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Sanctions, Military Strikes, and Other Potential Actions Against Iran

By CHARLES P. BLAIR and MARK JANSSON

Initial Findings from an Expert Elicitation on Potential Global Economic Impacts

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Acknowledgments

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The authors offer special gratitude to Gary A. Ackerman for his indispensable assistance and insights during the elicitation preparation, facilitation, and data analysis. The authors also offer special gratitude to Mila A. Johns for her invaluable assistance during the elicitation.
Finally, FAS would like to acknowledge and thank the Ploughshares Fund for supporting this effort and without whom this report would not have been possible.

All opinions expressed in this report, as well as its findings, are those of the authors alone and do not necessarily reflect the views of the Federation of American Scientists or any of the participants in the elicitation that served as the centerpiece of this study. Questions about the report should be directed to Mark Jansson at mjansson@fas.org.

About the Federation of American Scientists

The Federation of American Scientists, an independent, nonpartisan think tank and registered 501(c)(3) non-profit membership organization, is dedicated to providing rigorous, objective, evidence-based analysis and policy recommendations on national and international security issues related to applied science and technology. Founded in 1945 by many of the scientists who built the first atomic bombs, FAS is devoted to the belief that scientists, engineers, and other technically trained people have the ethical obligation to ensure that the technological fruits of their intellect and labor are applied to the benefit of humankind. FAS is committed to educating policymakers, the public, the news media, and the next generation of scientists, engineers, and global leaders about the urgent need for creating a more secure and better world.

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Executive Summary

A great deal of effort has been devoted to analyzing Iran's nuclear program and identifying possible actions the United States might take to thwart what many believe is a project designed to build nuclear weapons. In October 2012, amid concerns that surprisingly little research addressed the potential *broad* outcomes of possible U.S.-led actions against Iran, researchers at the Federation of American Scientists (FAS) assembled nine renowned subject matter experts (SMEs) to investigate one underexplored question that looms large: What are the potential effects on the global economy of U.S. actions against Iran? Collectively representing expertise in national security, economics, energy markets, and finance, the SMEs gathered for a one-day elicitation workshop to consider the global economic impacts of six hypothetical scenarios involving U.S.-led actions.

The report does not contain specific policy advice. Rather, it provides a starting point for discussion and further analyses relating to one category of potential outcomes – the global economic impact – associated with the policy choices before U.S. decision makers today. It is important to note that the dollar figures assigned to the potential outcomes of the six scenarios are not attributed to any of the individual subject matter experts.

Expert elicitation is a formal process of collecting and synthesizing opinions from those who are uniquely qualified to provide insight about how to approach complex problems. It is particularly useful for parameterization and quantifying uncertainty surrounding rare or unpredictable occurrences. In the case of the United States and Iran, the suitability of an elicitation was obvious due to the methodology's ability to explore issues characterized by high levels of uncertainty and change. Additionally, given the historically unique challenge at hand, an elicitation's usefulness comes from its ability to discern and define salient factors in the absence of empirical data provided by past experience. Collectively, the nine subject matter experts comprised a bipartisan and interdisciplinary group uniquely qualified to explore and assess the overarching question guiding the elicitation.

Despite the challenges facing a study of such broad scope and the preliminary nature of findings based on subjective judgments, the research team believes that the approach taken accounts for a variety of constraints and that the findings represent useful starting points for further study and dialogue. The intent in releasing the report's initial findings is to broaden the scope of analysis beyond issues immediately affecting Iran and its nuclear infrastructure, or a narrow economic focus on oil prices.

The elicitation revealed the rough effects of U.S. action against Iran on the global economy– measured only in the first three months of actualization – to range from a net global economic benefit of approximately $60 billion on one end of the scale and total losses of $1.7 trillion to the world economy on the other end.

The elicitation's six hypothetical scenarios involve U.S.-led actions taken with regard to Iran, along with the elicitation-derived average mid-point of cost for each to the global economy follow. Note that Scenario 6 is a de-escalatory stratagem and its three-month effects on the global economy are a net benefit as opposed to a cost. Note also that these costs represent estimates of net impacts on the global economy and average out the gains and losses to individual national economies. Extreme caution should thus be exercised in attempting to extrapolate these findings to particular countries or sectors.

1. Increasing Pressure: The United States opts to impose a new round of sanctions that penalize any foreign banks – public and private – that conduct transactions with *any* business with the Central Bank of Iran.
    - *Average estimated global economic costs: Approximately US$64 billion.*

2. Isolation and Persian Gulf Blockade: Among other actions, the United States moves to curtail any exports of refined oil products, natural gas, energy equipment, and services from Iran. Investments in Iran's energy sector are banned worldwide.
    - *Average estimated global economic costs: Approximately US$325 billion.*

3. Surgical Strikes: The U.S. leads a limited air and Special Forces campaign of "surgical strikes" on nuclear facilities and military installations that are of acute concern.
    - *Average estimated global economic costs: Approximately US$713 billion.*

4. Comprehensive Bombing Campaign: The United States leads an ambitious air campaign that targets not only the nuclear facilities of concern but also seeks to limit Iran's ability to retaliate by targeting its other military assets.
    - *Average estimated global economic costs: Approximately US$1.2 trillion.*

5. Full-Scale Invasion: The United States resolves to invade, occupy, and disarm Iran.
    - *Average estimated global economic costs: Approximately US$1.7 trillion.*

6. De-Escalation: The president experiments with a new approach to resolving the standoff with Iran by unilaterally taking steps to show that the United States is willing to make concessions.
    - *Average estimated global economic benefit: Approximately US$60 billion.*

The following report details the elicitation process and the research team's finding. Mindful that a multitude of difficult questions surround the issue of Iran's nuclear program, the report simply seeks to provide a starting point for discussion about one category of potential outcomes – the global economic impact – associated with the policy choices before U.S. decision makers today.

About the Report

A great deal of effort has been devoted to analyzing Iran's nuclear program and identifying possible actions the United States might take to thwart what many believe is a program designed to build nuclear weapons. The ongoing crisis with Iran has developed a consistent narrative wherein there is a great deal of discussion about what constitutes a "red line" with respect to its nuclear program, but less discussion about the outcomes and consequences of any international actions that might be set in motion if and when Iran crosses that line. In particular, surprisingly little attention has been paid to the outcomes of U.S.-led action taken against Iran beyond those immediately impacting Iran and its nuclear infrastructure. Outcome assessments that are wider in geographic and temporal scope are needed to further inform discourse on how the United States should respond to the Iranian nuclear challenge. Of the many questions remaining largely unexplored about the potential outcomes of certain U.S.-led actions, one looms especially large: What will the effects be on the global economy?

Prior research in this area has focused primarily on the impact of a U.S.-Iran conflict on oil prices: basically, the fear that a conflict-related disruption to oil supply coming out of Iran or through the Strait of Hormuz could cause an "oil price shock" of considerable magnitude. Yet it remains difficult to attach the likelihood and scale of such a shock to various potential U.S. courses of action. There could also be other economic impacts of U.S.-led actions *vis á vis* Iran that go beyond the effect of oil supply disruption. Significant changes to U.S.-Iran engagement could demand new capital expenditures and produce effects on other important economic forces such as private investment strategy and state monetary policy. Anticipating those effects by considering their likelihood and their scale is an important factor – though far from the only one – in evaluating the policy options available to the United States to blunt perceived Iranian nuclear ambitions.

In an effort to add this important issue to the policy debate, the authors launched a project to explore a range of possible U.S. actions *vis á vis* Iran and their foreseeable impacts on the global economy. The project was guided by three key questions:

- What *potential* outcomes might follow certain U.S.-led actions?
- How likely are these outcomes to occur *assuming* those hypothetical actions are taken?
- What are the *possible* impacts of these outcomes on the global economy in terms of U.S. dollar costs?

