U.S.-CHINA NUCLEAR ESCALATION RISK:

Mapping Pathways and Strategic Priorities Through 2030

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OPEN NUCLEAR NETWORK
A PAX *sapiens* programme

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The PAX *sapiens* Foundation (PAX) mission is to prevent predictable global catastrophes through the creation of new systems of collective coordination that build a more peaceful world. PAX is co-founded by Marcel Arsenault and Cynda Collins Arsenault. PAX is part of a family of foundations that includes Shuraako Capital, formerly the One Earth Future Foundation, and the Secure World Foundation.

PAX works on preventable catastrophic risks: Preventing the manufacture and trafficking of synthetic drugs, particularly fentanyl, preventing global pandemics, preventing conflicts between the U.S. and China, and preventing the use of nuclear weapons. With four offices in three countries, PAX operates with a long-term perspective, an empirical approach, and through public, private and philanthropic, or P^3, partnerships that bring non-governmental actors together with states to collectively solve problems. PAX also hosts the Our Secure Future program, advancing a global Women, Peace and Security agenda that works across PAX's other programs.

OPEN NUCLEAR NETWORK

About Open Nuclear Network

The goal of the Open Nuclear Network (ONN) is to reduce the risks associated with nuclear weapons and prevent predictable nuclear catastrophes. Leveraging open-source data, forecasting and foresight, and strategic engagement, ONN supports informed decision-making with independent, actionable information to reduce nuclear risks.

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Disclaimer

We recognize that language use in the context of U.S.-China relations, around disputed territories and sovereignty claims, is often contested. Terms used in this report, including those referring to Taiwan, the South China Sea, and other politically sensitive areas, are used strictly as geographic references and reflect the phrasing adopted by participating forecasters and subject matter experts (SMEs) during scenario development. Their usage is intended exclusively to support clarity and consistency in analytical modeling. It does not imply any position by the authors, PAX *sapiens* Foundation, or the Swift Centre for Applied Forecasting regarding the legal status, sovereignty, or political recognition of any territory or actor. Any errors remain the responsibility of the authors.

EXECUTIVE SUMMARY

Nuclear conflict between the United States and China remains a low-probability outcome, but the analysis identifies a clear structural driver of escalation risk. Expert forecasting conducted by the Open Nuclear Network (ONN) and the Swift Centre finds that forward deployment of U.S. nuclear weapons in the Indo-Pacific functions as the single most consequential risk amplifier. While the baseline probability of a U.S.-China nuclear exchange by 2030 is estimated at 1.3%, this risk rises to 3.4% under scenarios involving U.S. regional nuclear deployments and falls to 1.1% in their absence.

These deployments could be triggered by several potential changes in regional dynamics. Most critically, a crisis in the Taiwan Strait would put core U.S. and Chinese strategic and national interests in contention, and produce the largest shifts in nuclear deployment calculations. In comparison, conflict on the Korean Peninsula reflects a different dynamic, in which potential provocations by North Korea could draw Washington and Beijing into confrontation through alliance commitments and third-party entanglement.

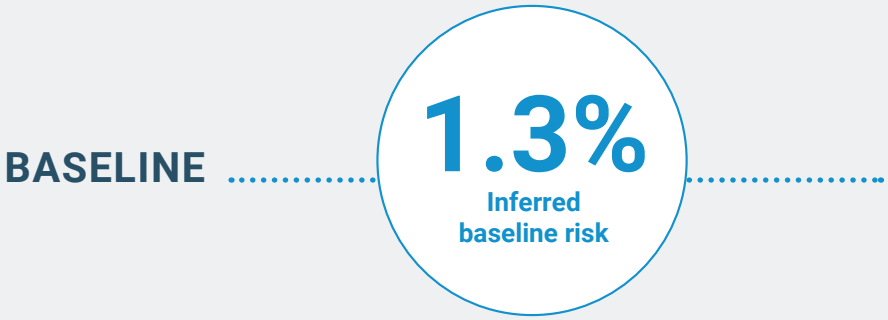
South China Sea scenarios, such as forcible removal of claimants from contested outposts or a China-Philippines clash resulting in significant casualties, pose the highest near-term risk of conventional conflict. While highly disruptive at the regional level, they generate comparatively limited increases in nuclear escalation risk due to weaker links to U.S. extended deterrence guarantees.

In addition to regional contingencies, the analysis examines changes in nuclear posture, including China abandoning its no-first-use pledge or either side resuming nuclear testing. These doctrinal or signaling shifts lead to moderate but notable growth in escalation risk. Specifically, they raise the probability of U.S. nuclear deployments to 8.6%, reflecting growing concerns over movement toward more preemptive doctrines. Ultimately, however, their impact on the overall probability of nuclear use remains less significant than that of acute crisis scenarios, which not only raise deployment probabilities more sharply but also directly affect alliance cohesion and strategic stability.

KEY FINDINGS:

Baseline risk

Nuclear conflict remains unlikely but structurally embedded. The inferred baseline risk of 1.3% reflects the integrated uncertainty across all escalation pathways and is consistent with prior ONN and Forecasting Research Institute (FRI) estimates.

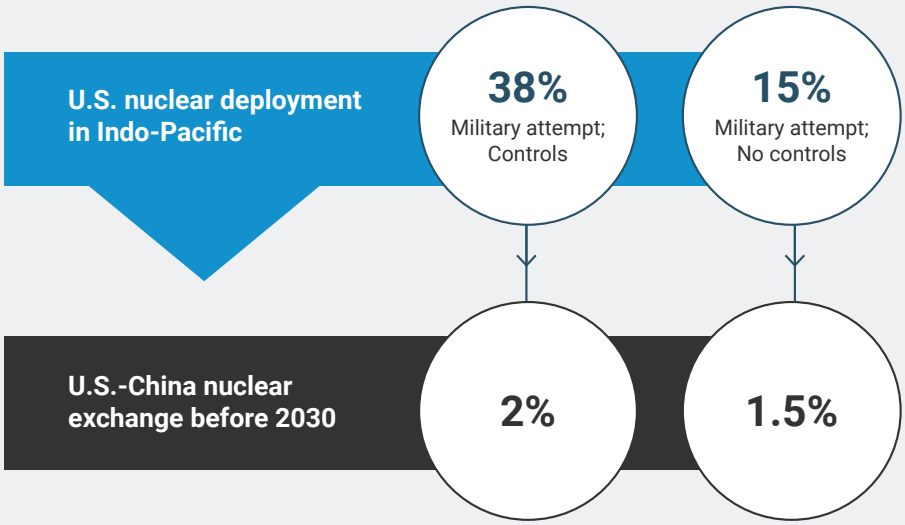


Most risk-amplifying factor

U.S. nuclear deployments act as a systemic risk amplifier. Forward-deployed nuclear assets are a common intensifier across multiple conflict scenarios and increase the likelihood of nuclear use from 1.1% to 3.4%.

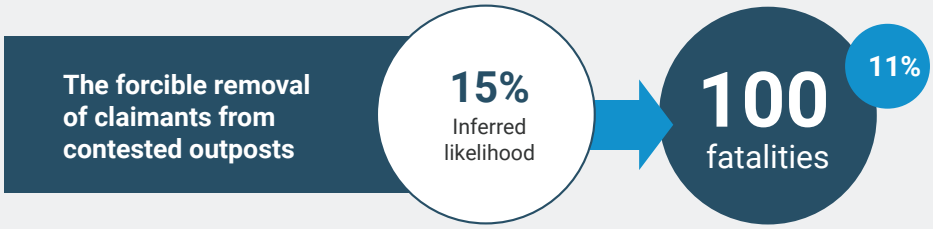
Most deployment-sensitive escalation scenario

Taiwan is the most deployment-sensitive and escalatory scenario. A scenario in which China establishes control over Taiwan raises the probability of U.S. nuclear deployments to 38% and nuclear use to 2.0%. Even when such control fails to consolidate, deployment likelihood remains elevated at 15%.



Highest near-term risk (conventional)

South China Sea scenarios pose the highest near-term risk of conventional conflict. The forcible removal of claimants from contested outposts is the most probable flashpoint (15% likelihood), followed by a China-Philippines clash with over 100 fatalities (11%). These scenarios carry potential implications for U.S. alliance commitments and regional stability.



Less significant escalatory moves

Doctrinal shifts subtly reshape the escalation architecture. China's abandonment of its no-first-use pledge (7.9%) or renewed nuclear testing by either Washington or Beijing (7.2%) doubles the likelihood of U.S. nuclear deployments, but does not change the underlying likelihood of ultimate nuclear use.

All scenarios in this assessment are modeled independently for analytical clarity. The causal network employed in the analysis links region-specific triggers to U.S. nuclear posture decisions and subsequent escalation outcomes, but does not model interaction effects among multiple simultaneous crises. While real-world conflicts may unfold sequentially or concurrently, such dynamics fall outside the scope of the current probability framework and are identified as priorities for future research.

Overall, the findings indicate that U.S.-China nuclear conflict remains unlikely, but that escalation risk is highly sensitive to U.S. nuclear posture decisions and concentrated in a small number of scenarios, most notably Taiwan. Reducing escalation risk therefore depends less on managing generalized tensions and more on constraining deployment-driving dynamics, strengthening crisis-time communication, and preserving strategic restraint in the most deployment-sensitive theaters.

