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Research Paper

Curtailed ambition: Endogenous power shift and preventive war ⋆

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ABSTRACT

Preventive war arises from fears of future power shifts threatening the status quo. However, critics argue that since power shifts can be influenced by states' strategic decisions, preventive war can always be avoided. Using a lab experiment and a representative survey, this paper investigates how states' endogenous decisions affect the likelihood of conflict. We focus on two strategies: a containment policy, where rising states halt their own growth to prevent a power shift, and a commitment policy, where they make binding future offers without altering the power shift trajectory. Our findings show that while both policies reduce the likelihood of preventive war, containment is much less preferred than commitment. Additionally, declining states often resort to costly coercive containment measures rather than trusting the self-containment of rising states. In the representative survey, we pose conceptually similar questions to understand broader public opinions regarding international politics and find patterns that are consistent with the experimental results.

1. Introduction

The emergence of a new power that contests an established hegemon's status inevitably leads to tensions. Preventive war theories hold that when a rising state cannot commit not to exploit its future power, a status quo or declining state may initiate a costly conflict before the power shift occurs (Fearon, 1995; Powell, 1999; Copeland, 2000). Allison (2017) introduced the term the "Thucydides Trap" to describe this scenario, raising public awareness of the tensions between the rising power, China, and the status quo power, the U.S., which poses a significant risk of escalation into a destructive military conflict.[1,2] This theoretical claim has received empirical support (Fearon, 2004; Weisiger, 2013). However, critics argue that rapid and substantial power shifts are rarely exogenous; they

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[1] Allison (2017) examined 16 historical events where a rising power challenged an established power, and found that war occurred in 12 of those cases. His examples range from the rise of Athens and the Peloponnesian War to the growth of Germany's power and the Anglo-German rivalry from 1870 to 1914. More recent developments, such as Israel's 2025 strike on Iran's nuclear facilities, may also be viewed through this lens, although that case is shaped by additional ideological considerations.

[2] Beyond preventive war, the relationship between power shifts and conflict is frequently examined through power transition theory (e.g., Kim and Morrow, 1992). This framework differs logically from the commitment-problem models analyzed here: whereas power transition theory posits that a rising, dissatisfied power typically initiates aggression to overturn the status quo, preventive war models suggest that the declining power

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are often the result of states' strategic choices. If a rising state, facing the risk of preventive war, chooses to limit its own growth to prevent a power shift, then conflict can theoretically be averted (Chadefaux, 2011). Thus, the mere possibility of power shifts does not inherently lead to conflict.[3] The endogenous nature of power shifts complicates the empirical examination of the relationship between power shifts and conflict. The basic logic of preventive war examined here applies not only to international politics but also to domestic political domains, such as elites in power who bargain with the poor who threaten revolution (Acemoglu and Robinson, 2001; Powell, 2006), as well as to economic domains, such as firms bargaining with newly emerging labor unions.

Curtailing its own power growth is the most extreme form of credible reassurance a rising state can offer in the context of endogenous power shifts.[4] However, this strategy poses significant political challenges, is often perceived as counterintuitive, and is rarely observed in history.[5] States and their leaders are typically reluctant to signal weakness by reducing the investments that could shift the balance of power. Even if they are deterred from pursuing such investments, they often conceal these decisions to avoid domestic pressure and maintain international credibility. Instead, rising states may seek alternative means of credibly demonstrating their peaceful intentions. For instance, they could commit to preallocating a portion of their future gains to the declining state. This commitment can be more favorable than self-containment for the rising state, as it does not increase its vulnerability should a conflict arise. However, in theory, the underlying cause of preventive war is precisely the unenforceability of such a commitment. In light of this, the central empirical questions are whether a rising power is willing to self-contain and how effective such a strategy is at mitigating the risk of war.

In the present study, we use a theory-based lab experiment and a representative survey to understand how states maneuver toward peace or conflict by employing different strategies in a preventive war scenario with endogenous power shifts. Lab experiments allow us to focus on specific policies while controlling for other factors and are ideal for establishing a causal link between a state's policies and the occurrence of conflict, whereas representative surveys serve to extend experimental results from abstract settings to real-world scenarios. The experimental game is based on the seminal work of Fearon (1995) and Powell (1999). Two states, a rising state and a declining state, engage in a two-stage bargaining process. In each stage, the rising state proposes a deal to the declining state, which must then decide whether to accept the proposal or resort to conflict. Conflict is costly and inefficient. If it occurs in the first stage, a lottery heavily favoring the declining state determines who receives the entire payoff for both stages, thus ending the game. Conversely, if conflict occurs in the second stage, a lottery favoring the rising state determines who secures the entire payoff. However, if peace is preserved in both stages, each state receives its accumulated bargaining payoffs. In this game, the rising state cannot initiate conflict, which, as argued in Abbink et al. (2023), eliminates its preemptive motivation for conflict and allows us to focus on the declining state's preventive motivation.

This stylized model omits many features of real-world international politics to isolate the commitment problem as cleanly as possible. This simplification offers several advantages. First, by controlling for factors such as information frictions, uncertainty, and domestic political pressures, the model allows us to focus directly on how endogenous shifts in relative power shape preventive conflict. Second, the simplified environment eliminates alliance dynamics, ideological motivations, and other contextual influences that typically complicate empirical assessment, enabling a more transparent test of core theoretical predictions. Accordingly, this stylized approach clarifies the logic of preventive war as a commitment problem.

