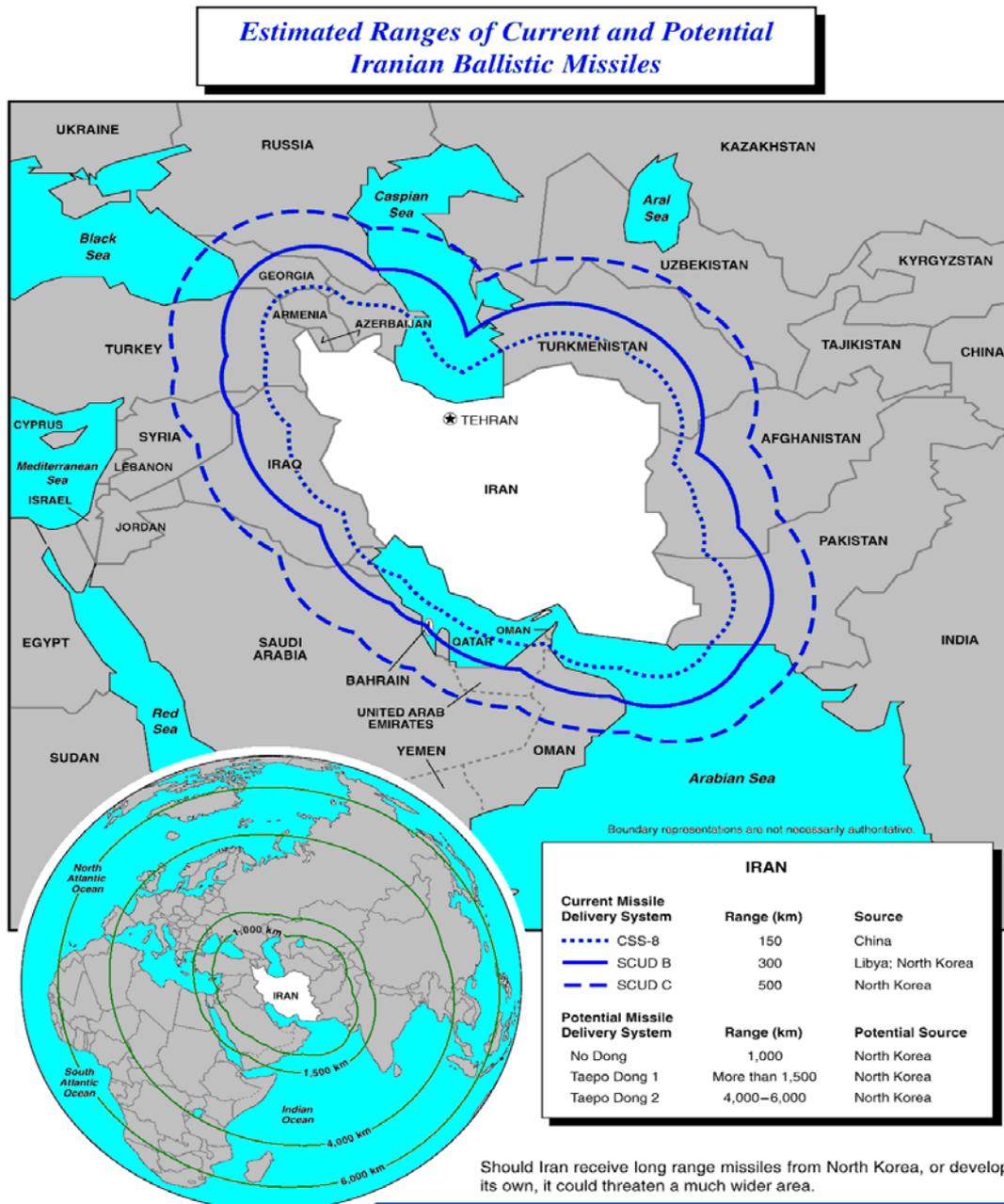
It remains unclear whether or not Iran is developing nuclear technology for peaceful energy purposes, or is also developing nuclear weapon capabilities.

¹²³ Eisenstadt, Michael and Mehdi Khalaji. "Nuclear Fatwa: Religion and Politics in Iran's Proliferation Strategy." Policy Focus #115. *The Washington Institute for Near East Policy*. September 2011. ix.

¹²⁴ Ibid ix.

¹²⁵ Ibid ix.