Key Findings:

1. *Baseline risk*
2. *Most risk-amplifying factor*
3. *Most deployment-sensitive escalation scenario*
4. *Highest near-term risk (conventional)*
5. *Less significant escalatory moves*

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CHAPTER 1

Introduction

Global nuclear competition has intensified in recent years, with major powers accelerating their strategic postures. In 2024, Russia signaled a dangerous shift by lowering its nuclear threshold at the height of its conflict with Ukraine, raising concerns that Moscow might adopt a more flexible or preemptive nuclear strategy.[1] Meanwhile, U.S. assessments indicate that China's nuclear arsenal grew by roughly 100 warheads in a single year, reaching over 600 warheads by mid-2024. According to the U.S. Department of Defense (DoD), this expansion could surpass 1,000 warheads by 2030—still far behind the U.S. and Russia—but it signals Beijing's intent to reshape nuclear deterrence dynamics.[2] Chinese officials, however, maintain that the country keeps its nuclear forces at the "minimum level required for national security," with a defensive posture and no intention to engage in a nuclear arms race, reaffirming its no-first-use pledge.[3]

Amid these shifts, the United States has continued its decades-long modernization of the nuclear triad and has reportedly made classified adjustments to its deterrence strategy in response to peer competitors.[4] DoD had requested $49.2 billion for nuclear modernization in FY2025, with total lifecycle costs projected to exceed $1.5 trillion over the next few decades. In Washington's view, these efforts are necessary to maintain a "safe, secure, effective, and credible" deterrent considering geopolitical developments.[5] Yet U.S. modernization is not universally regarded as stabilizing. Observers caution that introducing new delivery platforms, lower-yield nuclear warheads, and enhanced command-and-control capabilities could trigger action-reaction dynamics with other nuclear-armed states, heightening the risk of miscalculation or inadvertent escalation as others feel pressured to respond in kind.[6]

Within this evolving security landscape, PAX *sapiens* Foundation and the Swift Centre convened two forecasting workshops to assess the likelihood and consequences of nuclear escalation between the United States and China.[7] Rather than focusing solely on abstract scenario outcomes, the initiative sought to map the specific events, force posture shifts, and doctrinal decisions that could shape the trajectory of a future bilateral nuclear exchange. To that end, the project focused on the following research questions:

- **What are the fundamental triggers that could initiate a U.S.-China nuclear escalation pathway, and how likely are they to occur before 2030?**
- **How do these triggers differentially influence the probability of U.S. nuclear deployments in the Indo-Pacific, identified by experts as the most impactful "primary risk" contributing to nuclear escalation?**
- **In what ways does the presence (or absence) of forward-deployed U.S. nuclear weapons affect the probability of nuclear use across scenarios?**

By disaggregating escalation pathways into their causal components and assessing their likelihood using expert-informed Bayesian modeling, this report aims to provide actionable insights for policymakers, analysts, and civil society actors working to prevent nuclear conflict and identify the most urgent levers for risk reduction.

The report proceeds in three main sections. The first identifies the most probable scenarios that could trigger conventional conflicts across Asia through 2030. The second analyzes how each scenario shapes the likelihood of U.S. nuclear deployments in the Indo-Pacific and how those deployments, in turn, mediate escalation risks toward nuclear use. The final section outlines policy priorities for managing nuclear danger in both single-theater and compound crisis environments.

Methodologically, the modeling adopts a reverse-structured inference: It anchors on the probability of nuclear use by 2030 and traces backward to determine the most influential upstream drivers.[8] But the report itself is organized in forward causal sequence. This means the narrative begins with high-probability regional trigger scenarios, then examines how these events affect nuclear posture decisions, and finally estimates their downstream impact on escalation risk. This structure preserves the model's causal logic while enhancing accessibility for both technical and policy-oriented readers.

CHAPTER 2

Key Trigger Scenarios and Individual Probabilities

While no single trigger is assessed as highly likely to precipitate a broader U.S.-China conventional conflict, several scenarios stand out due to both their relative likelihood and their potential to drive escalation. Expert assessments are based on the assumption that these events could occur by 2030. Among the evaluated triggers:

TABLE 2.1. Estimated Probability of Selected Scenarios by 2030

China successfully dislodging claimants from a South China Sea outpost	**15%**
China-Philippines military conflict with significant casualties	**11%**
A large-scale cross-strait military contingency	**11%**
The Korean Peninsula scenario of direct military conflict	**9.2%**
Doctrinal shifts such as China renouncing its no-first-use nuclear policy	**7.9%**
Nuclear weapons testing by either U.S. or China	**7.2%**
100+ deaths in a direct conflict between Japan, North Korea and/or China	**4%**
1000+ deaths in a direct conflict between India and China	**3.9%**

If U.S. nuclear weapons were deployed in response to such crises, experts agree that the risk of escalation from conventional conflict to nuclear exchange would increase substantially. The following section examines the four most likely regional conflict scenarios in turn, outlining their core features and implications.

South China Sea Territorial Displacement

The forcible displacement of other claimants (e.g., the Philippines, Vietnam, Malaysia, or Brunei) from contested South China Sea outposts carries a 15% likelihood, making it the most probable trigger for regional escalation. In this scenario, China purportedly undertakes a limited but decisive operation using gray zone tactics, including maritime militia, coast guard vessels, and minimally escalatory deployments of the PLA Navy. These actions aim to consolidate *de facto* control over disputed features while avoiding the threshold of direct military conflict or triggering a forceful U.S. response. Strategically, such operations serve multiple objectives: To restrict rival claimants' access to maritime resources, secure economic advantages through sustained presence, extend the defensive perimeter away from the mainland, and shape the operational environment in anticipation of future contingencies.[9]

However, this type of operation, especially if directed at the Philippines, would likely prompt political appeals for U.S. reassurance under the Mutual Defense Treaty. While formal treaty invocation may remain unlikely absent kinetic attacks, symbolic alliance responses, such as joint patrols or rotational deployments, would likely follow as a credible demonstration of alliance cohesion. Experts generally agree that the Philippines is the most vulnerable claimant due to its weaker presence and more antagonistic stance toward China's territorial claims. A Chinese attempt to dislodge Philippine outposts could also generate anxiety among other regional allies (e.g., Japan), prompting requests for enhanced visible U.S. military presence as a signal of commitment. In response, the U.S. may opt for calibrated moves, such as deploying maritime patrol aircraft or conducting overflights with dual-capable bombers. Though conventionally postured, such deployments may be read by Beijing as latent escalatory signaling, especially because of blurry doctrinal separation between conventional and nuclear assets in some cases.[10]

Direct China-Philippines Military Conflict

A military conflict between China and the Philippines resulting in 100 or more fatalities by 2030 stands at an 11% likelihood, according to expert consensus. This scenario is driven by escalating tensions over South China Sea territories, especially around features such as the Second Thomas Shoal. Alongside China's sustained maritime assertiveness, including aggressive coast guard maneuvers and swarming tactics, recent Philippine initiatives have also reshaped regional dynamics. Manila's shift from internal security to territorial defense has been accompanied by legal codification of maritime claims, a revitalized alliance with Washington, and a strategy of "assertive transparency" designed to rally international support against China.[11] These moves are increasingly perceived by Beijing as part of a broader U.S.-backed effort to contain its maritime reach, especially amid expanded U.S. access to Philippine military bases under the Enhanced Defense Cooperation Agreement and high-profile joint exercises in contested waters.[12]

While both nations have historically avoided high-casualty clashes, the risk of a lethal incident (e.g., sinking of a single vessel) triggering broader escalation is rising. Experts caution that such an event could prompt Manila to invoke the 1951 Mutual Defense Treaty, leading Washington to consider clear reassurance measures. Although the treaty does not guarantee automatic intervention, U.S. officials have affirmed its applicability to attacks on Philippine forces or vessels in the South China Sea. Any American response involving forward-deployed naval or air assets, especially dual-capable platforms, risks being interpreted by China as coercive escalation rather than defensive alliance reassurance. In parallel, such a crisis may also prompt economic responses from Washington and its allies, including targeted sanctions or trade restrictions on Chinese state-run enterprises engaged in unauthorized fishing, maritime

surveys, or energy exploration within the exclusive economic zones of neighboring countries.[13] These developments, together, would endanger one of the world's most critical maritime corridors, an artery that carries roughly one-third of global shipping.