In the baseline setting, preventive war is theoretically inevitable due to a substantial exogenous power shift. The declining state finds it optimal to initiate conflict in the first stage rather than prolonging the game into the second stage. In the second stage, the rising state has a higher probability of winning, making it unlikely to make any offer. As Fearon (1995) notes: "the declining state attacks not because it fears being attacked in the future but because it fears the peace it will have to accept after the rival has grown stronger."

To investigate the impacts of various policy choices on bargaining outcomes, we introduce four treatments that allow the rising and/or declining state to adopt different policies, thereby endogenizing the power shift at the onset of the game. In the *RS-Contain* treatment, the rising state can halt the power shift between the two bargaining stages; in the *RS-Commit* treatment, it can preallocate a portion of the second-stage bargaining pie to the declining state without altering the power shift.[6] By comparing the baseline treatment with these two treatments, we separately assess the effectiveness of each policy in mitigating the risk of preventive war. We highlight that since the commitment policy is often unenforceable in real-world politics, the main purpose of the RS-Commit treatment is to provide a benchmark to assess the performance of the containment policy. In the *RS-Choice* treatment, the rising state has the option to select either policy. Although both policies are theoretically optimal and should be equally effective in preventing conflict, in the experiment, we find that the containment policy is adopted less frequently than the commitment policy. This reluctance to self-contain is especially pronounced when the rising state is granted full flexibility in choosing which policy to adopt, even though both approaches reduce the frequency of conflict to a similar degree.

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faces the primary incentive to strike. Empirical support for the core tenets of power transition theory remains mixed (Kim and Morrow, 1992; Lebow and Valentino, 2009).

[3] Debs and Monteiro (2014) goes even further by suggesting that it is the uncertainty surrounding these shifts that increases the likelihood of conflict, even if this perception is sometimes misguided.

[4] Self-containment could involve stopping military investments or destroying existing armaments (Debs and Monteiro, 2014), transferring war-related resources to the rival state (Chadefaux, 2011), and severing existing military alliances with other states (Krainin and Schub, 2021).

[5] As realist scholar Nicholas Spykman put it (Spykman, 1942), "The number of cases in which a strong dynamic state has stopped expanding…or has set modest limits to its power aims has been very few indeed."

[6] The commitment policy shares the same spirit as side-payments, which have been shown to be an effective conflict resolution mechanism in experimental Ultimatum bargaining games (Kimbrough and Sheremeta, 2013, 2014; Kimbrough et al., 2015).

The finding of a reluctance to self-contain leads us to explore another treatment, called *DS-Contain*, which gives the declining state the option of coercive containment. This option, however, is costly, reflecting the fact that coercion, sanctions, or other hard-line policies imposed by one state often incur substantial costs for both parties. To ensure this treatment is comparable to the RS-Contain treatment, if the declining state does not choose the containment policy, the rising state can still decide whether to self-contain, at no additional cost to the declining state. In this scenario, the theory predicts that the declining state should optimally wait and let the rising state adopt the self-containment policy. However, the experiment shows that the declining state often chooses to contain the rising state, at some cost to itself, rather than trusting the rising state to self-contain. Indeed, such trust often does not pay off for the declining state. Overall, our experimental evidence points to a reluctance among rising states to self-contain, even though it leads to a much higher likelihood of preventive war. This challenges critics' arguments that the risk of preventive war is often overstated, particularly the claim that war would not occur in complete-information models with endogenous power shifts (Chadefaux, 2011; Debs and Monteiro, 2014).

Critics of experimental research on war often note that, although lab experiments are useful for testing game-theoretical predictions, their relevance to real-world conflict remains uncertain.[7] To complement our lab study, we conducted a representative survey of the U.S. general population to explore whether public attitudes toward foreign policy exhibit similar patterns to those observed in the experiment. While such a survey cannot resolve the broader external validity concerns inherent in lab work, it can offer suggestive evidence of *construct validity*—that is, whether a wider population shows comparable intuitions about the plausibility and potential effectiveness of the policy mechanisms in the context of real-world threats. Because public opinion can influence foreign policy decisions, and because citizens may in some cases provide a rough proxy for certain elite perspectives, any consistency between the lab findings and the survey results would provide a tentative indication that our experimental insights may have relevance beyond the lab setting. To the best of our knowledge, Tingley (2017) is the only other study that tests the logic of preventive war in the context of exogenous power shifts using survey methods. However, our study is unique in that it combines a lab experiment grounded in a game-theoretical model of war with a complementary representative survey that illuminates public opinions on the role of foreign policies.

We constructed survey instruments to ensure that respondents' answers were comparable to the states' strategic decisions in our lab experiment. First, we provided respondents with contextual information regarding the evolving economic and military balance of power between the U.S. and China, framing China as a rising state and the U.S. as a status quo power. Respondents were then asked to estimate the probabilities of China adopting policies reflective of containment (i.e., curtailing military buildup) and commitment (i.e., making economic concessions and implementing domestic structural reforms). They were also asked to predict the probability of war between the two states, given the adoption of either policy or inaction. Consistent with the lab evidence, respondents believed that China was significantly less likely to adopt the containment policy than the commitment policy. Furthermore, if China were to hypothetically adopt either self-containment or commitment, respondents believed the probability of war would decrease significantly. However, unlike our lab findings, the commitment policy was not perceived to be as effective at decreasing the probability of war as the self-containment policy. This discrepancy is not entirely surprising; in the lab setting, commitment can be enforced by design, whereas respondents may have had doubts about its long-term viability in reality, possibly viewing it as a strategy for China to bide its time for more favorable conditions for future aggression. Overall, our survey evidence confirmed the perception of rising states' reluctance to self-contain and highlighted the limitations of employing the commitment policy within the realm of real-world politics.