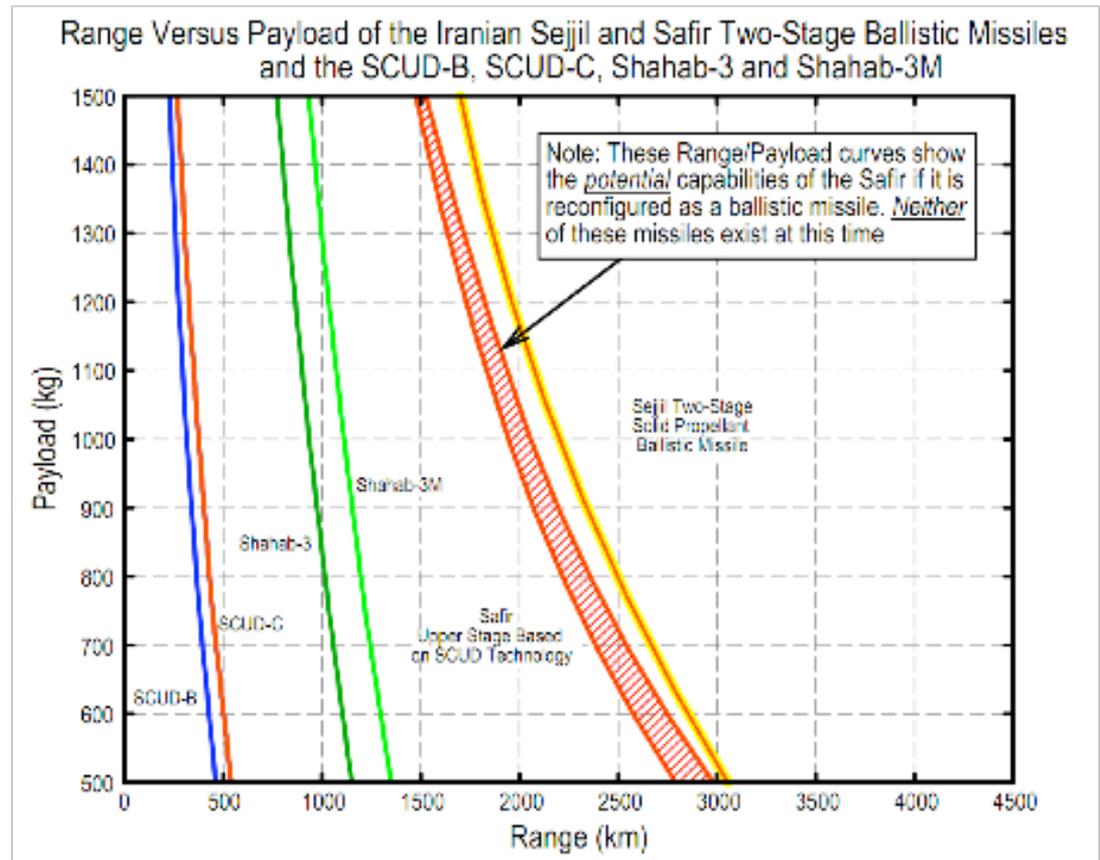
Appendix 1: Iran Ballistic Missile Capabilities Map



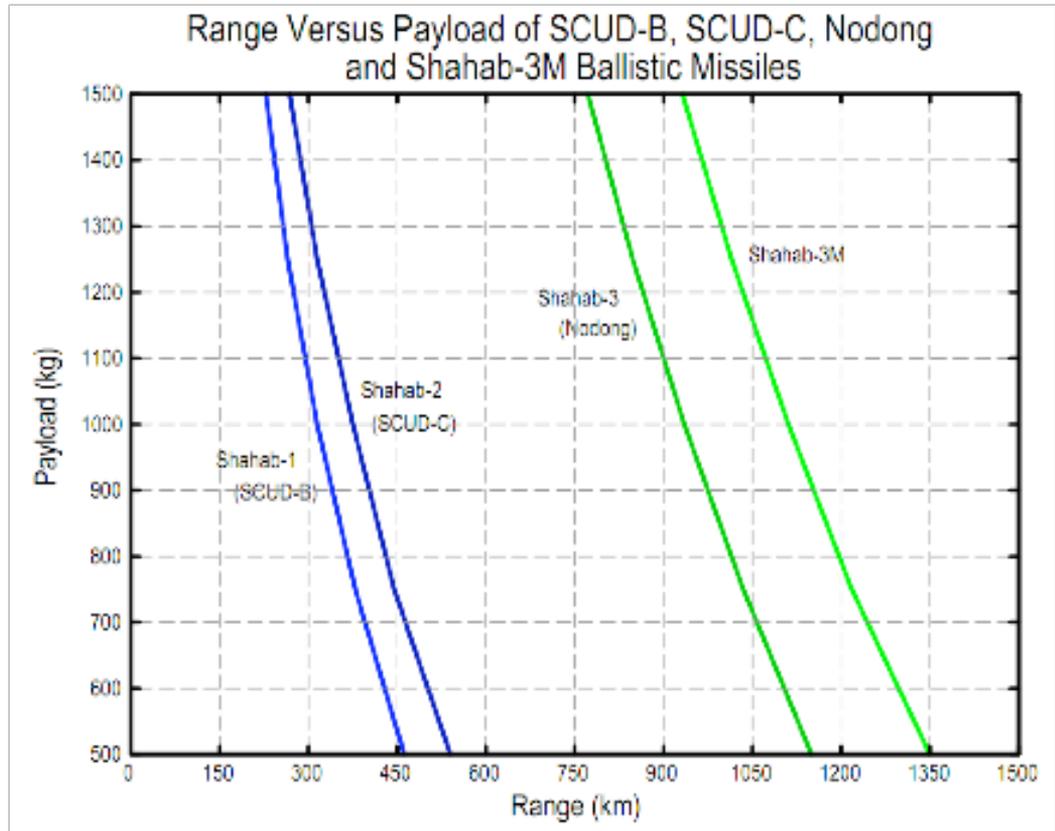
Source: GlobalSecurity.org
<http://www.globalsecurity.org/wmd/world/iran/missile-ranges.htm>