Taiwan

A large-scale cross-strait military scenario remains a lower probability but high-consequence case, with an 11% likelihood by 2030 and a 36% chance of Beijing successfully securing control over the island. Should such a military campaign occur, executed rapidly and decisively, experts suggest it would still likely result in a pyrrhic outcome: Devastating damage to Taiwan's infrastructure, substantial PLA casualties, port disruptions along China's southeastern coast, and a severe shock to global supply chains. Additional projections estimate global losses exceeding $10 trillion or roughly 10% of global GDP—surpassing the combined economic fallout of COVID-19 and the 2008 financial crisis.[14] Operationally, the complexity of executing an amphibious operation across the Taiwan Strait further compounds these risks, requiring highly synchronized joint-force operations across a 90-mile strait, under constrained seasonal and weather conditions, and in the face of increasingly asymmetric Taiwanese defenses.[15] The Lai administration has recently committed to bolstering its defense capabilities, raising the military budget to over 3% of GDP as part of a broader modernization drive.[16]

The risks of escalation are also embedded in strategic realities. Taiwan sits at the nexus of geopolitical, economic, and technological fault lines. Its outsized role in global semiconductor fabrication, particularly through firms like Taiwan Semiconductor Manufacturing Company (TSMC) and United Microelectronics Corporation (UMC), renders it indispensable to U.S. national competitiveness. Any disruption to Taiwan's chip outputs would reverberate across critical American sectors from defense to artificial intelligence, thereby reinforcing perceptions of the island as a strategic linchpin.[17] Accordingly, any major Taiwan contingency is expected to prompt U.S. military intervention, as consistently underscored by official commitments under the Taiwan Relations Act and major defense planning assumptions. However, even carefully calibrated U.S. support, such as long-range strikes or dual-capable platform deployments, could be misinterpreted by Beijing as preemptive or escalatory, particularly if Chinese leadership perceives threats to regime survival or nuclear command systems. This risk is further amplified by China's expanding but opaque nonstrategic nuclear capabilities. Some analysts warn these systems may be viewed as usable tools for early conflict termination, especially under conditions where conventional advantage begins to erode.[18]

Additional factors influencing Beijing's calculus include domestic economic instability, a formal declaration of Taiwanese independence, or perceived strategic opportunities during U.S. political transitions. Nonetheless, prevailing expert consensus suggests that Chinese leadership continues to prioritize a peaceful resolution. A military path could lock China into a trajectory of strategic isolation and prolonged economic disruption (e.g., Western decoupling, corporate exits, and sustained trade and investment barriers), outcomes it has historically sought to avoid.

The Korean Peninsula

The probability of a military conflict between North and South Korea resulting in 100 or more fatalities is estimated at 9.2%, reflecting the historically constrained yet volatile tensions on the Korean Peninsula. While no such large-scale clash has occurred in recent decades, structural triggers, ranging from regime insecurity to alliance signaling failures, sustain the unpredictability of escalation. In particular, perceived existential threats to the Kim regime, amid increasing elite fragmentation, economic deterioration, weakening ideological cohesion, and uncertainty surrounding fourth-generation succession, could incentivize deliberate military adventurism as a means of consolidating internal cohesion and regime legitimacy.[19] The regime's perceived loss of control has intensified its reliance on external displays of strength. "The Kim dynasty would risk it all in a war if necessary to preserve their power," noted during the workshop discussion. Declaring South Korea a "permanent adversary" and expanding the scope of preemptive nuclear doctrine may thus reflect a strategy to bolster domestic control and reinforce deterrence, absent meaningful internal reform. North Korea's 2022 nuclear posture law explicitly authorizes preemptive use if the leadership or command infrastructure is threatened, codifying a doctrine that tightly couples regime survival to external coercive behavior.[20]

Simultaneously, South Korea's political upheaval marked by then-President Yoon Suk Yeol's impeachment following his declaration of martial law, has introduced a level of domestic instability that Pyongyang may perceive as a strategic opening in the future. Historically, North Korea has exploited moments of political volatility in Seoul to test the boundaries of inter-Korean engagement and alliance resolve. South Korea's leadership capacity to coordinate resilient crisis responses and mitigate national security threats is now called into question. Accordingly, the likelihood of misperception from the North increases, not only regarding Seoul's deterrent posture, but also Washington's willingness to respond decisively.[21] Although the U.S. military presence on the peninsula long serves as a tripwire against major aggression, Pyongyang may come to view it as a politically constrained force during allied transitions, particularly if nuclear signaling from the U.S. remains deliberately ambiguous. In this context, any domestic upheaval in South Korea does not directly cause conflict escalation, but heightens the probability that North Korea will initiate calibrated provocations under the assumption of limited allied intervention and extended deterrence.

Potential Interdependencies and Issue Linkage

While our current modeling assumes conditional independence among the major regional triggers to ensure analytic tractability and probabilistic coherence, this does not suggest that compound escalation pathways are implausible. On the contrary, real-world crises rarely unfold in isolation but rather hold causal links, noted by forecasters. For instance, a U.S. military commitment to a Korean Peninsula conflict could constrain Washington's ability to signal resolve in the South China Sea or Taiwan Strait, potentially inviting opportunistic behavior. Similarly, China's actions in territorial disputes may influence decision-making regarding Taiwan.

These interconnected risks create potential cascade effects that the current probability framework does not fully capture. Future iterations of this model could refine the existing Bayesian approach to explicitly account for lateral dependencies between theaters, or utilize Monte Carlo simulation of coincident risks. For now, policymakers should note that the total risk of nuclear escalation under conditions of multi-theater crisis may be significantly greater than the additive sum of independent scenarios, and design response mechanisms accordingly.

CHAPTER 3

Escalation Pathways of a U.S.-China Nuclear Exchange

The probability of a U.S.-China nuclear exchange before 2030 is shaped by a complex interplay of regional crisis scenarios, force posture decisions, and structural uncertainty. This chapter draws on a Bayesian network model to estimate the probability of nuclear conflict across a range of contingencies. Within this framework, inferred likelihood refers to the model's posterior probability of nuclear escalation, conditional on the specific combinations of inputs (e.g., force posture settings, territorial conflicts, or doctrinal changes) and the network's internal causal dependencies.[22]

Absent any activated crisis trigger, the model estimates a 1.3% inferred likelihood of U.S.-China nuclear conflict by 2030. This estimate constitutes a structural baseline: A probabilistically integrated assessment of all modeled escalation pathways under conditions of uncertainty propagation. It is not the result of any single trigger or event, but rather the system-level risk embedded in the broader geopolitical environment. For example, if U.S. nuclear weapons are assumed to be absent from the Indo-Pacific theater, the inferred likelihood drops slightly to 1.1%. In contrast, when forward-deployed nuclear assets are introduced, the model associates forward-deployed nuclear assets with a growth to 3.4%. Although this threefold increase signals a notable shift in projected risk, the underlying mechanisms, and whether deployments deter aggression or introduce new forms of instability, remain contested and warrant closer examination.

One line of reasoning holds that a robust U.S. nuclear posture carries significant deterrent value: Visible deployments signal resolve and thus reduce the likelihood of aggression. Forward-deployed nuclear-capable forces, even in limited roles such as submarine port visits, are intended to influence adversary cost-benefit assessments in a way that keeps their nuclear assets "in garrison" or renders their use strategically self-defeating.[23] If based on allied territory, such deployments reinforce deterrence by allowing Washington to respond proportionately at the regional level, short of escalation risk to general nuclear war. Strategically, they could both lower the risk of U.S. homeland involvement in early nuclear exchanges and deliberately shift the burden of further escalation onto the aggressor.

Critics, however, contend that such deployments may accelerate arms competitions, embolden first-strike incentives, and lower the threshold for nuclear signaling, thereby increasing the risk of miscalculation in a crisis.[24] These dynamics are particularly acute in the U.S.-China context. Risks are amplified when conventional and nuclear systems are entangled in ways that undermine perceived second-strike survivability, prompting concerns that even non-nuclear deployments could be precursors to disarming strikes. Forward-based precision assets and missile defenses may be interpreted not as reassurance, but as threats to deterrent stability, encouraging preemptive action or reactive arms racing. These interpretations are further reinforced by widespread Chinese skepticism toward the controllability of nuclear escalation itself. Many reject the notion of limited

nuclear war, fearing that even low-yield or regionally based nuclear use would rapidly trigger inadvertent escalation beyond any control. In their views, the nature of nuclear weapons remains the same regardless of their yield and range.[25]

TABLE 3.1. Estimated Probability of U.S. Nuclear Deployments by Scenario

A large-scale cross-strait military contingency	**38%**
The Korean Peninsula scenario of direct military conflict	**19%**
100+ deaths in a direct conflict between Japan, North Korea and/or China	**12%**
China-Philippines military conflict with significant casualties	**8.9%**
China successfully dislodging claimants from a South China Sea outpost	**8.6%**
Doctrinal shifts such as China renouncing its no-first-use nuclear policy	**8.6%**
Nuclear weapons testing by either U.S. or China	**8.6%**
1000+ deaths in a direct conflict between India and China	**6.2%**