Our study contributes to the experimental literature on the causes and resolution of conflict (Sheremeta, 2013; Dechenaux et al., 2015; Kimbrough et al., 2020; Ke et al., 2023; Baier et al., 2024), focusing on preventive war as the underlying source of conflict. From an economic perspective, a striking aspect of the preventive war logic is that it predicts a positive likelihood of war and, in fact, the inevitability of war, even under complete information.[8] This stands in contrast to the voluminous literature that posits that at least some degree of information asymmetry or imperfect information drives conflict (e.g., Chatterjee and Samuelson (1983), Brito and Intriligator (1985), Kydd (2005), Chassang and Miquel (2010); see reviews by Sanchez-Pages (2012) and Ramsay (2017)). To date, only a few experimental studies have focused on preventive war (Tingley, 2011; Quek, 2017), and the baseline game in the present study is built upon the model of Abbink et al. (2023). However, all previous experiments have predominantly focused on scenarios involving exogenous power shifts. This study provides the first experimental investigation into the validity of arguments against the inevitability of preventive war in the context of endogenously determined power shifts. Furthermore, we extend our inquiry beyond the abstract lab environment by conducting a representative survey to examine whether public opinions align with the lab evidence, thus providing more confidence in the real-world relevance of our experimental findings.

The theoretical literature on international bargaining has considered the impacts of various strategies that may endogenously shift the balance of power.[9] For rising states or challengers, military investments can be made to directly increase their military power, or they may choose to make transgressions or concessions that may have military value to avoid war (Chadefaux, 2011; Debs and

[7] In addition to the obvious concern about the relevance of abstract lab settings to real-world decision environments, one may argue that treatment differences are simply due to differential rates of learning the equilibrium across different games, thereby not reflecting underlying differences in behavioral motivations.

[8] Another type of model that can predict war under complete information is the two-stage bargaining model with two-sided commitment (Schelling, 1960; Crawford, 1982; Ellingsen and Miettinen, 2008; Miettinen, 2022), where each player can make a commitment attempt and may incur a cost of backing down if commitment is successful.

[9] Fearon (1996) and Schwarz and Sonin (2008) consider models in which the current division of resources determines the state's balance of military power in the next round. However, such models do not consider policy choices other than simple offers of the bargaining pie division.

Monteiro, 2014; Gurantz and Hirsch, 2017; Joseph, 2023).[10] Similarly, Baliga and Sjöström (2020) model successful transgressions as providing a first-mover advantage in terms of military odds, effectively endogenizing power shifts. For declining states or defenders, as alternatives to preventive war, they can impose military sanctions or employ containment strategies short of war to erode the rival's military strength such that power shifts are too small to trigger a preventive war (McCormack and Pascoe, 2017), or to serve as a strategic tactic of "testing" rising states' benign intentions (Yoder, 2019). It may also be preferable for declining states to initiate low-level conflict, known as hassling, to counteract rising states' military investments or transgressions while allowing bargaining to continue (Schram, 2021, 2022).[11] Our game-theoretical model aligns most closely with those of Debs and Monteiro (2014) and McCormack and Pascoe (2017) by incorporating the self-containment policy and the coercive containment policy for declining states, respectively. However, our model is substantially different from theirs to ensure that the various policies remain comparable and easily understood when implemented in the lab.

Finally, we situate our results within the extensive ultimatum game literature (Cochard et al., 2021, see). While classic experiments report low rejection rates for equal offers, rejections rise significantly when asymmetric outside options trigger conflicting self-serving interpretations of fairness (Schmitt, 2004; Hennig-Schmidt et al., 2018). Although our baseline preventive war treatment also yields high rejections for equal offers, the mechanism is strategically distinct. Unlike rejections in asymmetric ultimatum games, which serve as reactive punishment for distributive greed, rejections in our setting are "preventive." They are driven jointly by the anticipation of a future disadvantage and the current distribution of power. This is demonstrated by our commitment treatment, which reduces rejections by resolving the commitment problem while holding the power distribution (and thus outside options) constant, indicating behavior that cannot be explained by distributive preferences alone. Furthermore, by allowing states to choose commitment or containment policies, we endogenize the power structure itself and examine how agents strategically alter their environment to solve commitment problems, a dimension rarely explored in standard ultimatum experiments with fixed outside options.

2. Theoretical framework

Following Abbink et al. (2023), we employ a two-stage, two-individual bargaining model with endogenous power shifts to analyze preventive war dynamics. While the core theoretical framework is not original to this paper, we extend it here by introducing three policy mechanisms that allow us to experimentally test how endogenous policy choices by one or both parties can mitigate or exacerbate the commitment problem that underlies preventive war.[12] In each stage, two individual states—a rising state (RS) and a declining state (DS)—bargain over a pie worth one unit. Specifically, the rising state first decides how much to offer to the declining state, denoted as $x_1 \in [0,1]$ in the first stage and $x_2 \in [0,1]$ in the second stage. The declining state observes the offer and then decides whether to initiate a costly war against the rising state in each stage. If the game ends in peace, each state receives its share of the total bargaining pie according to the rising state's offers across the two stages. Alternatively, if war occurs in either stage, any prior bargaining offers are nullified.[13] The game's payoff for each party then depends probabilistically on their relative winning probabilities in that stage. The victor receives the total prize worth two units, while the defeated receives nothing. Additionally, both states must bear the cost of fighting, $C < 1$. Fig. 1 shows the game tree in this baseline setting.