The narrow focus on potential outcomes and costs of U.S.-led actions is intended to help fill a specific gap in research, not to limit the scope of discussion about U.S. policy. While this report focuses on the economic implications of action, the research team also recognizes that there are significant potential costs to *inaction*, especially if inaction results in Iranian development of a nuclear weapon. A recent report suggests that the long-term costs of such an outcome could be quite high (based on Iran's capability to sow regional instability and the chances of a future nuclear exchange between Iran and Israel or Saudi Arabia).[1]

Policy makers in the United States wrestle continuously with difficult questions and trade-offs about how to address the Iranian nuclear issue. To that end, this report does not contain specific policy advice. Rather, it provides a starting point for discussion about one category of potential outcomes – the global economic impact – associated with the policy choices before U.S. decision makers today.

Predictions of likely consequences and costs usually rely on comparisons between current and past events. However, historical analogs and extrapolations from current trends, although useful, are inadequate as the sole sources of information for predicting what will happen if tension between the United States and Iran escalates and the proverbial "red line" is crossed. For this reason, researchers at the Federation of American Scientists (FAS) determined that a subject matter expert (SME) elicitation would be an appropriate approach for exploring and quantifying the potential global economic reverberations of potential actions taken by the United States in response to Iran's nuclear challenge.

This report contains the initial findings from the SME elicitation. As with any report that seeks to predict future events in dynamic systems, all findings are tentative and should be approached with a good deal of caution. The purpose of the study was to provide a preliminary assessment of potential economic impacts, not to establish definitive or specific price tags for what each action would cost. With these goals in mind, the research team turned to experts to provide their best judgments as to future occurrences and their costs.

[1] See Robb, Charles S., and Wald, Charles. 2012. *The Price of Inaction: An Analysis of Energy and Economic Effects of a Nuclear Iran.* Washington DC: Bipartisan Policy Center.

The Elicitation Methodology

Previous research designed to anticipate outcomes from unprecedented events affecting international security has revealed that "in circumstances characterized by high levels of uncertainty and change, where there is an absence of sufficient empirical data, one well-recognized technique for validating and supplementing a theoretical framework is to leverage the pooled knowledge and creativity of a number of experts."[2] Expert elicitation is a formal process of collecting and synthesizing judgments from those whose collective expertise qualifies them to provide insight about how to approach complex problems. It is particularly useful for parameterization and understanding the uncertainty surrounding rare or unpredictable occurrences.[3] Applying this methodology, the project team assembled a diverse group of nine renowned experts in national security, economics, energy markets, and finance to consider the global economic impacts of six hypothetical scenarios involving U.S.-led actions taken with regard to Iran. Participants were selected based on their unique expertise in one or more of the aforementioned subject areas. Collectively, they comprised a bipartisan and interdisciplinary group.

The elicitation consisted of several components to identify potential cost-bearing factors, including: cognitive exercises intended to reduce subconscious biasing effects while priming participants to consider the widest range of possibilities attainable; brain-storming exercises designed to identify as many possible outcomes to U.S.-led actions as possible; and scenario-building exercises to elucidate how leaders in the United States and Iran might respond to actions undertaken by the other. The primary goal of this last exercise was the reduction of cognitive barriers, allowing the SMEs to identify costs not previously identified during the brainstorming portion of the elicitation. In fact, of the 64 potential variables identified by the elicitation's SMEs, eleven were identified in this final exercise.

The project team presented the SME participants with six scenarios depicting a wide range of possible U.S.-led actions – from conciliatory gestures intended to de-escalate a potential crisis to full-scale military invasion to completely disarm Iran. (See below for details of each scenario.) These scenarios included only the initial U.S.-led action and deliberately excluded any presumptive

[2] Charles P. Blair and Gary A. Ackerman, "Terrorist Nuclear Command and Control," report prepared for the Department of Homeland Security, grant number HSHQDC-10-D-00023 (College Park, MD: National Consortium for the Study of Terrorism and Responses to Terrorism, 2012), pp. 111-113.

[3] Expert elicitations can be used to guide planning for complex projects and to aid risk assessments. The methodology can also be applied to study potential events that are infrequent but highly consequential.

descriptions of how Iran or other countries would respond. In other words, the scenarios were used to define reality strictly regarding initial U.S.-led action while leaving it up to the participants to assess for themselves how Iran and other entities might respond. Accordingly, participants were asked to suspend judgment about the likelihood of each scenario the potential outcomes *assuming* that each scenario unfolded. As noted, the drafted scenarios spanned a broad range of potential courses of action but all remained within the realm of plausibility given the latitude that the United States' military capability and global standing affords it.

Additionally, for each scenario, participants were asked to limit their consideration of potential outcomes and their associated monetary costs to a three-month time window – the equivalent of one economic quarter – following the initial U.S.-led action described. The research team judged that many additional variables would likely factor-in after this brief period of time and thereby significantly increases uncertainty about the economic impacts associated with each scenario. (However, it should be noted that several participants expressed the view that limiting the analysis to the first three months actually increased the difficulty – especially in quantifying effect – due to the lag time associated with many potential costs.)

The substantial set of potential outcomes identified by participants as variables that *could* affect the global economy in each scenario represent perhaps the most useful data generated by the study. Elicitation SMEs identified over sixty of these potential variables during group the elicitation. The sheer number of variables relevant to determining the overall economic impact – to say nothing of their intrinsic unpredictability and the complexity of their interaction – underscores that developing concrete answers about economic impacts will require more research and analysis. Uncertainty about the likelihood of occurrence and scale of impact surrounded virtually every potential outcome identified during the elicitation.

In an attempt to account at least partially for this uncertainty, the researchers incorporated participants' confidence judgments about the likelihood of potential outcomes into the analysis of possible monetary costs. The data used in this analysis were supplied by elicitation participants for each scenario in the following forms:

- a list of potential outcomes associated with each scenario that would be determinative of the overall economic impact;

- a 90% confidence interval of the costs (or benefits in some cases) to the global economy in current U.S. dollar terms, *assuming for the moment* that the envisioned outcomes occurred and all anticipated costs/benefits materialized;
- a final and critical assessment of the *likelihood* (as a percent) of the occurrence actually taking place in the given scenario.

Monetary amounts were thus subject to limiting factors pertaining to both the confidence in the cost estimation for each cost factor and the likelihood of each cost factor occurring. The recorded data was subsequently aggregated and subjected to statistical analysis to establish ranges and certainty levels of possible economic impact expressed in dollars. (See Appendix 1 depicting the data analysis process.)

For ease of presentation, the outcomes and associated costs were then grouped into several broad categories that the research team believed were representative of the main areas of global economic impact discussed by the elicitation participants. These categories include: (1) financial market losses, (2) oil price increases, (3) military costs and other expenditures to provide security, (4) damage to infrastructure resulting from conflict, and (5) other global economic costs. Thus, the graphs below show costs grouped into these five categories for each scenario.

It is the hope of the research team that additional research into specific global economic impacts of U.S. policy choices – including determinants of their likelihood of occurrence and cost – will yield new and important insights. For now, the data provided below by the experts participating in the FAS elicitation can be regarded as a useful starting point of reference for future research and policy analysis.

Study Limitations

To ensure proper interpretation of the data and results contained in this report, it is critical to underscore its limitations by highlighting three important caveats. The first is that, while all efforts were made to control for individual bias and to leverage the collective wisdom of the group of experts, elicitation, even at its best, remains a heuristic – and inherently subjective – approach to establishing guiding points of reference, not a scientifically replicable approach to producing definitive answers or predictions. This report represents a synthesis of expert estimations regarding the likelihood of potential occurrences and a range of probable associated costs; it does not purport to establish conclusive answers or to put a definitive "price tag" on U.S.-led actions.