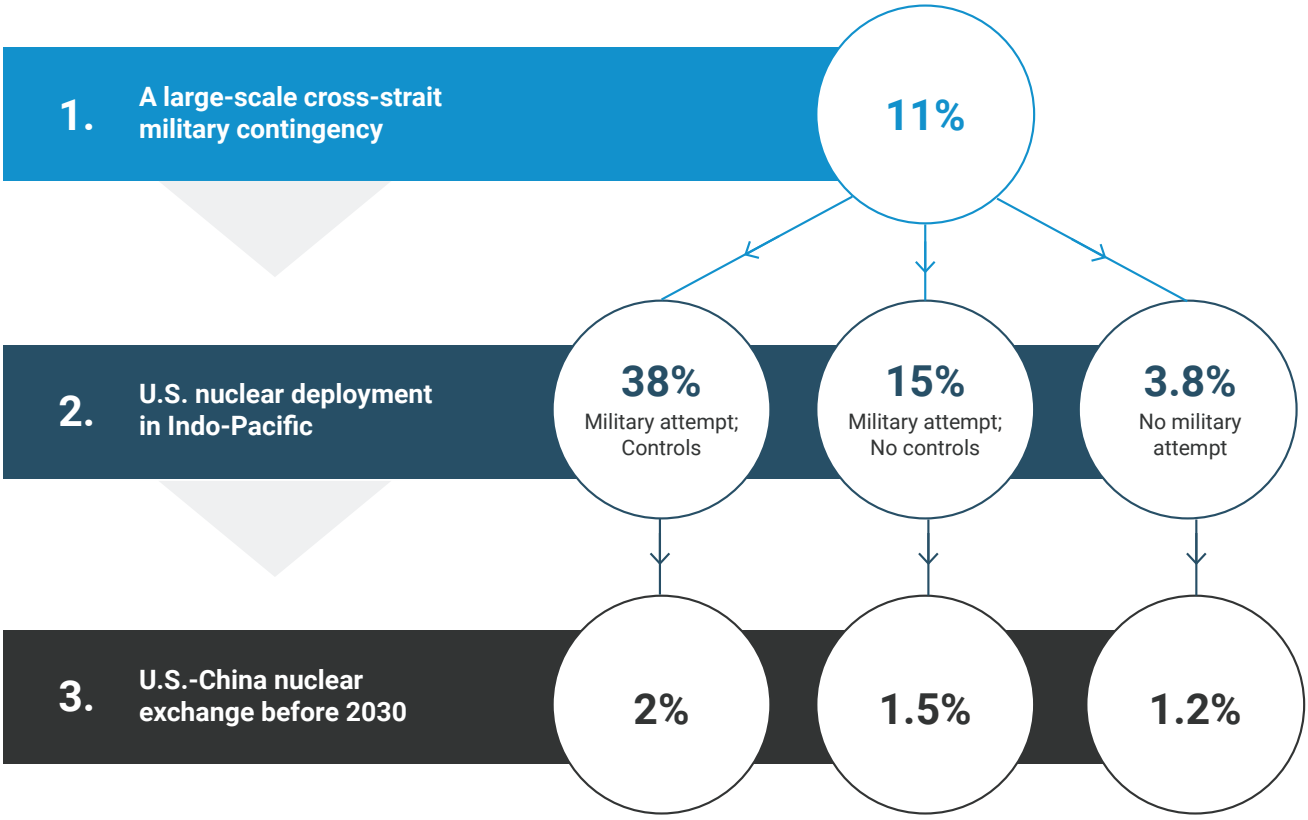
Given these competing interpretations, the preliminary modeling results help clarify the variation in deployment probabilities across aforementioned scenarios, and how such deployments mediate escalation toward nuclear exchange. Across all modeled scenarios, the probability of U.S. nuclear deployments rises most sharply in response to a successful Chinese establishment of control over Taiwan (38%), and more moderately in scenarios involving high-casualty conflict on the Korean Peninsula (19%), direct armed clashes with Japan (12%) or the Philippines in the South China Sea (8.9%), or China's forcible removal of rival claimants from contested maritime outposts (8.6%). Even when China does not succeed in securing the island after a military attempt, deployment probability remains elevated at 15%. These cross-scenario variations reinforce the importance of nuclear force posture not as a fixed cause of escalation, but as a structurally embedded mediator. It conditions how specific geopolitical developments translate into differentiated levels of nuclear risk exposure.

Taiwan

Among all modeled scenarios, a Taiwan contingency presents the most volatile pathway toward nuclear escalation. Before the onset of high-intensity military attempt, the inferred probability of U.S. nuclear deployments in the Indo-Pacific remains low at 3.8%, yielding a 1.2% inferred likelihood of a U.S.-China nuclear exchange before 2030—just below the model's structural baseline of 1.3%.

In contrast, should a major cross-strait contingency unfold, the model first estimates a 36% probability of Beijing successfully establishing territorial control. Under this specific outcome of consolidated control, the odds of U.S. nuclear deployments rise to 38%, and the inferred likelihood of nuclear conflict increases to 2.0%. Even if Beijing's subsequent efforts to stabilize governance do not succeed, the probability of U.S. nuclear deployments remains elevated at 15%, with an associated 1.5% inferred likelihood of nuclear exchange.

FIGURE 3.1. U.S.-China Nuclear Exchange Pathways Under the Taiwan Scenario

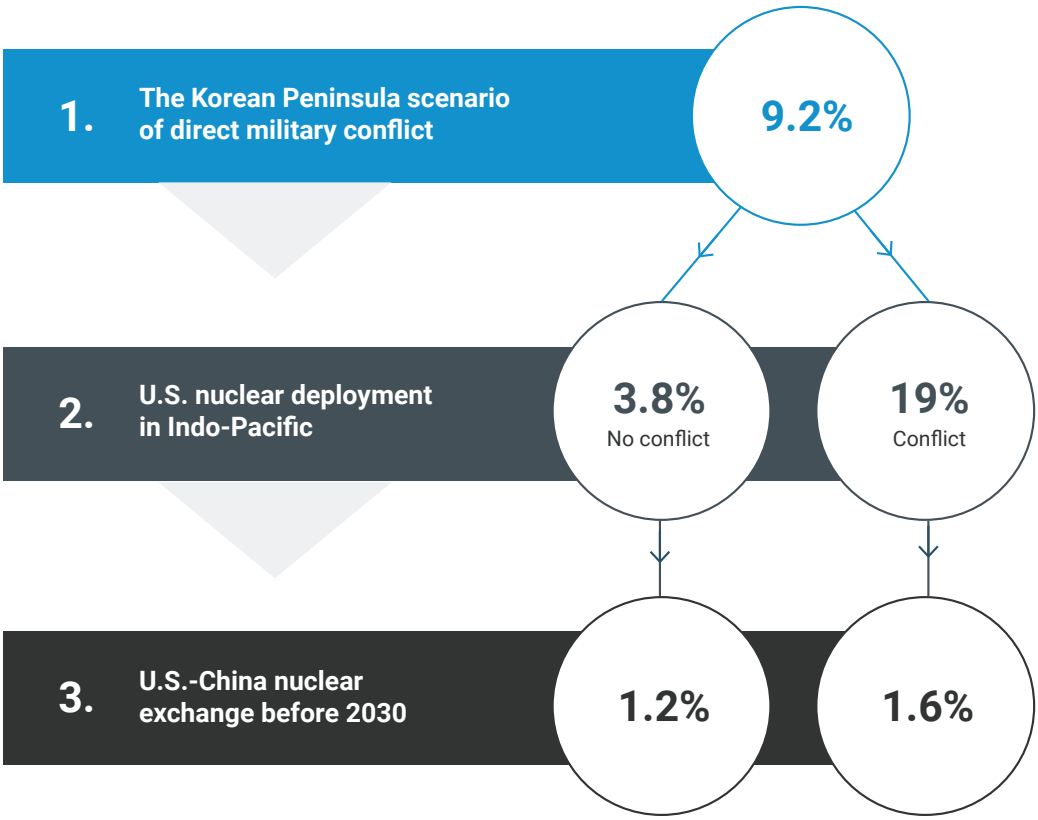


These dynamics underscore how Taiwan functions as a primary escalation accelerator, not merely due to the initial act of aggression but because of the cascading effects on U.S. nuclear posture and the resulting shift in strategic risk. While these probabilities remain below the model's upper bound of 3.4% (observed when nuclear deployments are explicitly assumed), they reveal how specific geopolitical outcomes like territorial control can reshape force posture decisions and amplify nuclear risk without overt policy choices.

The Korean Peninsula

Lacking any direct military conflict, the Korean Peninsula does not significantly alter the broader escalation environment. Under these conditions, the model estimates a 3.8% probability of U.S. nuclear deployments in the Indo-Pacific, yielding a 1.2% inferred likelihood of a U.S.-China nuclear exchange and effectively mirroring the structural baseline. However, a conflict scenario resulting in significant casualties (100+ fatalities) alters this trajectory. The probability of U.S. nuclear deployments increases to 19%, raising the inferred likelihood of nuclear conflict to 1.6%. While this remains below the escalation potential observed in Taiwan-related pathways, the shift highlights how kinetic developments on the Peninsula, even those originating in Pyongyang, can influence U.S.-China strategic calculations.