Absent any intervention, the relative power of the two states, which reflects their relative economic and military potentials in war effort, shifts in favor of the rising state from the first to the second stage. This relative power is modeled through the declining state's probability of winning in a stage, P_1^{DS} in the first stage and P_2^{DS} in the second stage, whereby $0 < P_2^{DS} < 0.5 < P_1^{DS} < 1$. Correspondingly, the rising state's probability of winning in a stage is P_1^{RS} (P_2^{RS}) for the first (second) stage, with the conditions that $P_1^{DS} + P_1^{RS} = 1$ and $P_2^{DS} + P_2^{RS} = 1$.

In Abbink et al. (2023), the power shift is exogenous, meaning that the extent to which the rising state becomes stronger and the declining state becomes weaker in the second stage is determined outside the model. The authors show that, according to the subgame perfect equilibrium, war or peace depends on whether the rising state can make a satisfactory offer to the declining state in the first stage. Specifically, if $2P_1^{DS} - C > 1$, war is theoretically inevitable as the unique SPE. The key rationale for this result lies in the rising state's inability to commit to an offer in the second stage. Once the game proceeds to this stage peacefully, the rising state, now possessing greater relative power, has a strong incentive to renege on any previous bargaining offer, if one is made at all.

[10] This is also related to the literature on strategic militarization in which both states can make often unobserved arming decisions (Baliga and Sjöström, 2008; Meirowitz and Sartori, 2008; Jackson and Morelli, 2009; Meirowitz et al., 2019). However, the focus of these models is to understand how randomized arming may help deter opponents and obtain larger pies despite the fact that war may be unavoidable in equilibrium due to the information asymmetry created by this randomization.

[11] In the context of state consolidation, Powell (2013) models complex strategic interactions between a government and an armed opposition in an infinite horizon game. The government can choose to consolidate power, which, if successful, will lower the opposition's payoff from fighting in the future, thereby shifting the balance of power endogenously. However, the opposition can fight in the current stage in an attempt to impede the government's efforts to consolidate, resulting in the balance of power remaining unchanged.

[12] The basic model can be generalized to an infinite horizon game without altering the key insight on the commitment problem (Fearon, 1995). It has also been suggested that focusing on simple take-it-or-leave-it offers rather than more complex bargaining protocols in a crisis bargaining game produces the same equilibrium outcome in terms of the risk of war and distribution of benefits (Fey and Kenkel, 2021).

[13] Abbink et al. (2023) provided both theoretical and empirical justifications for this modeling choice. Another modeling approach is to assume that the conflict impacts only the division of the current and future bargaining resources, leaving past divisions unchanged. This approach is appropriate for examining disputes over resources that are consumed immediately. However, in reality, many prior agreements on resource distribution made during peaceful times can be overturned or revisited during conflicts. A notable instance of this is territorial control, such as in the Russia-Ukraine War, where both parties are vying for control over regions like Crimea, Luhansk, and Donetsk.

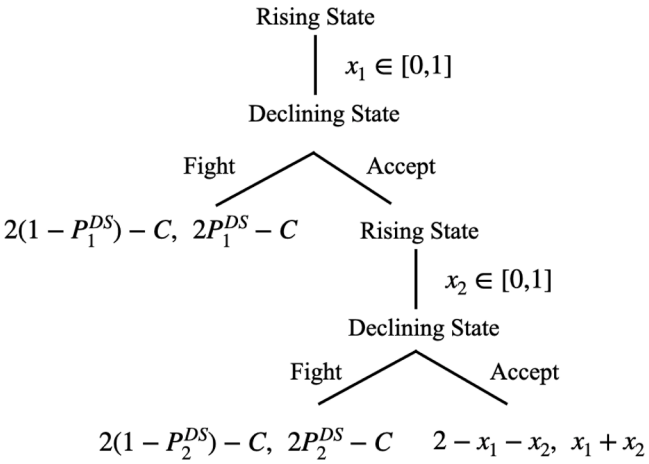

Fig. 1. The game tree in the baseline setting.

Anticipating this commitment problem, the declining state is better off initiating a preventive war in the first stage when it is still relatively stronger.[14]

The primary critique of the inevitability of preventive war stems from the theoretical observation that a rising state, foreseeing the potentially disastrous consequences of preventive war, would be deterred from making (transparent and verifiable) investments that lead to a significant power shift (Chadefaux, 2011; Debs and Monteiro, 2014). To model the endogenous power shift under the present theoretical framework, we consider a situation in which the rising state can unilaterally decide to limit its own power growth before the first stage. When the rising state chooses to curtail its power growth, the relative power between the two states remains constant across both bargaining stages. Specifically, the declining state retains its position as the relatively stronger state in the second stage, while the rising state remains the relatively weaker state. To demonstrate how the endogenous power shift affects the equilibrium outcome, we focus on a parameter configuration where preventive war is theoretically inevitable under an exogenous power shift, i.e., $2P_1^{DS} - C > 1$. When a self-containment option is available, backward induction implies that the rising state will opt for this strategy to avoid a costly war, offering the declining state a share of the total bargaining pie equivalent to its first-stage (counterfactual) war payoff, plus a minimal amount to break ties; thus, the unique SPE predicts a peaceful resolution.