The second caveat is that any forward-looking assessment of interaction between the United States and Iran must acknowledge the effects of compounded uncertainty. There is no way of predicting what specific actions the United States might pursue or the nature of subsequent Iranian reactions. The uncertainty surrounding this issue is compounded by the fact that, any initial action taken against Iran is likely to set into motion a sequence of events affecting numerous international actors whose responses are difficult to predict with certainty. Therefore, even if U.S. actions and Iranian responses somehow become foreseeable, identifying and understanding the numerous ripple effects that would add to the global economic impact would remain an exceedingly difficult task. Finally, even if all of the foregoing were tractable, quantifying the economic impacts in dollar terms would still present a daunting challenge to even the most knowledgeable and proficient economists.

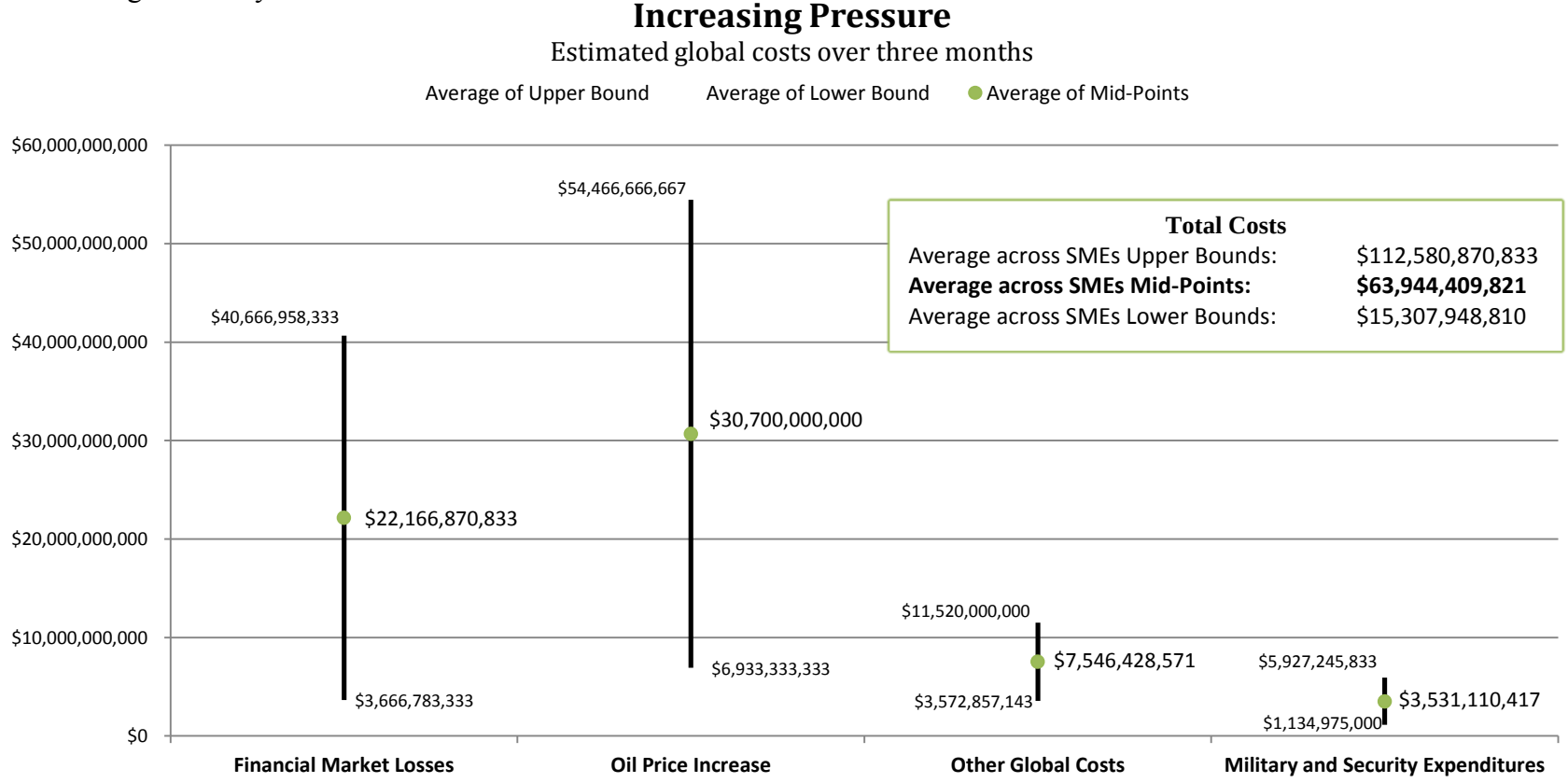
A third caveat is that the dollar figures assigned to potential outcomes, as well as the outcomes themselves, cannot be attributed to any of the individual subject matter experts participating in the elicitation. Results derived from the elicitation are aggregate findings based on the data collected and processed from the entire group, and thus mask differences in individual opinions about the plausibility of the given scenarios, the likelihood that certain outcomes would be precipitated by the U.S. action described in those scenarios, and the costs associated with those actions.

Finally, the data presented below represent only *initial* findings. The FAS research is still in the process of data validation and analysis to ensure accuracy and to increase precision by confirming costs ranges for the specific outcomes. These cost-bearing outcomes are listed as variables in Appendix 2.