FIGURE 3.2. U.S.-China Nuclear Exchange Pathways Under the Korean Peninsula Scenario

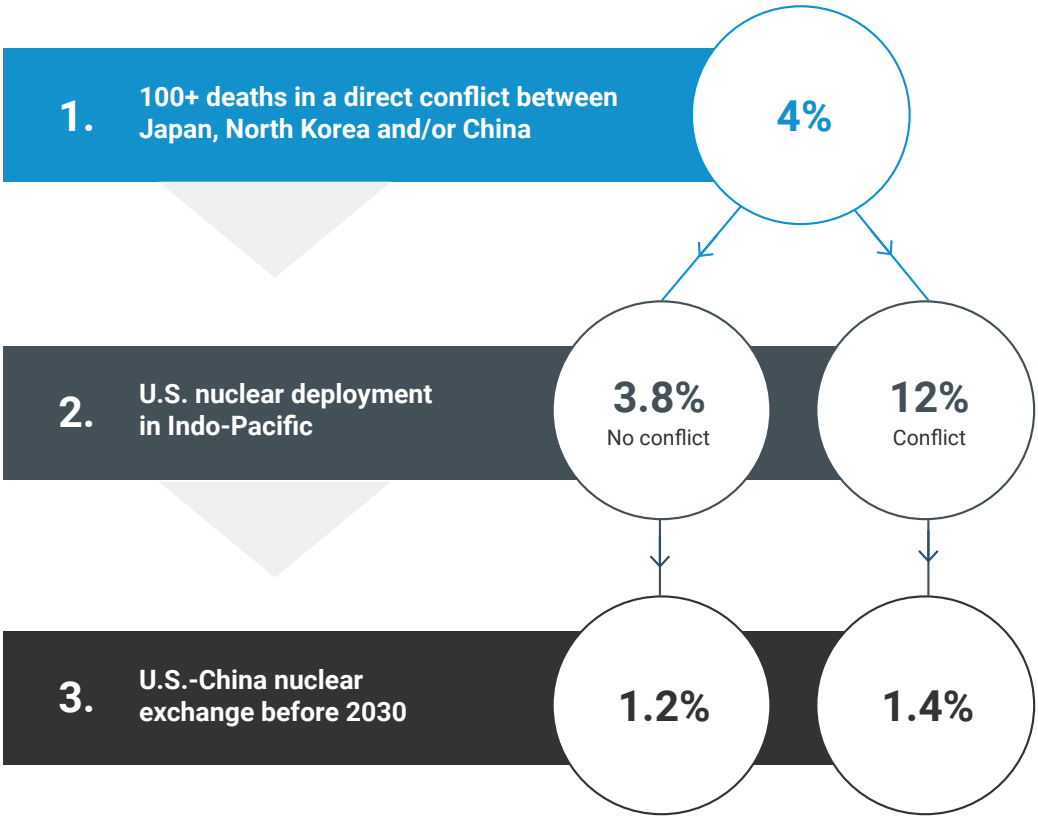


These effects are particularly salient in multi-theater contingencies, where simultaneous crises could reduce signaling clarity, compress decision windows, and raise the risk of misperception between Washington and Beijing. In such contexts, even secondary flashpoints may act as catalysts for escalation, particularly when nuclear posture becomes entangled in extended deterrence commitments.

Japan

A conflict scenario involving Japan, whether triggered by tensions with North Korea or direct confrontation with China, introduces distinct escalation dynamics. If tensions remain below the threshold of armed conflict, the model projects no substantive deviation from the structural baseline: The probability of U.S. nuclear deployments holds at 3.8%, with a corresponding 1.2% inferred likelihood of nuclear exchange.

FIGURE 3.3. U.S.-China Nuclear Exchange Pathways Under the Japan Scenario



However, in the event of a direct clash, the probability of U.S. nuclear deployments rises to 12%, and the inferred likelihood of a U.S.-China nuclear exchange increases to 1.4%. While this represents a moderate shift relative to other high-risk scenarios, it reflects Japan's pivotal role in U.S. regional strategy and alliance credibility. Military conflict involving Tokyo could activate extended deterrence dynamics, expand the geographic scope of U.S. commitments, and increase the chances of inadvertent escalation through entanglement effects.

South China Sea

Escalation pathways in the South China Sea emerge through both kinetic conflict and coercive displacement. Without active hostilities, the probability of U.S. nuclear deployments holds at 3.8%, while the inferred likelihood of a U.S.-China nuclear exchange dips slightly to 1.2%. However, scenarios involving either the forcible removal of rival claimants from contested outposts or China-Philippines armed conflict resulting in 100 or more fatalities significantly increase U.S. deployment probability, to 8.6% and 8.9% respectively, while the inferred likelihood of nuclear exchange remains at 1.3%.

FIGURE 3.4. U.S.-China Nuclear Exchange Pathways Under a China-Philippines Conflict Scenario

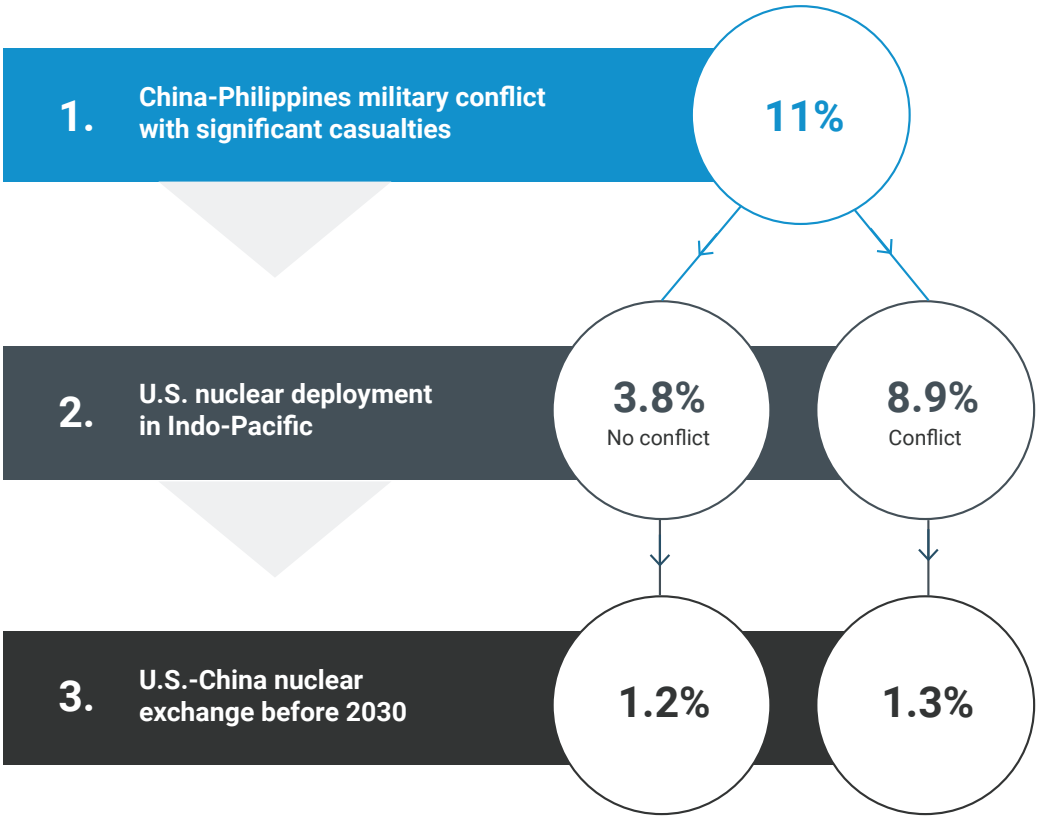
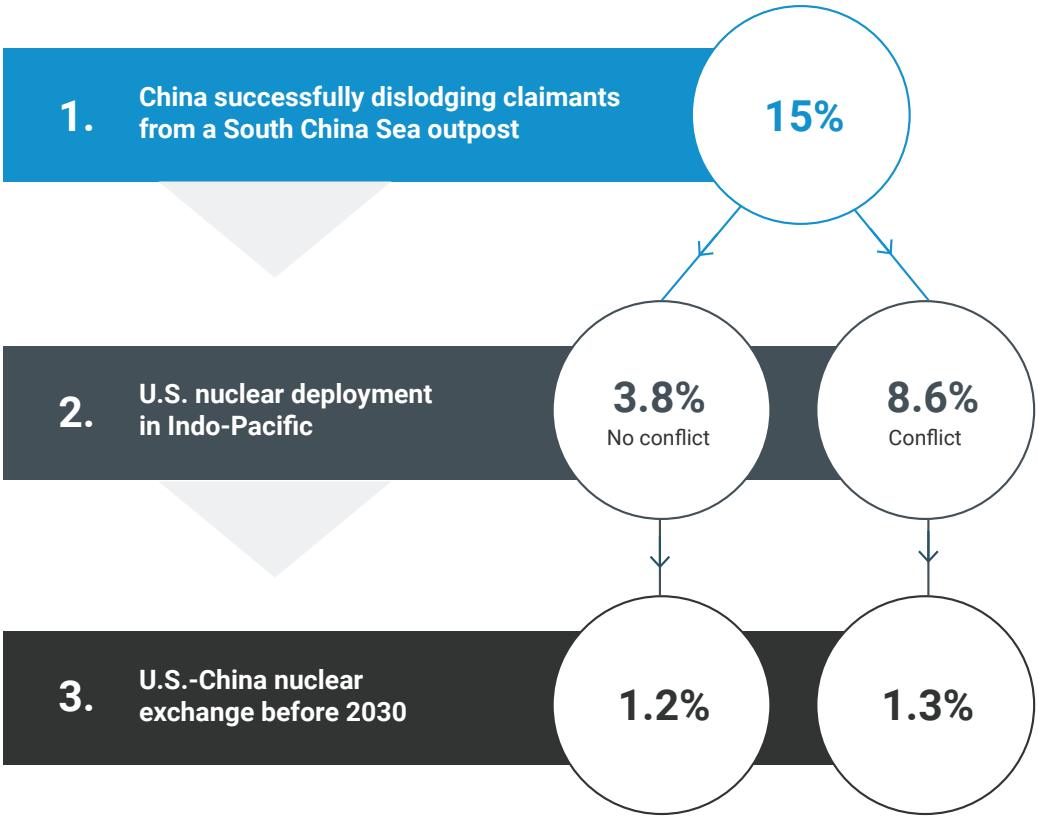


FIGURE 3.5. U.S.-China Nuclear Exchange Pathways Under the South China Sea Disputes Scenario



This apparent stability in nuclear risk masks a meaningful shift in the escalation architecture. The sharp rise in deployment probability suggests that even limited conflict in the South China Sea alters U.S. force posture expectations, moving the system closer to activation without yet crossing the nuclear threshold. Such incomplete escalation may preserve deterrence in the short term but increases the fragility of crisis management in the region.