Proposition 1. *Assume $2P_1^{DS} - C > 1$, when the power shift is exogenous, every SPE involves preventive war. When the power shift can be endogenously determined by the rising state, peace prevails in every SPE.*

It is important to note that limited containment, as opposed to full-scale containment, is theoretically ineffective in promoting peace. The declining state can only obtain its expected war payoff from the first stage, irrespective of whether the outcome is resolved through fighting or peaceful bargaining. If the game advances to the second stage, in which the rising state is even slightly stronger than it was in the first stage, the rising state has every incentive to offer less than the declining state's expected payoff from fighting in the first stage, provided that the declining state has no incentive to fight in the second stage. Anticipating this unfavorable outcome, the declining state would be better off initiating a preventive war in the first stage. In summary, the challenge with limited containment is that the declining state may conclude that "if the rising state truly had non-aggressive intentions, it would have demonstrated this through full containment." Hence, limited containment fails to resolve the underlying commitment problem.[15]

A related critique of the preventive war logic is that the declining state has a broader range of policy options than those assumed in the model, including coercive containment policies that may be less costly than engaging in all-out war. By adopting a containment strategy against the rising state, the declining state can effectively halt the power shift and avoid the costly consequences of preventive war. However, as previously argued, the rising state is already inclined to adopt self-containment. This undermines the necessity for the declining state to consider other containment policies, making the broader range of policy options theoretically redundant.

To summarize, we examine the logic of self-containment, which is theoretically viable for sustaining peace because rational rising states would choose to self-contain their growth to avoid preventive war. This strategy could be as effective as a commitment policy, where the rising state preallocates resources to the declining state to avert conflict. However, the rationale behind self-containment

[14] For a detailed proof, see Abbink et al. (2023). To illustrate the basic idea, the declining state accepts an offer in the first stage only if $x_1 > 2P_1^{DS} - C$. When $2P_1^{DS} - C > 1$, no feasible x_1 will meet the declining state's demand. In such a case, even an offer of $x_1 = 1$ would not be sufficient for acceptance. However, if the game proceeds to the second stage, the declining state can be satisfied as long as $x_1 + x_2 > 2P_2^{DS} - C$, which is automatically fulfilled since $P_1^{DS} > P_2^{DS}$. Therefore, as long as the rising state can commit to offering the declining state $x_1 + x_2 > 2P_2^{DS} - C$, preventive war can be avoided. Yet, the inability to commit is inherent within the structure of this game.

[15] In practice, it is also unclear whether limited containment necessarily works better than full-scale containment. Limited containment might be viewed by the status quo power as the rising power's hiding its capabilities and biding its time, only serving to defeat the status quo power when the timing is mature.

Table 1
The experimental design.

Treatment	Key features	Prediction
PW-Baseline	In each stage, RS allocates a 10-point pie. DS accepts or fights. Fighting costs 4 points for each state. RS's winning probability shifts from 20% in stage 1 to 70% in stage 2.	DS fights in stage 1 irrespective of RS's choice.
RS-Contain	RS can limit its winning probability to 20% across both stages.	RS self-contains and peace prevails.
RS-Commit	RS can preallocate stage2ŕs pie in stage 1.	RS commits by offering 12 points to DS and peace prevails.
RS-Choice	RS can 1) self-contain, 2) preallocate, or 3) take no action.	RS either self-contains or commits; peace prevails.
DS-Contain	DS can adjust RS's winning probability to 20% across both stages, which costs DS 1 point. If DS does not adjust, RS can self-contain.	DS does not adjust, RS self-contains and peace prevails.

may appear counterintuitive; it is often viewed as incongruous or embarrassing to voluntarily restrict one's growth and expose oneself to vulnerability. Moreover, a question arises as to whether the declining state will trust the rising state to effectively self-contain. If such trust is absent, the declining state may resort to coercive measures to impede the power shift. While our model provides definitive theoretical answers to these questions, understanding how individuals navigate these complexities requires empirical investigation. To this end, we designed a controlled experiment to test these theoretical claims.

3. Experimental design and hypotheses

3.1. Treatments

To experimentally examine the potential of various policies that the rising state or the declining state could undertake to mitigate the risk of preventive wars, we designed a total of five between-subjects treatments, which will be described in detail as follows. Table 1 summarizes the key features and theoretical prediction for each treatment.[16]

3.1.1. The PW-Baseline Treatment

The PW-Baseline treatment serves as the baseline, in which both the rising and declining states have no additional strategies other than bargaining and fighting. The basic design closely follows the model setup. In each of the 30 rounds, two randomly matched participants were randomly assigned to the role of the rising state and the declining state (referred to as Role A and Role B, respectively, in the experiment). Each participant received an endowment of 5 points per round, ensuring that no one incurred a loss from participating in the game.