Scenarios and Cost Estimates

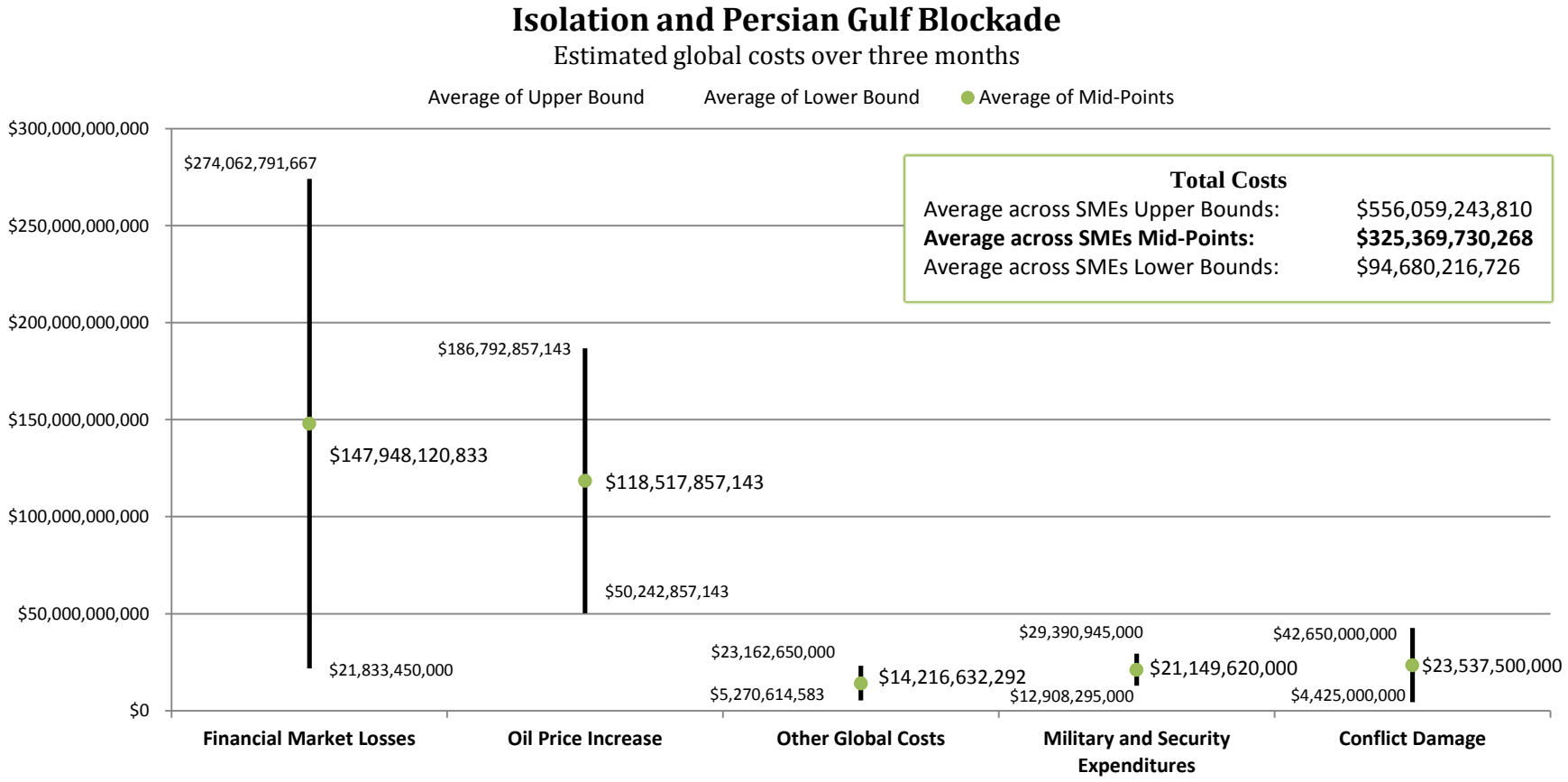
Scenario One: Increasing Pressure

The United States opts to increase the pressure on Iran by imposing a new round of sanctions that penalize any foreign banks – public and private – that conduct transactions with *any* Iranian bank that does business with the Central Bank of Iran. (Currently, only large transactions related to the sale of oil are banned.) The sanctions would continue the ban on insurance and reinsurance services on oil imports, and seek to cleave Iran's entire energy sector from the world economy. However, the State Department will continue to grant waivers for limited imports of Iranian crude on the condition that those receiving waivers continue to reduce their oil purchases. The new round of sanctions would include other measures such as limiting international lending that would accelerate the depletion of Iran's foreign currency reserves.



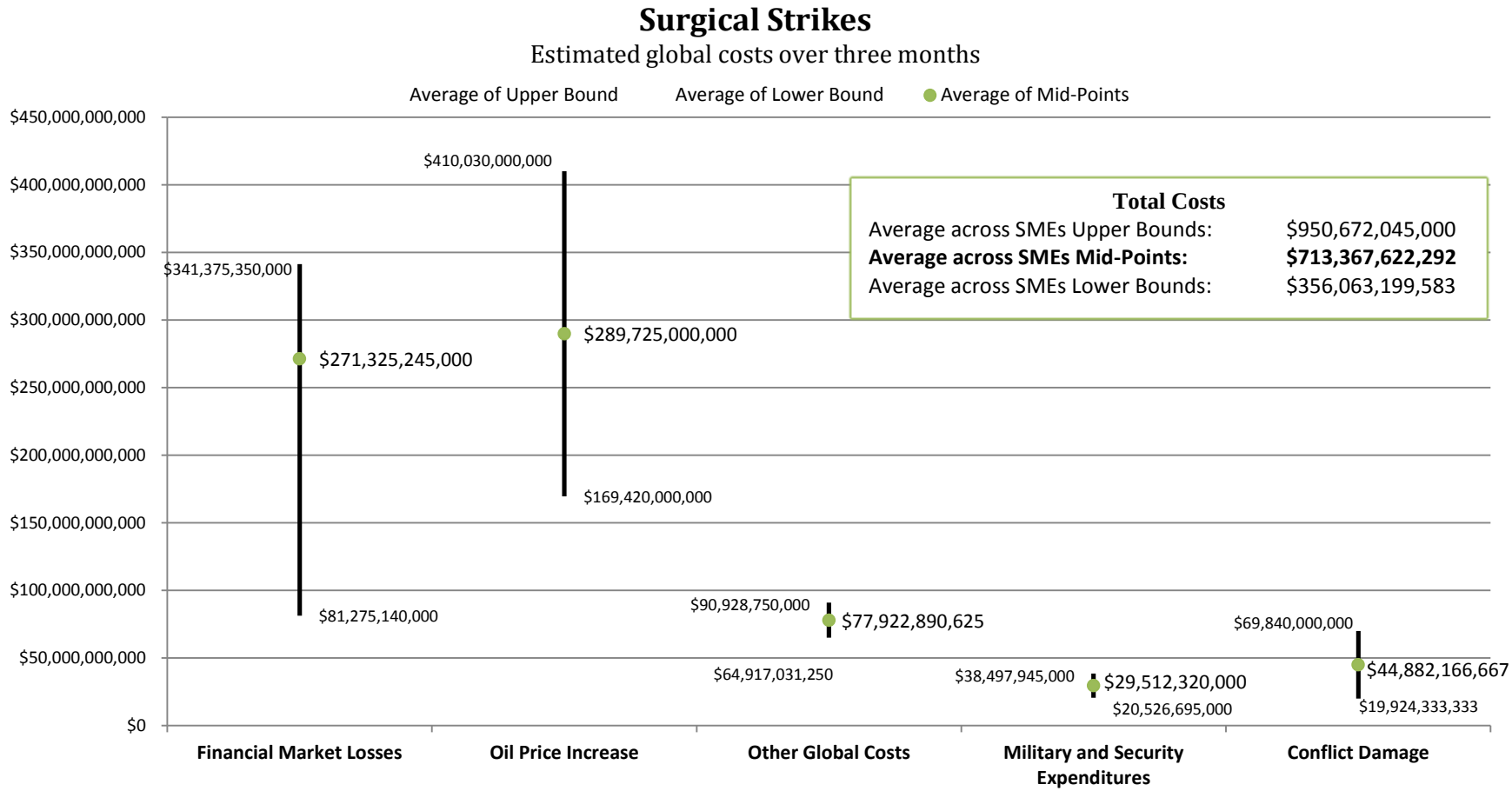
Scenario Two: Isolation and Persian Gulf Blockade

Iran's economy is reeling yet diplomatic agreement remains elusive. The United States, concerned that the Iranian regime has gone into survival mode, enacts what can be referred to as a "total cutoff" policy. The United States moves to curtail any exports of refined oil products, natural gas, energy equipment, and services. Investments in Iran's energy sector are banned worldwide. Official trade credit guarantees are banned, as is international lending to Iran and investment in Iranian bonds. Insurance and reinsurance for all shipping going to and from Iran is prohibited. Substantial U.S. military assets are deployed to the Persian Gulf to block unauthorized shipments to and from Iran as well as to protect shipments of oil and other products through the Strait of Hormuz.