Nuclear Posture Shifts

Two potential changes in nuclear posture show identical probability impacts: First, China's formal abandonment of its no-first-use policy; and second, resumption of nuclear weapons testing by either Washington or Beijing. If neither of these conditions occurs, the model estimates remain at baseline levels: A 3.8% probability of U.S. nuclear deployments and a 1.2% inferred likelihood of nuclear conflict. Should either condition take place, signaling a shift toward more preemptive or assertive nuclear posturing, the probability of U.S. deployments more than doubles to 8.6%, while the inferred likelihood of nuclear exchange increases slightly to 1.3%. While the change in nuclear risk is marginal in quantitative terms, the altered signaling environment substantially reshapes escalation dynamics. Strategic ambiguity is replaced by overt doctrinal signaling, potentially compressing reaction times and raising the stakes in future crisis scenarios.

FIGURE 3.6. U.S.-China Nuclear Exchange Pathways Under a Chinese Renunciation of No-First-Use

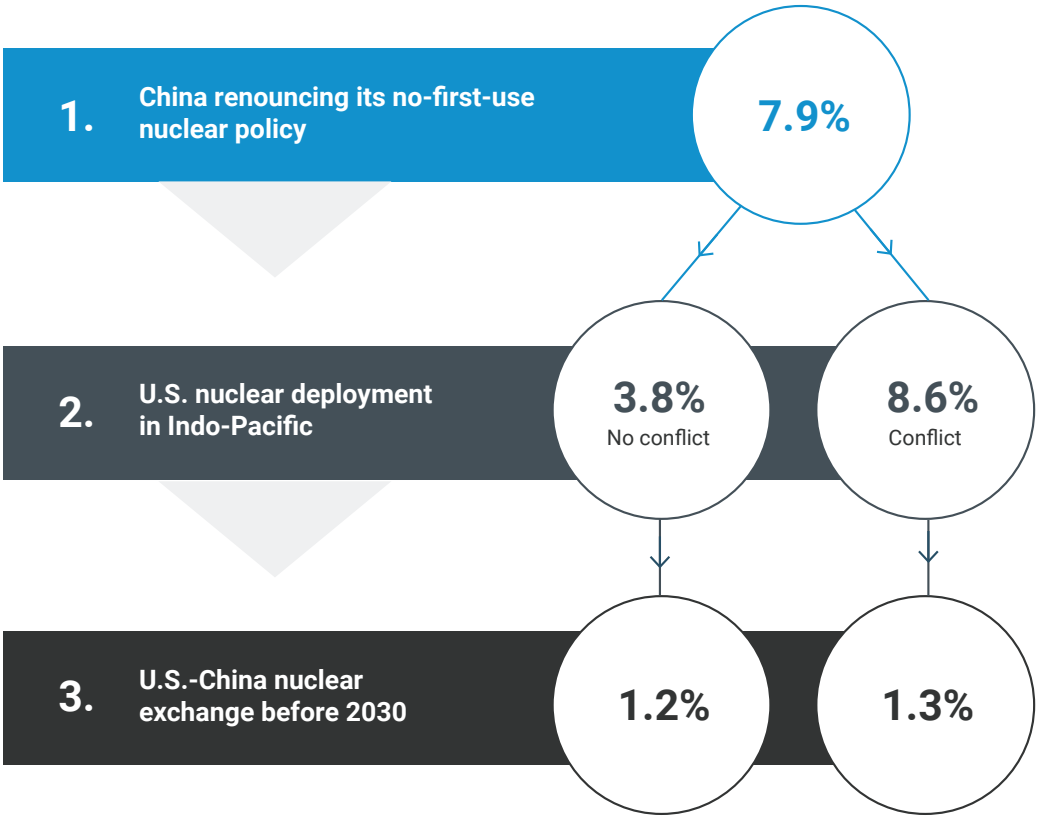
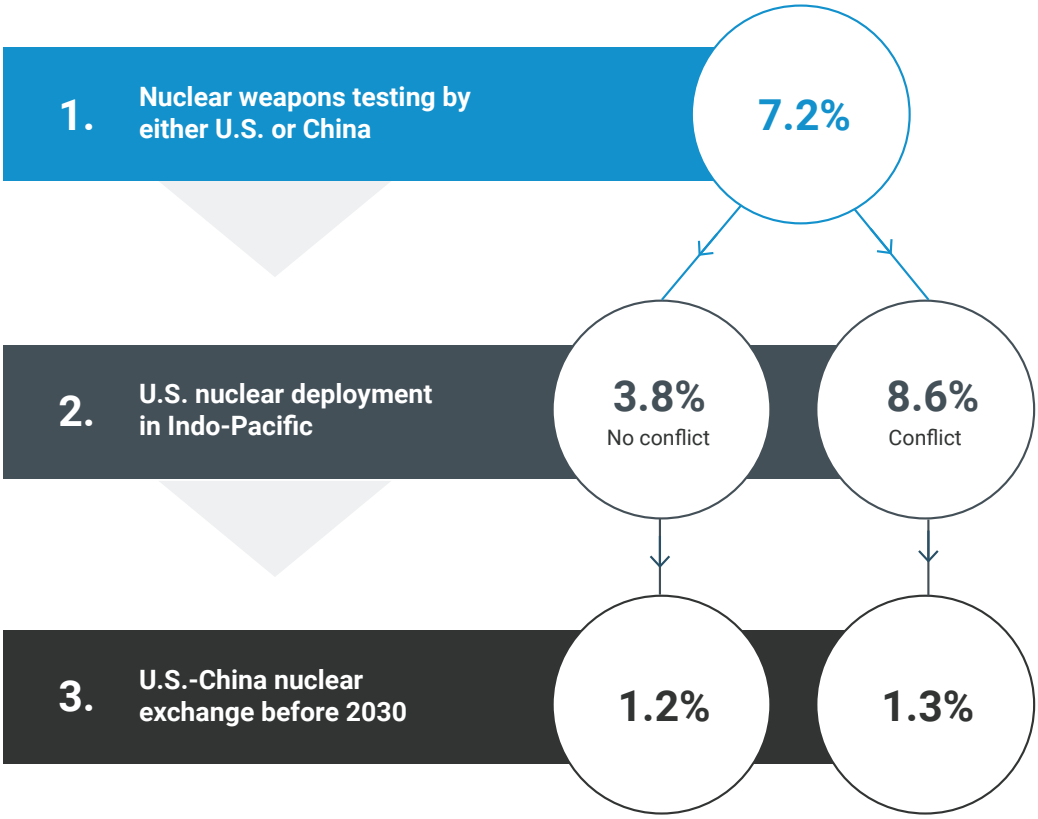


FIGURE 3.7. U.S.-China Nuclear Exchange Pathways Under the Resumption of Nuclear Weapons Testing

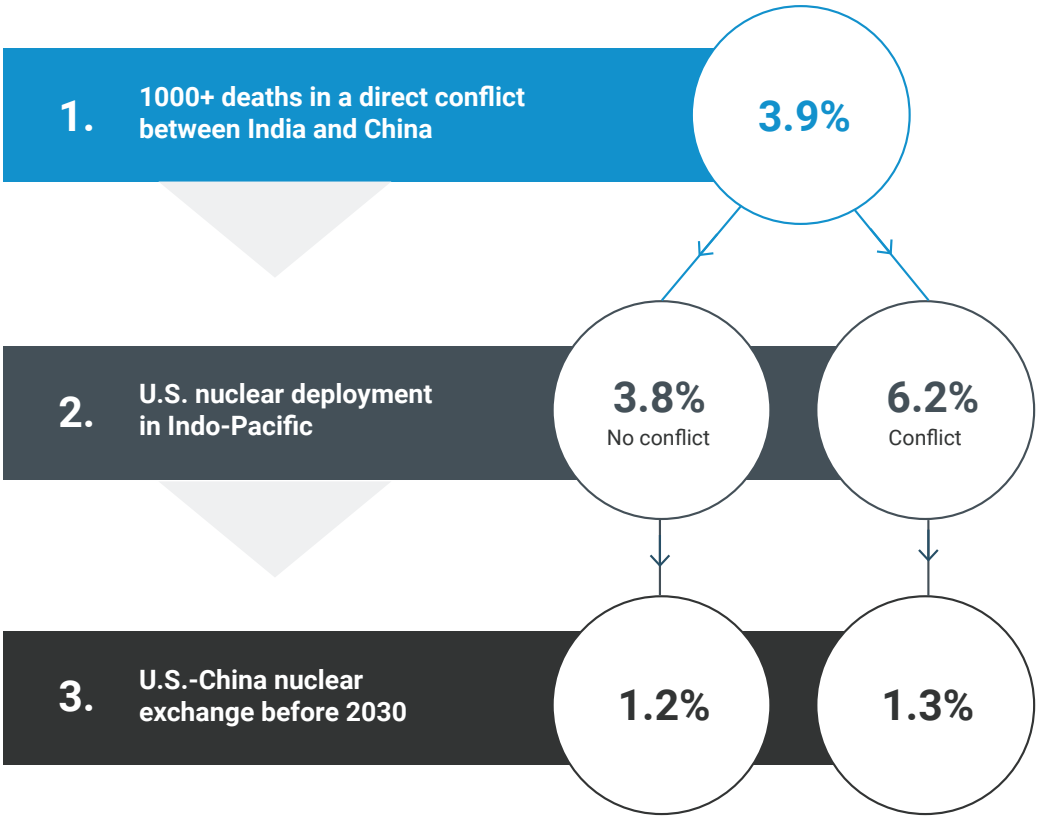


These findings underscore that not all escalation drivers are event based. Changes in declared posture or demonstrative behavior can silently reconfigure the structural balance of perceived threat, even in the absence of immediate conflict.