The PW-Baseline treatment consists of two stages. In Stage 1, the rising state makes an offer out of a pie worth 10 points. The declining state observes the offer and decides whether to "accept" or "reject" it. Both states' Stage 1 decisions are revealed after this stage is completed. The declining state's choice of "reject" in Stage 1 is interpreted as the occurrence of preventive war. In this case, the rising state's offer will not be implemented, and both states will compete for a prize worth 20 points, equivalent to the total bargaining pie across the two stages. The computer then determines who receives the prize according to their probability of winning in Stage 1: 20% for the rising state and 80% for the declining state ($P_1^{DS} = 0.8$). Each party incurs a fighting cost of 4 points irrespective of the outcome, and the round ends without proceeding to Stage 2.[17]

If the declining state chooses "accept" in Stage 1, the game proceeds to Stage 2, where the rising state makes another offer from a new pie worth 10 points. The declining state observes the offer and decides whether to "accept" or "reject" it. A choice of "reject" nullifies the rising state's offers across both stages and result in a competition for a prize worth 20 points, each incurring a fighting cost of 4 points. The computer determines who receives the prize based on the probability of winning in Stage 2, set at 70% for the rising state and 30% for the declining state ($P_2^{DS} = 0.3$). Hence, a large exogenous power shift in favor of the rising state occurs in Stage 2. Alternatively, if the declining state chooses to "accept," the game concludes peacefully, with both states receiving their earnings according to the rising state's offers across the two stages. Given the chosen parameters for the PW-Baseline treatment, theory predicts the 100% occurrence of preventive war.

3.1.2. The RS-Contain Treatment

To investigate whether the rising state would choose to contain its own fighting capabilities to avoid preventive war, we implemented the RS-Contain treatment. This treatment differs from the PW-Baseline treatment in one aspect: prior to Stage 1, the rising

[16] Fig. C1 in Online Appendix C displays the timing, decisions and payoffs of the game for each treatment (with all values scaled down by a factor of one-tenth).

[17] Note that the fighting cost is 5 points in the baseline treatment of Abbink et al. (2023). The reason for lowering it to 4 points in the current baseline treatment is to increase the prevalence of preventive wars, thereby providing more scope to detect whether the policy treatments (commitment and containment) reduce the risk of preventive war.

state has the option to forestall the power shift. Specifically, the rising state can "adjust" the probability of winning to ensure it remains the same across both bargaining stages (i.e., $P_1^{DS} = P_2^{DS} = 0.8$). In other words, the rising state chooses to limit its winning probability to 20%, thereby ensuring that neither the rising state gains power nor the declining state loses power. If no adjustment is made, the subsequent game is essentially the same as the PW-Baseline treatment, in which the power shift favors the rising state.

According to the theoretical analysis in the previous section, peace prevails when the power shift is endogenous. The rising state always chooses the self-containment policy and offer a total of 12 points to the declining state, assuming a tie-breaking rule that favors peace. This offer is equivalent to the declining state's counterfactual expected payoff in the event of preventive war ($20 \times P_1^{DS} - 4 = 12$).

3.1.3. The RS-Commit Treatment

As an alternative to the containment policy, the rising state may adopt a commitment policy that fulfills the declining state's material interest by committing a portion or the entirety of the Stage 2 pie in advance. To facilitate comparison with the containment policy, we implemented the RS-Commit treatment, which differs from the PW-Baseline treatment in one aspect: in Stage 1, in addition to deciding how to split the pie from that stage, the rising state can also make an advance allocation of the pie from Stage 2. However, this advance allocation does not make Stage 2 decision-making entirely passive; the rising state must still allocate remaining points from Stage 2, provided that no fighting has occurred. For example, if the rising state preallocates 3 points from Stage 2 to the declining state, the remaining points available for allocation in Stage 2 would be reduced to 7 points. An alternative design is to simply eliminate Stage 2; but we decided to keep the two-stage structure to facilitate cleaner comparisons with other treatments.

In equilibrium, the rising state should offer a total of 12 points, including the advance allocation, to the declining state in Stage 1 and subsequently offer nothing in Stage 2. While such a commitment policy might not always be feasible in practice due to liability constraints or enforceability issues, especially if the struggle is between great powers, our purpose is to use the RS-Commit treatment as an appropriate benchmark, in which the commitment problem is completely absent, to assess the efficacy of the containment policy.

3.1.4. The RS-Choice Treatment

To expand the policy toolkit available to the rising state under the threat of preventive war, we designed the RS-Choice treatment. In this treatment, the rising state has the flexibility to choose between three strategic options prior to Stage 1: (i) to forestall the power shift anticipated in Stage 2; (ii) to make an advance allocation in Stage 1; (iii) to take no action, opting neither to forestall the power shift nor to make an advance allocation. If the rising state selects option (i) or (iii), then the game effectively mirrors the structure of the RS-Contain treatment. Conversely, should the rising state choose option (ii), the game follows the structure of the RS-Commit treatment.

The RS-Choice treatment serves two main purposes: first, to determine whether a broader policy toolkit can more effectively reduce the risk of preventive wars; and second, to identify which policy the rising state is inclined to adopt. Both questions lack clear ex-ante answers, as both policies are theoretically effective in eliminating preventive wars. Therefore, it is unclear which policy the rising state would prefer and whether the overall propensity for preventive war could be further diminished. Nonetheless, we speculate that the commitment policy may be more intuitively appealing, as it does not expose the rising state to the same vulnerability in Stage 2 that the containment policy does.