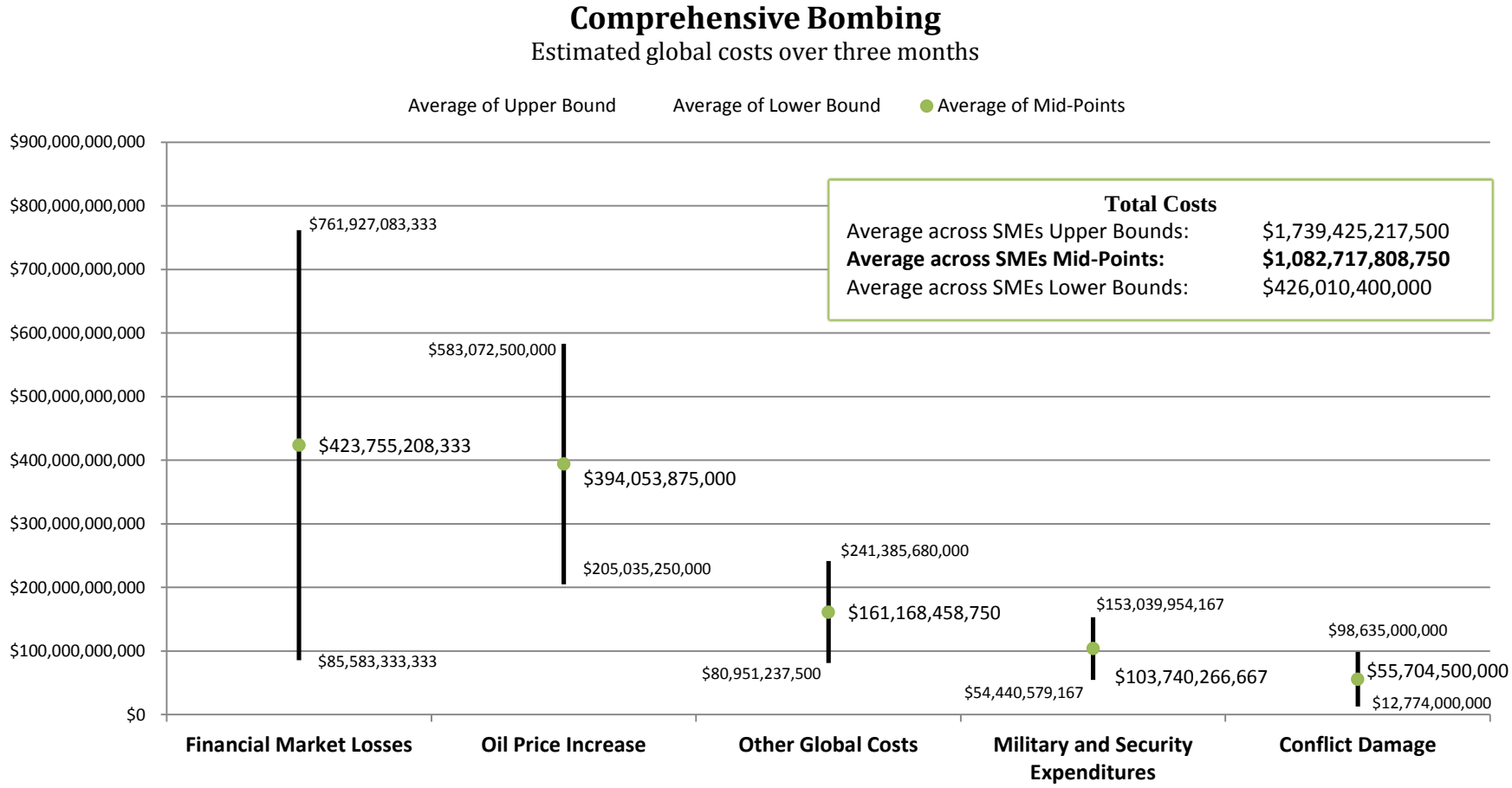
Scenario Three: Surgical Strikes

The U.S. leads a limited air and Special Forces campaign of "surgical strikes" on nuclear facilities and military installations that are of acute concern. These include the facilities discussed in the most recent IAEA report and, presumably, up to three other locations of potential concern that are discussed in classified documents but not identified in the public domain. In order to avoid rapid escalation and a broader conflict, the United States relies on stealth, speed, and accuracy in its mission and deliberately does *not* target Iranian military assets that could counter the strikes. In so doing, it runs some risk of losing its own planes and commandos in the hopes that Iranian leadership will "take its medicine" and not retaliate in any meaningful way.



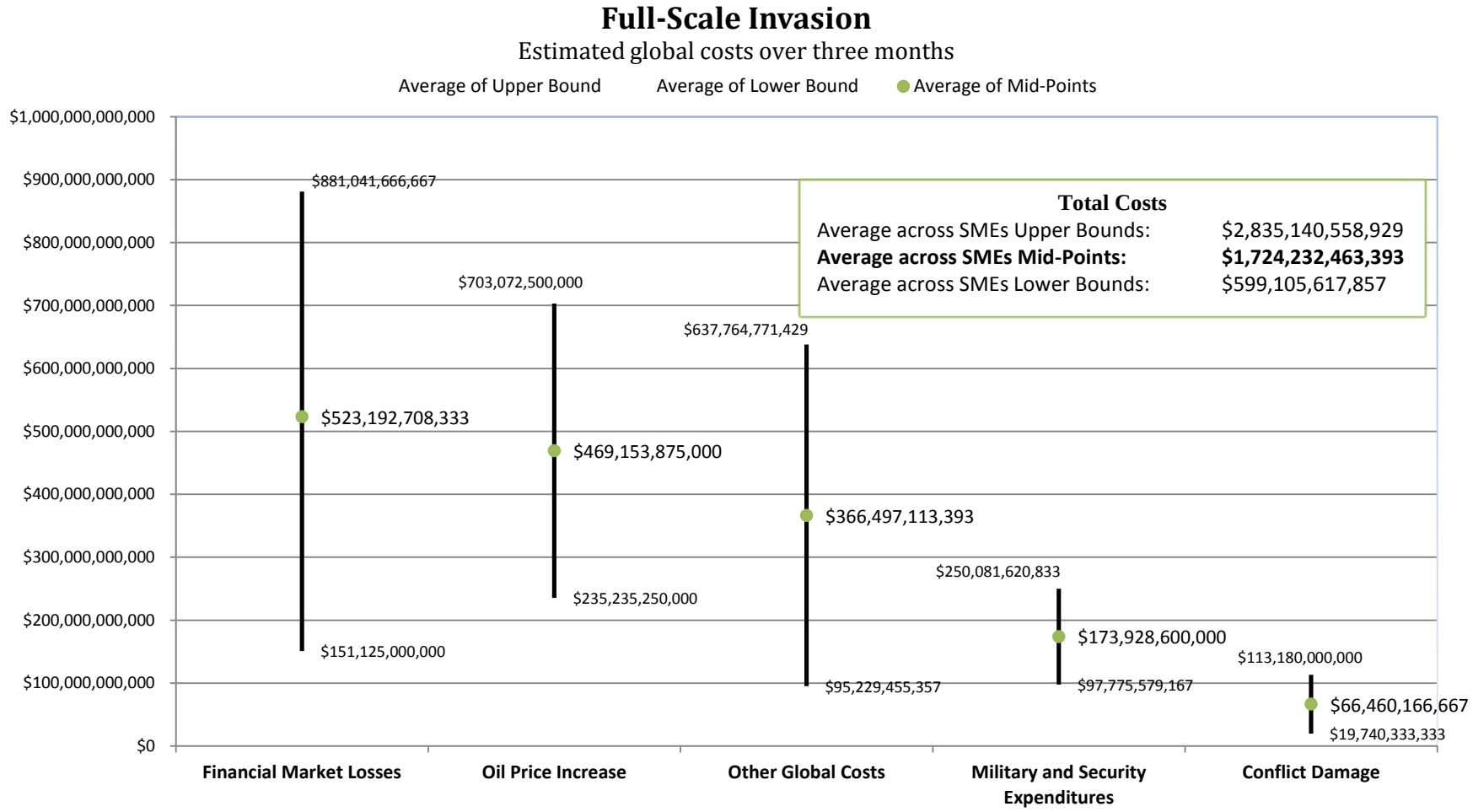
Scenario Four: Comprehensive Bombing Campaign

The president, not wanting to leave the job half-done and fearing that a more limited strike may not achieve all of its objectives or at too high a price should Iran retaliate, opts for a more thorough mission. The United States leads an ambitious air campaign that targets not only the nuclear facilities of concern but also seeks to limit Iran's ability to retaliate by targeting its other military assets, including its air defenses, radar and aerial command and control facilities, and much of Iran's direct retaliatory capabilities. These would include its main military bases, the main facilities of the Iranian Revolutionary Guard Corps (IRGC), and the Iranian Navy, Army, and Air Force. The United States seeks to ensure that the Strait of Hormuz remains open by targeting Iranian capabilities that may threaten it.