<<http://www.globalsecurity.org/wmd/world/iran/missile-ranges.htm>>

Appendix 2: Iran's SRBM Range-Payload Relationship

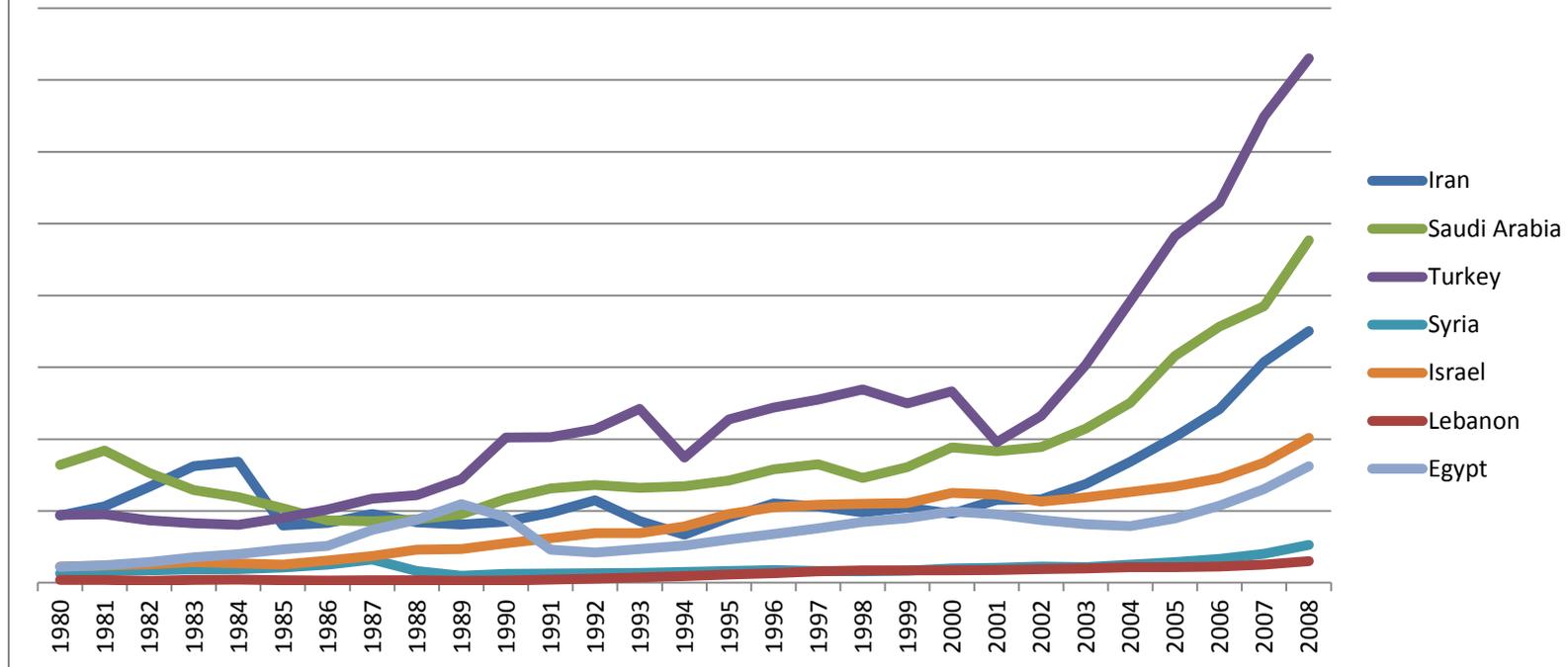


Source: Theodore Postol, *A Technical Assessment of Iran's Ballistic Missile Program*, from "Technical Addendum to the Joint Threat Assessment on the Iran's Nuclear and Missile Potential." (JTA) May 6, 2009.