3.1.5. The DS-Contain Treatment

If implementing self-containment is considered unintuitive or risky for the rising state, it may be more prudent for the declining state to actively pursue a containment policy, even if it incurs additional costs. The DS-Contain treatment differs from the RS-Contain treatment in one aspect: prior to the rising state's adjustment decision, the declining state has the option to "adjust" the probability of winning to ensure it remains the same across the two stages, at the cost of 1 point to itself. In other words, the declining state can, at some cost, contain the rising state from gaining power. Only if the declining state chooses not to make this adjustment does the rising state have the chance to adopt its self-containment policy. From a theoretical perspective, the declining state does not need to engage in a costly containment strategy, as the rising state would invariably choose to adopt the self-containment policy on its own.

3.2. Hypotheses

We formally state the hypothesis regarding the occurrence of preventive war based on theoretical predictions as follows.

Hypothesis 1. The declining state is more likely to choose to fight in Stage 1 in the PW-Baseline treatment than in any other treatments.

While a larger policy toolkit available to either the rising state or the declining state can theoretically promote peace, the specific pathway to achieving that peace varies across treatments. According to the SPE, in the RS-Contain treatment, the rising state should adopt the self-containment policy and offer a total of 12 points to the declining state. In the RS-Commit treatment, the rising state should preallocate points from Stage 2 by offering a total of 12 points in Stage 1 while retaining all points for itself in Stage 2. In the RS-Choice treatment, it is ex-ante unclear whether the rising state is more likely to pursue the containment or the commitment policy, as both are theoretically equally effective and efficient. However, our conjecture is that the commitment policy is intuitively more appealing, as it does not render the rising state vulnerable to fighting in Stage 2. It is important to acknowledge that, despite our efforts to design the self-containment and commitment policies to be as strategically simple as possible, the self-containment policy

Table 2
The frequency of preventive wars.

	All rounds	Last 10 rounds
PW-Baseline	67.2%	75.0%
RS-Contain	60.1%	53.7%
RS-Commit	49.4%	43.3%
RS-Choice	47.9%	39.7%
DS-Contain	43.2%	36.3%

may still be perceived as more strategically complex due to its reliance on a deeper understanding of the underlying commitment problem. However, strategic complexity may also manifest in the opposite manner. Since the self-containment policy involves a binary decision (full versus no containment) and the commitment policy entails a continuous choice, the latter could be regarded as more strategically complex. To facilitate learning, we also designed a relatively long experiment comprising 30 rounds of interactions. Although this issue is unlikely to be fully resolved within the context of our laboratory experiment, we attempt to address it in the survey study presented in Section 5 by eliminating strategic complexity through the use of straightforward questions about policy choices framed within the context of real-world international politics.

Finally, in the DS-Contain treatment, while the rising state is predicted to adopt the self-containment policy, which obviates the need for the declining state to pursue its own containment strategy, our conjecture is that the declining state may nonetheless find it advantageous to implement containment measures. This policy eliminates any uncertainty regarding the rising state's willingness to self-contain, thereby ensuring that the declining state maintains a stronger bargaining position across both stages.

3.3. Procedure

The experiment was conducted at the Nanjing Audit University Economics Experimental Lab with a total of 300 university students, using the software z-Tree (Fischbacher, 2007). For each of the five treatments, we conducted 6 sessions, each with 10 participants. The participants were randomly assigned to partitioned computer terminals upon arrival. They received experimental instructions (see Online Appendix A) in written form, which were also read aloud by the experimenter at the start of each session. The experiment began once all participants had completed their comprehension quiz questions about the instructions. During the experiment, participants were randomly paired in each round and randomly assigned to different roles. After each round, participants received full feedback about their own and paired members' decisions and payoffs. At the end of a session, participants were paid 1 RMB for every 6 points they accumulated in all rounds, in addition to 15 RMB for taking part in the experiment (with decimals in the final amount rounded to the nearest tenth). A typical session lasted about two hours with average earnings of 78.0 RMB per participant.[18]

4. Experimental results

In this section, we first evaluate the effectiveness of the containment and commitment policies that the rising state could pursue in reducing the risk of preventive war, relative to the PW-Baseline treatment. Next, we examine the rising state's preference between the two policies when both are available. Lastly, we explore whether the declining state may pursue its own containment policy to preclude the power shift.

4.1. Comparing RS-contain and RS-commit to PW-baseline: the effectiveness of the containment and commitment policies

Table 2 presents the overall frequency of preventive wars, i.e., the likelihood of fighting in Stage 1, for each treatment. The results are generally aligned with Hypothesis 1: averaging over all rounds, the declining state was significantly more likely to initiate preventive wars in PW-Baseline than when it can pursue either the containment policy (67.2% vs. 60.1%, $p = 0.093$) or the commitment policy (67.2% vs. 49.4%, $p < 0.001$).[19]

Notably, the containment policy appeared to be less effective in mitigating the risk of preventive war than the commitment policy (see column (1) of Table 3, hypothesis test H0: RS-Contain = RS-Commit, $p = 0.013$). Furthermore, as Table 2 shows, both policies became more effective as our participants gain experience. While the frequency of preventive wars increased over the rounds in PW-Baseline, it decreased in both RS-Contain and RS-Commit.[20] Focusing on observations from the last 10 rounds, the containment policy remained noticeably less effective than the commitment policy, although the treatment difference is not statistically significant (see column (4) of Table 3, hypothesis test H0: RS-Contain = RS-Commit, $p = 0.220$).

[18] The average per-hour earnings in the experiment were substantially higher than the minimum hourly wage, which is about 15–20 RMB in the local region. At the time of the experiment, the conversion rate was approximately 1 US dollar to 6.9 RMB.

[19] Unless otherwise stated, all p values in this subsection relate to the coefficient estimates from random effects probit regressions reported in Table 3.