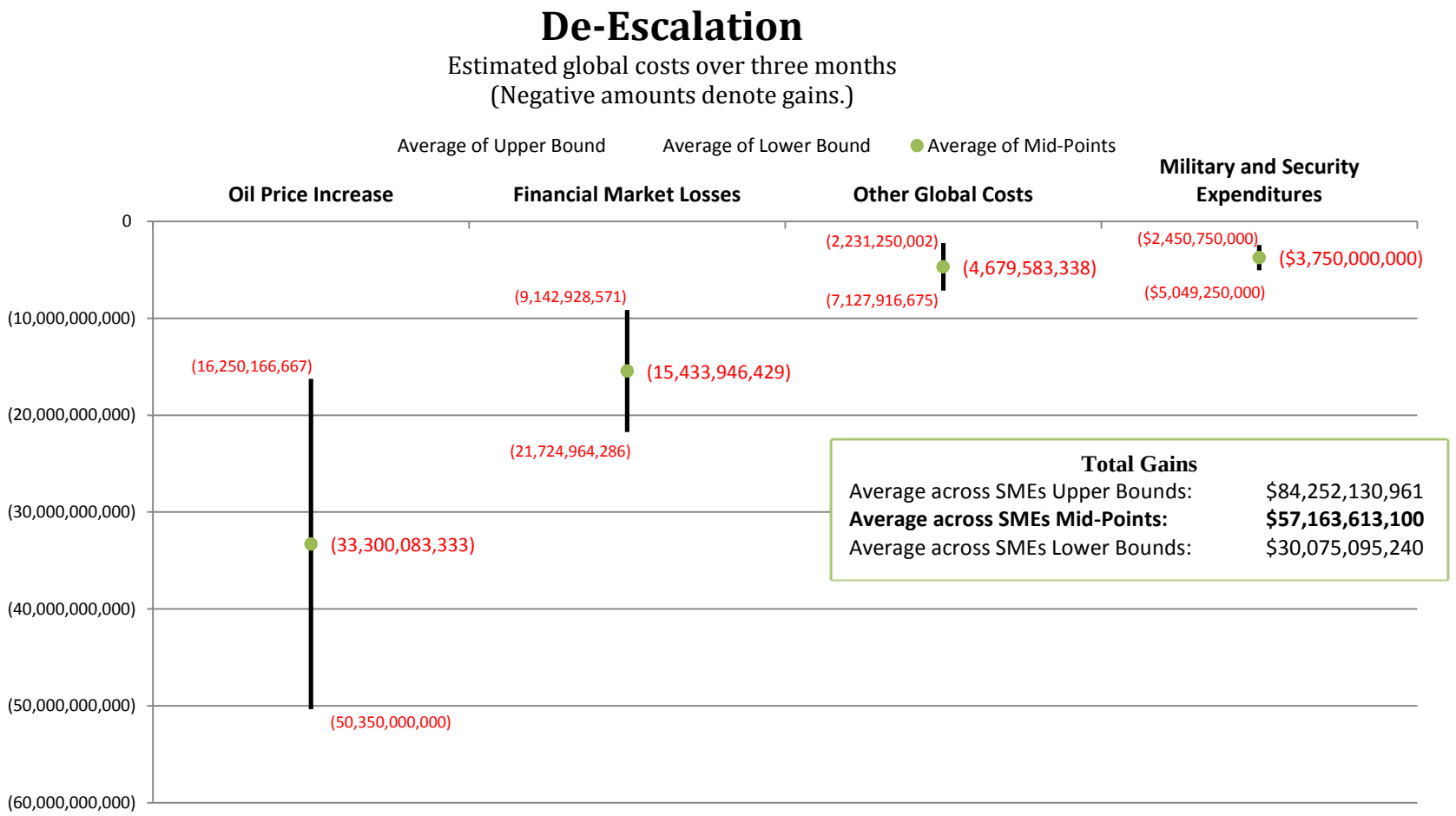
Scenario Five: Full-Scale Invasion

The United States resolves to invade, occupy, and disarm Iran. It carries out all of the above missions and goes "all in" to impose a more permanent solution by disarming the regime. Although the purpose of the mission is not explicitly regime change, the United States determines that the threat posed by Iran to Israel, neighboring states, and to freedom of shipping in the Strait of Hormuz cannot be tolerated any longer. It imposes a naval blockade and a no-fly zone as it systematically takes down Iran's military bases and destroys its installations one by one. Large numbers of ground troops will be committed to the mission to get the job done.