China-India Conflict

When no major conflict between China and India is present, the model estimates remain at structural baseline levels: A 3.8% probability of U.S. nuclear deployments and a 1.2% inferred likelihood of a U.S.-China nuclear exchange before 2030. Even under conditions involving large-scale military conflict—defined here as 1,000 or more battlefield casualties—the escalatory impact remains very limited. The probability of U.S. nuclear deployments rises modestly to 6.2%, while the inferred likelihood of nuclear exchange ticks up only slightly to 1.3%, aligning with the model's structural baseline.

FIGURE 3.8. U.S.-China Nuclear Exchange Pathways Under a China-India Conflict Scenario



This comparatively muted risk profile reflects both the geographic separation of the Sino-Indian frontier from U.S. core strategic commitments and the existence of bilateral crisis management mechanisms between Beijing and New Delhi. While the potential for regional spillover cannot be dismissed, the model suggests that U.S. nuclear posture is less sensitive to developments along the China-India axis than to flashpoints in the western Pacific.

Taken together, the model demonstrates that U.S.-China nuclear escalation risk is not uniformly distributed across crisis scenarios. Rather, it varies with the specific crisis pathway, the nature of force posture responses, and the embedded structural assumptions of each case. While some pathways (most notably Taiwan) exert direct upward pressure on escalation likelihood, others operate through more subtle posture shifts or signaling mechanisms. By quantifying these differences, the model offers a structured framework for identifying where nuclear risks are most likely to emerge, and how posture decisions may amplify or mitigate their trajectory over time.

CHAPTER 4

Conclusion

This assessment identifies a set of regionally specific but structurally comparable pathways to a potential U.S.-China nuclear exchange by 2030. While the baseline probability remains low, certain regional contingencies across the Indo-Pacific region raise this likelihood considerably, particularly those involving Taiwan, the Korean Peninsula, and the South China Sea. Key findings suggest that proximity to core U.S.-China strategic and national interests emerges as a primary driver of escalation probabilities, as evidenced by the heightened risks in the Taiwan and Korean cases. Direct challenges to U.S. alliance commitments consistently generate larger probability shifts in nuclear deployment calculations.

Conversely, conflicts in the South China Sea or along the India-China border, while regionally disruptive, generate more moderate changes due to lower direct entanglement of U.S. extended deterrence guarantees. Beyond regional flashpoints, changes in nuclear posture (e.g., China ending its no-first-use policy or either side resuming nuclear testing) also lead to moderate but notable growth in escalation risk. These shifts raise the probability of U.S. nuclear deployments to 8.6%, reflecting growing concerns over movement toward more preemptive doctrines. However, their impact remains less significant than crisis scenarios, which not only raise deployment probabilities more sharply but also directly affect alliance cohesion, strategic signaling, and regional stability.

Finally, although this assessment models each trigger independently to ensure analytical clarity, expert feedback underscores the importance of preparing for multi-theater escalation. In real-world crises, contingencies rarely unfold in isolation. Overlapping conflicts, whether sequential or simultaneous, may create compounding pressures that exceed linear risk estimates. As such, future modeling should incorporate interlinked pathways and stress-test U.S.-China crisis management mechanisms under conditions of degraded communication, strategic ambiguity, and competing alliance demands. Recognizing these compound risks is essential for prioritizing investments in early-warning systems, deconfliction protocols, and adaptive deterrence planning across the Indo-Pacific.

Top Priority Risk Management Areas

The exercise did not directly solicit expert preferences on risk reduction measures. Drawing on the risk reduction findings from the 2024 FRI-ONN study, this section outlines several actionable recommendations tailored to the U.S.-China context.[26] They are grouped under four mutually reinforcing domains, aimed at insulating the nuclear threshold from inadvertent escalation during regional crises:

1

Crisis Communication and Activity Verification

To reduce the risk of misperception during high-tempo deployments, the United States and China should establish a dedicated bilateral crisis-communication annex to complement existing hotlines, focused specifically on strategic signaling and conflict management. This should include:

- **Multi-layered and survivable communication channels between theater commanders and national decision-makers, potentially leveraging both military and civilian backchannels;**
- **Automated alert protocols for high-risk force movements, such as forward positioning of dual-capable bombers or ballistic missile units;**
- **Shared incident verification procedures for ambiguous incidents involving Intelligence, Surveillance, and Reconnaissance (ISR) platforms, naval collisions, or ambiguous launch signatures.**

Such mechanisms should be scoped modestly at first but expandable over time and politically decoupled from broader strategic arms control negotiations.

2

Posture Transparency and Failsafe Review

Given their consistent influence on escalation pathways across modeled scenarios, U.S. nuclear deployments warrant structured, posture-focused failsafe reviews. This approach prioritizes peacetime risk identification to clarify which deployments could be misinterpreted as preemptive or escalatory during future crises even when routine in intent. Structured as a Track 1.5 mechanism, the review process would involve:

- **Posture-focused review exercises, convening retired senior military planners and civilian strategists to evaluate recent movements of dual-capable or low-visibility systems like bomber rotations and submarine-launched ballistic missile (SSBN) patrols;**
- **Cross-domain simulations, focused on how ISR patterns, deployment ambiguity, or time compression could produce divergent threat interpretations across bureaucracies;**
- **Scenario-specific posture redline mapping, identifying which movements may resemble offensive first-strike indicators in degraded communications.**

Unlike formal transparency regimes, this process emphasizes interpretive alignment rather than disclosure, and aims to preempt crisis-era friction through anticipatory heuristics built in peacetime.

3

Scenario-Based Tabletop Exercises (TTX) and Signaling Calibration

While posture audits clarify how deployments may be misread in future crises, the U.S. and China should also institutionalize structured crisis simulations to explore how escalation decisions unfold under uncertainty. The current lack of shared strategic training creates dangerous asymmetries in how each side interprets adversary behavior under time pressure. Bilateral tabletop exercises should be conducted regularly and include:

- **Cross-role simulation of high-risk contingencies, such as Taiwan or South China Sea flashpoints, under conditions of degraded communication, ISR ambiguity, and alliance entanglement;**
- **Participation by senior civilian officials and retired military planners, to simulate real-world strategic dialogue chains while minimizing political friction;**
- **Emphasis on escalation thresholds, signaling intent, and preemption dilemmas, particularly how nuclear-relevant moves are interpreted in real time under compressed decision windows.**

Importantly, these TTX activities are not intended to legitimize specific force postures, deployments, or doctrines, nor to substitute for formal arms control or dialogue mechanisms. Rather, they complement existing crisis communication channels and failsafe review processes by improving mutual understanding of escalation dynamics and reducing the risk of inadvertent threshold crossing during acute regional crises.

4

Mutual Crisis-Time Restraint Pledges on Nuclear Deployment

While long-term strategic arms control between the U.S. and China remains unlikely in the near term, both sides could signal restraint during acute regional conflicts by issuing limited, reciprocal pledges under crisis conditions. These could include:

- **Mutual declarations to avoid introducing tactical or theater nuclear systems into conflict zones (e.g., Taiwan Strait, Korean Peninsula) at crisis onset;**
- **Temporary suspension of easily observable strategic maneuvers (e.g., SSBN port calls, bomber sorties) during agreed crisis windows that could be mistaken for first-strike mobilizations;**
- **Advance signaling requirements for dual-capable movements in ambiguous proximity, even absent explicit transparency agreements.**

Such measures would not require treaty formalization, legal codification, or permanent policy commitments. Instead, they could be paired with pre-negotiated confidence-building modules and crisis communication procedures to establish shared expectations of restraint during escalation-sensitive periods.

Technical Appendix

To systematically map pathways leading to a potential U.S.-China nuclear exchange by 2030, this study employed a structured expert forecasting process facilitated by The Swift Centre, in collaboration with ONN. The methodology combines subjective probability elicitation, causal risk structuring, and Bayesian network modeling—an approach widely used in analyzing low-probability, high-impact geopolitical risks.

A. Expert Selection and Forecasting Workshops

The process began with the recruitment of a multidisciplinary expert team comprising twenty SMEs and professional forecasters with high forecasting accuracy. These participants were selected to ensure a balance of domain knowledge and calibrated probabilistic reasoning. Before contributing forecasts, all participants received structured accuracy training to improve judgment quality and reduce cognitive biases. The elicitation took place over two workshops, during which experts interacted with live forecasting tools and collaborated on scenario development.