Source: Theodore Postol, *A Technical Assessment of Iran's Ballistic Missile Program*, from "Technical Addendum to the Joint Threat Assessment on the Iran's Nuclear and Missile Potential." (JTA) May 6, 2009.

Appendix 3: GDP of Countries in the Middle East (in Billions of 2013 USD)



Appendix 4: Iran's Estimated Missile Capabilities			
Specification	Range	Base Model/Source	Payload
Shahab-1	300kms/185miles	Scud-B (USSR, DPRK)	770-1000kg
Shahab-2	500kms/310mils	Scud-C	700kg
Shahab-3	900-1300kms/560mils	Nodong (North Korean)	1000kg
Ghadr-1	1600-2000kms/1000mils	Mod. Shahab-3	750-1000kg
Sajjil Family	2000-2500kms/1375mils	Domestic	2000kg
Sajjil-2	3700kms/2200mils	Modified Sajjil	
Safir ¹²⁶	3000kg (Potential)	Composite of Shahab, SCUD, SS-N-6	500-1500kg
Simorgh	500km orbit, 6000-9000km	DPRK's Unha-2 ^{127/128}	100kg?
BM-25 (?)	2400-3000kms	Soviet SS-N-6	?
Mushak-120 ¹²⁹	130km	Domestic	600kg
Mushak-160	160km	Domestic	500kg
CS88/Tondar 69	150km	Chinese	190kg
HY-2 ¹³⁰	95+km	China ("Silkworm")	500kg
Fateh-110		Domestic	300kg
Qiam-1 ¹³¹	500-1000km	Indigenous	
C-801/Tondar ¹³²	42km	China/Indigenous	165kg

¹²⁶ Postol, Theodore. "A Technical Assessment of Iran's Ballistic Missile Program." 6 May 2009. 8-16.

<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&ved=0CFgQFjAH&url=http%3A%2F%2Fdocs.ewi.info%2FJTA_TA_Program.pdf&ei=kKoSUbYfOYju9ATsmIHw&usg=AFQjCNFSpeDXME8633ZebprdqGBUAzLVYA&sig2=9htz3hiiLm4PEDAzjgdi6g&bvm=bv.42080656,d.eWU>

¹²⁷ Wright, David. "An Analysis of North Korea's Unha-2 Launch Vehicle". Union of Concerned Scientists. Citizens and Scientists for Environmental Solutions. 20 March 2009.

<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=11&ved=0CGUQFjAK&url=http%3A%2F%2Fwww.ucsusa.org%2Fassets%2Fdocuments%2Fnwgs%2FWright-Analysis-of-NK-launcher-3-18-09.pdf&ei=TqISUZLQO5DU8wT8moGoDg&usg=AFQjCNGMXryII05DJ_fcCSosR0ryIs6Tcg&sig2=TV-URb0M_5u5xHnRzQ6vfw&bvm=bv.42080656,d.eWU>

¹²⁸ Crail, Peter. "Iran Launches Second Satellite." Arms Control Today. July/August 2011. <http://www.armscontrol.org/act/2011_08/20Iran_Launches_Second_Satellite_Safir_Rasad>

¹²⁹ "Fateh-110/NP-110/Mushak." Globalsecurity.org.

<<http://www.globalsecurity.org/wmd/world/iran/mushak.htm>>

¹³⁰ Friedman, Normal. *The Naval Institute Guide to World Naval Weapons Systems, 1997-1998*. 1997.

¹³¹ Hildreth, Steven A. "Iran's Ballistic Missile and Space Launch Programs." Congressional Research Service. 6 December 2012. 18.

¹³² "C-801 JY-1/JY-8 (Eagle Strike) SCC-N-4 SARDINE. FAS Military Analysis Network. 10 August 1999. <<http://www.fas.org/man/dod-101/sys/missile/row/c-801.htm>>

C-802 ¹³³	120km	China	165kg
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¹³³ "C-802 / YJ-2 / Ying Ji-802/CSS-C-8 / SACCADE/C-8xx / YJ-22." FAS Military Analysis Network. 17 February 2000. <<http://www.fas.org/man/dod-101/sys/missile/row/c-802.htm>>