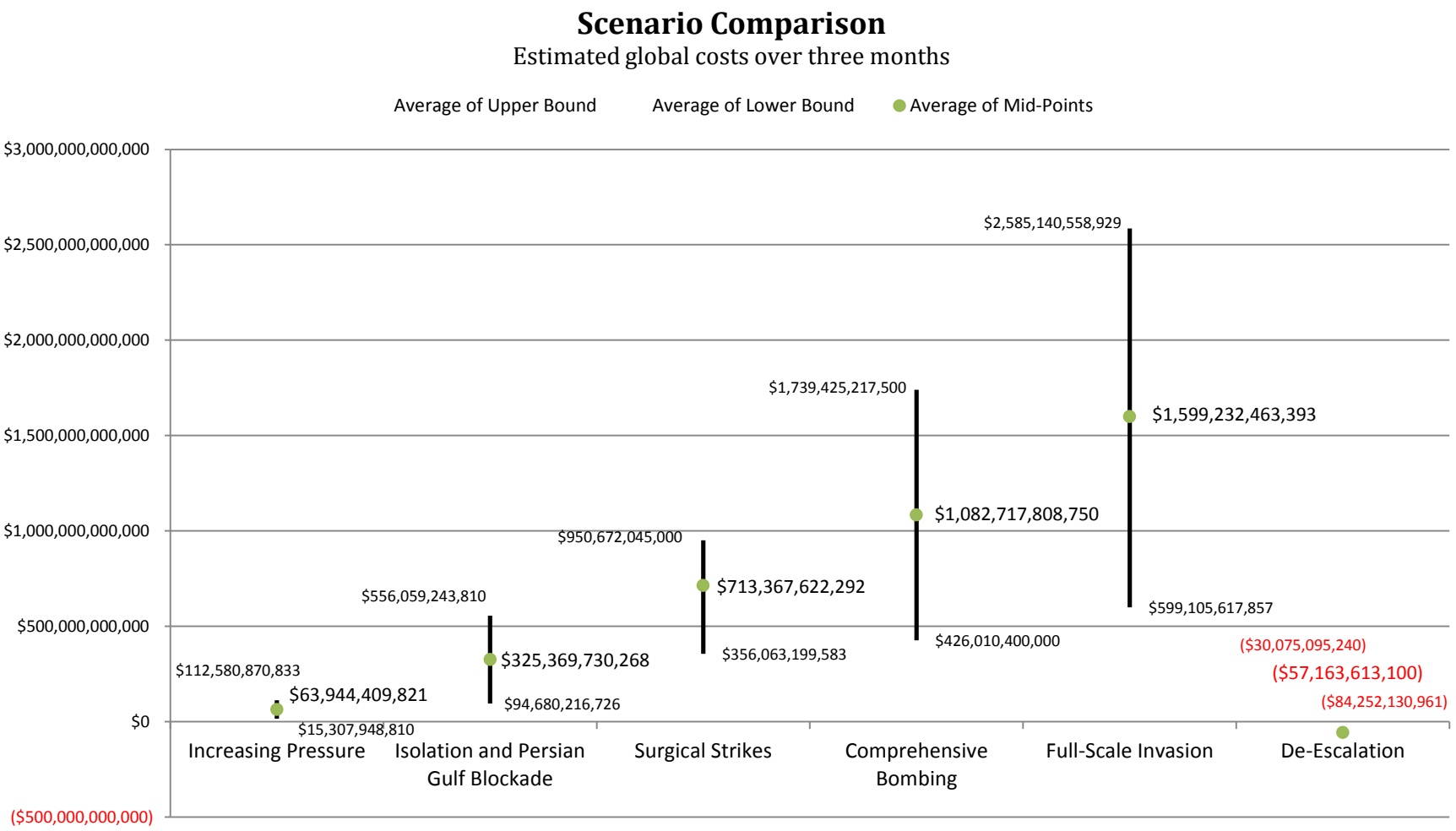


Scenario Six: De-escalation

The president experiments with a new approach to resolving the standoff with Iran by unilaterally taking steps to show that the United States is willing to make concessions. The United States begins to grant year-long waivers (instead of 180-day waivers) to countries still importing Iranian crude oil and temporarily suspends sanctions on foreign banks handling transactions for the National Iranian Oil Company and its trading subsidiary, Naftiran Intertrade Company. It also nominally scales back its military presence in the Persian Gulf by deploying the USS John C. Stennis aircraft carrier (one of two carriers currently in the Gulf) to another area to show that Iran need not fear getting attacked regardless of whether or not it makes concessions on its nuclear program.



Comparison of Total Costs for Each Scenario



Observations on the Data

Despite the many challenges facing the study and its limitations, the research team believes that the methodology accounted for those limitations to the extent possible and that the results presented above can be useful starting points for further study. In that vein, the authors would like to leave interpretation of the data contained in this report and implications for policy largely up to readers.

That being said, a few observations about the data provided can be safely made without biasing interpretation. The first is that, unsurprisingly, as the severity of U.S. action against Iran increases, so do the foreseeable global economic impacts. Broadly speaking, a full-scale military invasion is not only more costly to execute than a blockade or even a limited bombing campaign, it is also more likely to trigger a larger number of potentially cost-bearing effects and to drive up their respective costs in dollar terms. Yet it also clear that, as probable costs generally increase commensurately with the assumed severity of action, so does uncertainty about potential outcomes and the degree of their impact in economic terms. For example, whereas the high-end and low-end estimates of the aggregate global economic costs for imposing a blockade are separated by several hundred billion dollars, the high-end and low-end estimates of costs resulting from a full-scale military invasion are separated by over two trillion dollars.

Moreover, the data reveal points at which certain costs are likely to surge. For instance, the estimated effect on oil prices increases significantly with the onset of kinetic action in the "surgical strikes" scenario from the estimated effect in the event of a Persian Gulf blockade. Similarly, the estimated financial market impact of a comprehensive bombing campaign that targets Iranian military assets is more pronounced than it is in the event of a more limited strike aimed at exclusively at high value targets in Iran's nuclear infrastructure. Although positing specific explanations for what triggers these cost estimate surges would go beyond the scope of this report, the steep increases are noteworthy nonetheless.

Lastly, recognizing that there are costs and benefits associated with every policy choice, and that the report investigates only one facet of a much larger policy analysis, the authors stress that the

report's findings should not be construed as an endorsement by FAS or any of the SMEs participating in the elicitation for any specific course of U.S. action (or inaction). As FAS continues its work to address the security challenges posed by nuclear weapons worldwide, it will remain grateful to those experts who were generous with their time and courageous in putting forward their ideas about what might transpire in the very uncertain future of U.S.-Iran relations.

Expert Elicitation Participants

Dr. Daniel P. Ahn
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Henry L. Stimson Center

Mr. James G. Rickards
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JAC Capital Advisors

Dr. Paul Sullivan
Professor of Economics
National Defense University

FAS would also like to recognize the contributions of an additional expert who asked to remain anonymous.

Elicitation Guides

Mr. Charles P. Blair

Charles P. Blair joined FAS in June 2010. He is the Senior Fellow on State and Non-State Threats. Mr. Blair has worked on issues relating to the diffusion and diversification of weapons of mass destruction (WMD) in the context of proliferation amid the rise of mass casualty terrorism incidents and the centripetal and centrifugal elements of globalization. His work focuses on state and violent non-state actors (VNSA) amid a dystopic and increasingly tribal world.

Mr. Blair explores the perceptions of new disruptive technologies (e.g., WMD) and specific indicators of emerging and future-oriented chemical, biological, radiological, nuclear and high-yield conventional explosive (CBRNE) proliferation, with regard to both states and VNSAs. Mr. Blair also focuses on the technical dimensions of CBRNE agents and their potential weaponization by VNSAs.

In addition to his role at FAS, Mr. Blair is a lecturer at the Johns Hopkins University where he instructs graduate students on the technologies underlying WMD. At George Mason University, Mr. Blair lectures on the nexus of terrorism and WMD. Before joining FAS, he was a research associate with the National Consortium for the Study of Terrorism and Responses to Terrorism (START) where, among other projects, he managed the Global Terrorism Database (GTD), the largest open-source compilation of terrorist events in the world.

A noted scholar with deep appreciation and experience with qualitative methodologies, Mr. Blair is known for his effective and pioneering use of quantitative methodological approaches. These include the design, creation and utilization of a variety of widely utilized data sets and databases exploring, inter alia, state and non-state involvement with WMD. From 2006-2009 Mr. Blair helped to design and implement the GTD.

Mr. Mark Jansson

Mark Jansson is the special projects director for the Federation of American Scientists. In that capacity, he coordinates organizational development efforts and carries out research on issues