The first and foremost question posed to participants was: What is the likelihood of a U.S.-China nuclear exchange before 2030? Experts were asked to provide unconditional forecasts—that is, probability estimates assuming no major policy or strategic shifts. The aggregate result was 1.3%, described as “exceedingly unlikely”. This estimate closely mirrors the 1% baseline generated in a 2024 structured elicitation conducted by FRI and ONN, based on a larger sample of roughly 150 experts and superforecasters.[27] This alignment helped validate the forecast calibration prior to scenario disaggregation.

B. Elicitation of Escalatory Risk Pathways

After this baseline was established, experts engaged through a live platform designed to support anonymous interaction. Anonymity was maintained throughout to mitigate social conformity bias and encourage candid judgment. Using this platform, participants were first tasked with identifying and prioritizing key factors that could plausibly lead to a nuclear exchange between the United States and China. Through structured proposal, deliberation, and voting procedures, the group identified the deployment of U.S. nuclear weapons in the Indo-Pacific as the most impactful “primary risk” contributing to nuclear escalation.

Experts then proposed and voted on the set of hypothesized secondary risks most likely to increase the probability of the primary risk materializing. These included (but were not limited to): a conventional military conflict on the Korean Peninsula, territorial disputes around South China Sea, and escalation surrounding a Taiwan Strait crisis. They were refined and structured into a causal network with this basic structure:

- **Secondary risks → Primary risk → U.S.-China nuclear exchange**

C. Probabilistic Forecasting and Aggregation

Each participant independently submitted their probabilistic forecasts for each node in the causal chain. Specifically, they estimated both unconditional probabilities (e.g., the likelihood of a Taiwan Strait crisis) and conditional probabilities of associated downstream risks (e.g., the likelihood of U.S. nuclear deployment in the Indo-Pacific given a Taiwan crisis). The forecasts were aggregated using the geometric mean, which offers a robust central estimate for skewed probability distributions and reduces the influence of outliers. The resulting network was then used to identify which pathways had the greatest influence on the likelihood of bilateral nuclear exchange. In this iteration, all forecasts were equally weighted; no adjustments were made based on individual post-elicitation calibration scores or self-rated confidence. This uniform weighting approach is an acknowledged limitation and could be explored in future work.

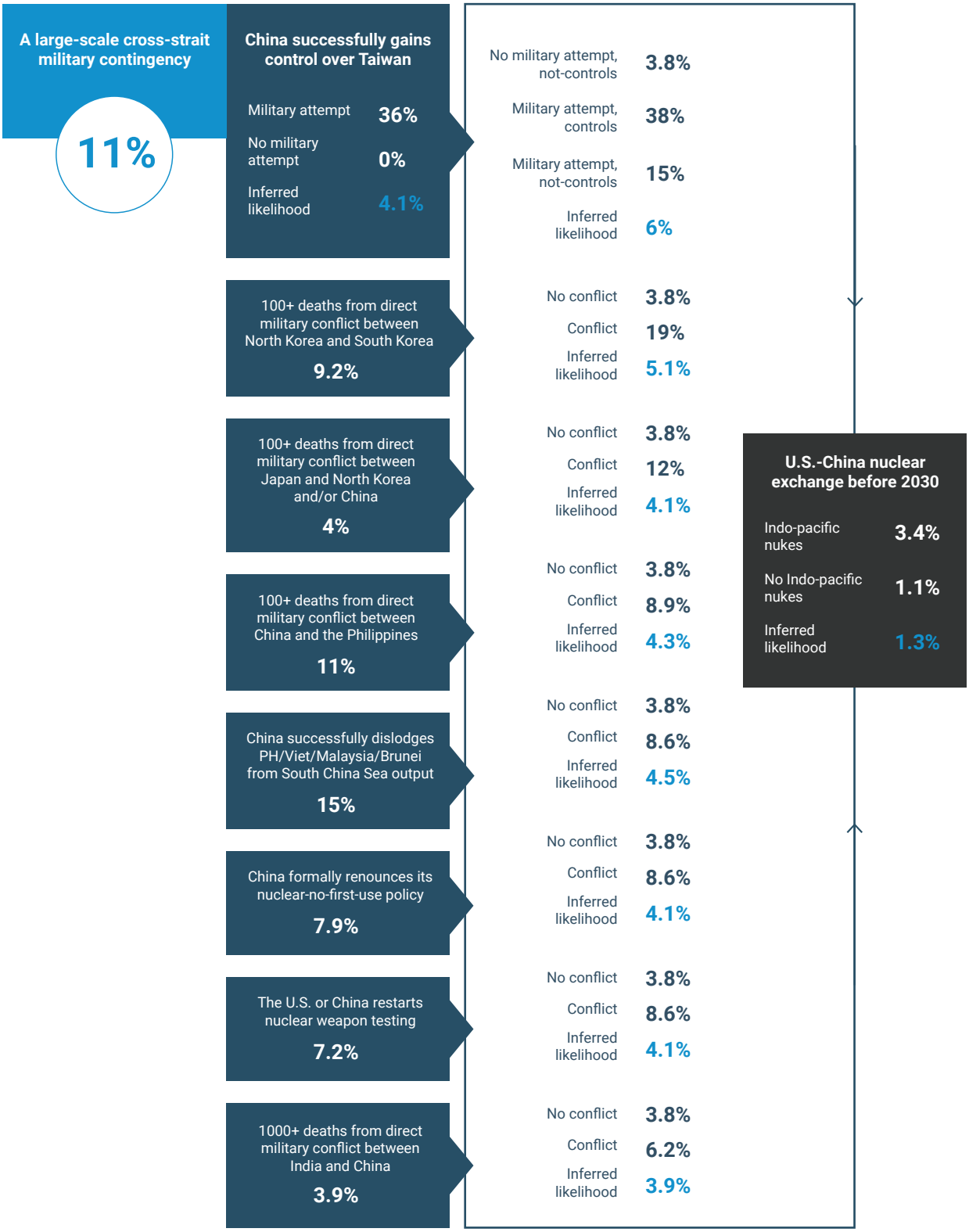
D. Bayesian Network Construction and Inference

The aggregated conditional probabilities were used to construct a Bayesian network representing a series of potential escalation pathways. Bayesian networks are well-suited for modeling escalation scenarios over alternative approaches, such as the use of conditional trees, mainly due to their ability to: (a) dynamically update probabilities as new information unfolds; (b) represent dependencies without collapsing across heterogeneous conditions; and (c) avoid common statistical fallacies such as Simpson's paradox. For example, in the following pathway:

- **Military conflict between North Korea and South Korea → U.S. nuclear weapons in Indo-Pacific → U.S.-China nuclear exchange before 2030**

Toggling the first event to "true" (e.g., assuming conflict occurs) automatically increases the inferred probabilities of downstream risks via Bayesian belief updating (presence of U.S. nuclear weapons in the Indo-Pacific and in turn the inferred likelihood of a U.S.-China nuclear exchange). Conversely, assuming no military conflict results in a downward adjustment of probabilities. The platform developed by the Swift Centre supports interactive visualization of these inferences, allowing users to simulate different combinations of scenario assumptions (Figure D.1).

FIGURE D.1. Illustrative View of the U.S.-China Nuclear Exchange Pathways Model



E. Definition of "Nuclear Use"

To clarify the model's conceptual scope, this report defines "nuclear use" in a deliberately abstracted and actor-neutral manner. Neither the workshop nor the analysis attempts to determine who would use nuclear weapons, how they would be used, or what yield category might be involved. Instead, it focuses on modeling the escalatory pathways that increase the overall probability of any nuclear use between the United States and China before 2030, regardless of initiator or technical configuration.

This abstraction reflects both methodological and normative choices. Workshop participants were not asked to disaggregate actor-specific use thresholds or weapons systems, given the limited available data and divergent doctrinal interpretations. More importantly, the project's core objective is to identify upstream conditions and leverage points most relevant for reducing escalation risk, rather than to simulate operational decisions or assign intent.

In this framing, "nuclear use" is treated as the terminal node of an escalation pathway—an outcome to be avoided—rather than as a domain for predictive wargaming. The conditions leading to it are, however, disaggregated and probabilistically assessed. Future work may incorporate actor-specific doctrines and thresholds, but such distinctions lie beyond the scope of this study.

F. Interpretive Boundaries and Limitations

Overall, there are some important limitations to consider when interpreting the inferred likelihoods. First, our model intentionally focuses on a single escalation corridor—U.S. nuclear deployment in the Indo-Pacific—as a heuristic to identify relatively influential risk factors. This narrowed scope necessarily excludes other accounts of plausible escalation dynamics, such as cyber operations, decapitation strikes, leadership instability, or early-warning system failures. These omitted pathways may interact with, or even override, the mechanisms modeled here.

Second, while Bayesian networks are effective tools for tracing conditional dependencies, they rest on the assumption of conditional independence between non-adjacent variables. In complex real-world environments, this assumption may underrepresent systemic feedback loops or nonlinear interactions, such as the mutual escalation dynamics between allied force posture and adversary threat perceptions, potentially oversimplifying the intertwined realities of decision-making under crises.

Finally, the inferred probabilities should not be interpreted as objective or standalone estimates of the likelihood of nuclear exchange. Rather, they reflect the relative influence of different escalation pathways under structured uncertainty. The model is designed to support comparative risk assessment, scenario stress-testing, and policy prioritization—not deterministic prediction.

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