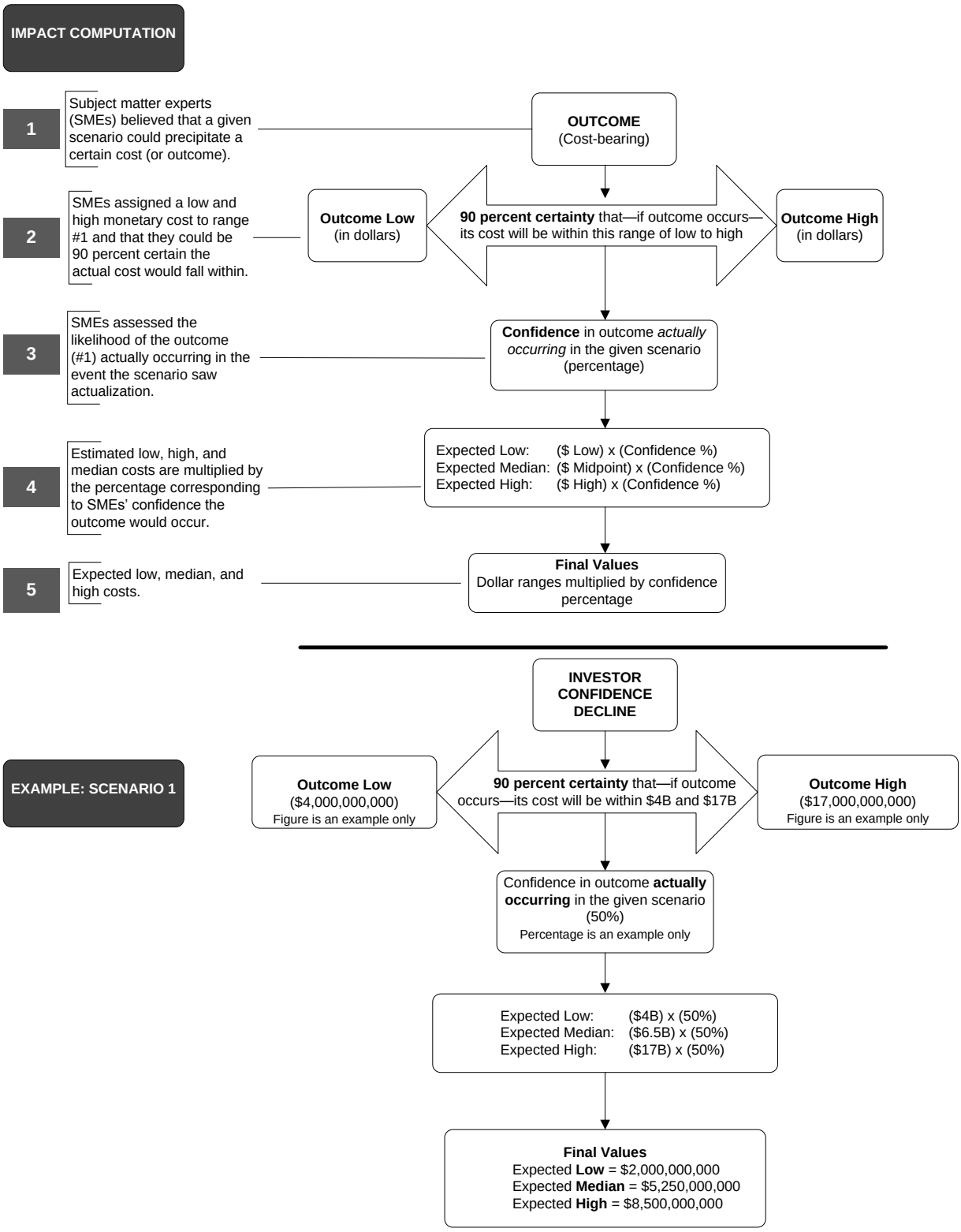
ranging from nonproliferation and nuclear security to natural resource depletion and other emerging threats to states and the people within them.

Mark also manages the International Science Partnership, a pilot project that brings together scientists and engineers from the United States and Yemen to develop collaborative projects that will improve the capacity of both countries to ensure sustainable access to food, water, and energy.

Mark was previously the deputy director of the Project on Nuclear Issues at the Center for Strategic and International Studies and the North America Liaison for the International Network of Emerging Nuclear Experts. He has also worked as a researcher for DPK Consulting in El Salvador and possesses several years of experience in the public and nonprofit sectors as a grant writer and administrator.

Mark received his master's degree in conflict resolution from Georgetown University, where his studies focused on international security and comparative politics. He also completed a graduate program in world religions, diplomacy and conflict resolution from George Mason University and received a bachelor's degree in criminal justice from Roanoke College.

Appendix 1: Data analysis process



Appendix 2: Variables describing potential outcomes

The variables listed below reflect, in general terms, the potential outcomes that elicitation participants identified as relevant factors in determining global economic impacts for each given scenario. Plus signs next to variables denote potential gains.

Capital flight (Iran)
Enhanced global military readiness and force protection
Evacuation costs
Homeland security and anti-terrorism costs
Import/export disruption
Increased oil prices
Increased Russian arms sales (+)
Inflation
Insurance premiums rise
Investor confidence decline
Iranian economic loss
Military costs (U.S.)

Scenario Two: Isolation and Persian Gulf Blockade

Blockade enforcement
Capital flight (Iran)
Capital flight (regional)
Capital losses
Enhanced global military readiness and force protection
Evacuation costs
Global tourism decline
Higher interest costs
Homeland security and anti-terrorism costs
Humanitarian assistance
Import/export disruption
Increased LNG prices
Increased cost of living (regionally)
Increased oil prices
Increased Russian arms sales (+)
Inflation
Infrastructure conversion costs
Investor confidence decline
Iranian economic losses
Military costs (regional)
Military costs (U.S.)
Regional conflict damage
Regional economic disruption
Regional work stoppages

Scenario Three: Surgical Strikes

Blockade enforcement
Capital flight (Iran)
Capital flight (regional)
Capital losses
Damage to Iran (non-nuclear/civilian)
Damage to Iran (nuclear)
Disruption of global economy
Increased cost of living (regionally)
Increased LNG prices
Increased oil prices
Increased Russian arms sales (+)
Inflation
Investor confidence decline
Iranian economic loss

Scenario Three continued . . .

End of defense sequestration (+)
Enhanced global military readiness and force protection
Evacuation costs
Global tourism decline
Higher interest costs
Homeland security and anti-terrorism costs
Humanitarian assistance
Import/export disruption
Iranian/Iranian proxy attacks
Military costs (regional)
Military costs (U.S.)
Radioactive material effects and cleanup
Regional conflict damage
Regional economic disruption
Regional work stoppages
Region-wide political instability

Scenario Four: Comprehensive Bombing Campaign

Blockade enforcement
Capital flight (Iran)
Capital flight (regional)
Capital losses
Damage to Iran (non-nuclear/civilian)
Damage to Iran (nuclear)
Disruption of global economy
Enhanced global military readiness and force protection
Evacuation costs
Financial sector contagion
Global strategic stockpile release (+)
Global tourism decline
Higher interest costs
Homeland security and anti-terrorism costs
Humanitarian assistance
Import/export disruption
Increased cost of living (regionally)
Increased oil prices
Increased Russian arms sales (+)
Inflation
Infrastructure conversion
Investor confidence decline
Iranian economic loss
Iranian/Iranian proxy attacks
Market crash
Military costs (regional)
Military costs (U.S.)
Radioactive material effects and cleanup
Regional conflict damage
Regional economic disruption
Regional instability/civil war
Regional work stoppages
Trade wars
U.S. economic instability

Scenario Five: Full-scale Invasion

Blockade enforcement
Capital flight (Iran)
Increased oil prices
Inflation

Scenario Five continued . . .

Capital flight (regional)

Capital losses

Damage to Iran (non-nuclear/civilian)

Damage to Iran (nuclear)

Disruption of regional economy

Enhanced global military readiness and force protection

Evacuation costs

Financial sector contagion

Global economic disruption

Global strategic stockpile release (+)

Global tourism decline

Higher interest costs

Homeland security and anti-terrorism costs

Humanitarian assistance

Import/export disruption

Increased LNG prices

Infrastructure conversion

Investor confidence decline

Iranian economic loss

Market crash

Market distortion

Military costs (global)

Military costs (U.S.)

Radioactive material effects and cleanup

Regional conflict damage

Regional economic disruption

Regional work stoppages

Region-wide political instability

Russian arms sales (+)

Trade wars

U.S. economic instability

Scenario Six: De-Escalation

Asian market boost (+)

GCC banking boost (+)

Increased regional trade

Investment in nuclear industry (+)

Investor confidence boost (+)

Iranian economic improvement (+)

Military costs (regional) (+/-)

Oil price decline (+)

Reduced wear and tear on military hardware (+)

Regional smuggling increase

Rial appreciates (+)

Sanctions relaxation (+)