[20] Also see Figs. C2 and C3 in Online Appendix C for the frequency of preventive wars round-by-round in RS-Contain and RS-Commit relative to PW-Baseline, respectively.

Table 3
Random effects probit regressions on the frequency of preventive wars.

	All rounds			Last 10 rounds		
	(1)	(2)	(3)	(4)	(5)	(6)
RS-Contain	–0.094*	0.033		–0.308***	0.015	
	(0.056)	(0.057)		(0.095)	(0.097)	
RS-Commit	–0.207***		–0.042	–0.434***		–0.056
	(0.050)		(0.063)	(0.064)		(0.085)
Contain		–0.324***			–0.428***	
		(0.030)			(0.062)	
Commit			–0.361***			–0.407***
			(0.054)			(0.063)
Clusters	18	12	12	18	12	12
N	2700	1800	1800	900	600	600
H0: RS-Contain = RS-Commit	$p = 0.013$			$p = 0.220$		

Notes: This table reports the average marginal effects on the declining state's decision of launching preventive war. Standard errors clustered at the session level are in parentheses. The variables "Contain" and "Commit" indicate that the containment policy and the commitment policy are adopted, respectively. We define that the commitment policy is adopted when the combined Stage 1 offer exceeds 11 points. The PW-Baseline treatment serves as the benchmark in all regressions. *** $p < 0.01$, * $p < 0.10$.

The treatment difference in overall effectiveness between the two policies may arise from the rising state's differing adoption rates of each policy, the effectiveness of each policy when implemented, or a combination of both factors. To investigate the primary cause of this difference, Fig. 2 shows the frequency of the rising state's policy choice in RS-Contain and RS-Commit. In RS-Commit, we define that the commitment policy is implemented when the combined offer, consisting of the stage 1 offer plus the advance allocation, exceeds 11 points, aligning with the theoretical prediction. This figure shows a clear trend: while both policies are chosen more frequently over time, the commitment policy emerged as more favorable. During the last 10 rounds, while the containment policy was chosen only 49% of the time, the commitment policy was adopted 70% of the time. Further, Fig. 3 revealed that the frequency of preventive wars conditional on policy choices is similar between RS-Contain and RS-Commit. In both treatments, if the rising state does not adopt any policy to appease the declining state, the frequency of preventive war mirrored that of the PW-Baseline treatment. Conversely, when either the containment or commitment policy is chosen, both are nearly equally effective in reducing the likelihood of preventive wars (see Table 3, columns (2) and (3) for statistical evidence from regressions using data from all rounds, and columns (5) and (6) using data from the last 10 rounds.).[21] Therefore, the difference in overall effectiveness between the two policies was mainly attributed to the rising state's greater propensity for choosing the commitment policy over the containment policy. Also note that, given that the containment policy involves a simple binary decision (full versus no containment) and 30 rounds of learning opportunities, the substantial discrepancy in adoption rates between the two policies is unlikely to be fully attributable to differences in strategic complexity and the associated challenges in learning.

Next, we briefly discuss the rising state's bargaining offers and the declining state's responses to these offers. In RS-Contain, as shown in Fig. C5 in Online Appendix C, when the rising state chooses not to adopt the containment policy, the Stage 1 offer converged to almost 10 points, while the Stage 2 offer reduced to almost zero. This observation is consistent with that from PW-Baseline and aligns well with the theoretical predictions. By contrast, when the rising state chooses the containment policy, the Stage 1 offer and the Stage 2 offer were around 8 points and 6 points, respectively. Despite the lower Stage 1 offer associated with the containment policy, the frequency of preventive wars was significantly reduced. This decrease is most clearly demonstrated in Fig. C6, which suggested a lower rate of fighting in Stage 1 for almost every possible Stage 1 offer when the containment policy is adopted. This contrasts sharply with the fighting rate in PW-Baseline or when the containment policy is not adopted in RS-Contain.[22] In RS-Commit, as shown in Fig. C7, the rising state's combined Stage 1 offer, including any advance allocation, increased over time and reached around 13 points, while the Stage 2 offer reduced to almost zero. Further, Fig. C8 showed that the rate of fighting in Stage 1 generally decreased with the higher combined Stage 1 offer, suggesting that the rising state's greater commitment fostered a more peaceful outcome.

Finally, we turn to the payoff consequence for both the rising and declining states under RS-Contain and RS-Commit, as shown in Fig. 4. In RS-Contain, perhaps surprisingly, although the adoption of the containment policy substantially reduced the likelihood of preventive wars, the rising state did not benefit from this concession. In fact, the rising state's payoff was lower when the containment policy was adopted than when it was not. By contrast, the declining state managed to secure an even higher payoff when the rising

[21] See Fig. C4 in Online Appendix C for the frequency of preventive wars conditional on policy choices for the last 10 rounds, which suggests a generally similar pattern.

[22] Table C1 Appendix C reports statistical evidence from regression analyses, showing that the containment policy reduces the frequency of preventive wars across the board. In particular, beyond the overall greater effect of the offer of 10 points on reducing the fighting rate compared to the offer of less than 10 points (see the negative estimate of $\mathbb{1}[\text{Offer}=10]$), the containment policy does not additionally cause the maximum Stage 1 offer to be less or more conducive to peace (see the insignificant estimate of the interaction term between Contain and $\mathbb{1}[\text{Offer}=10]$).

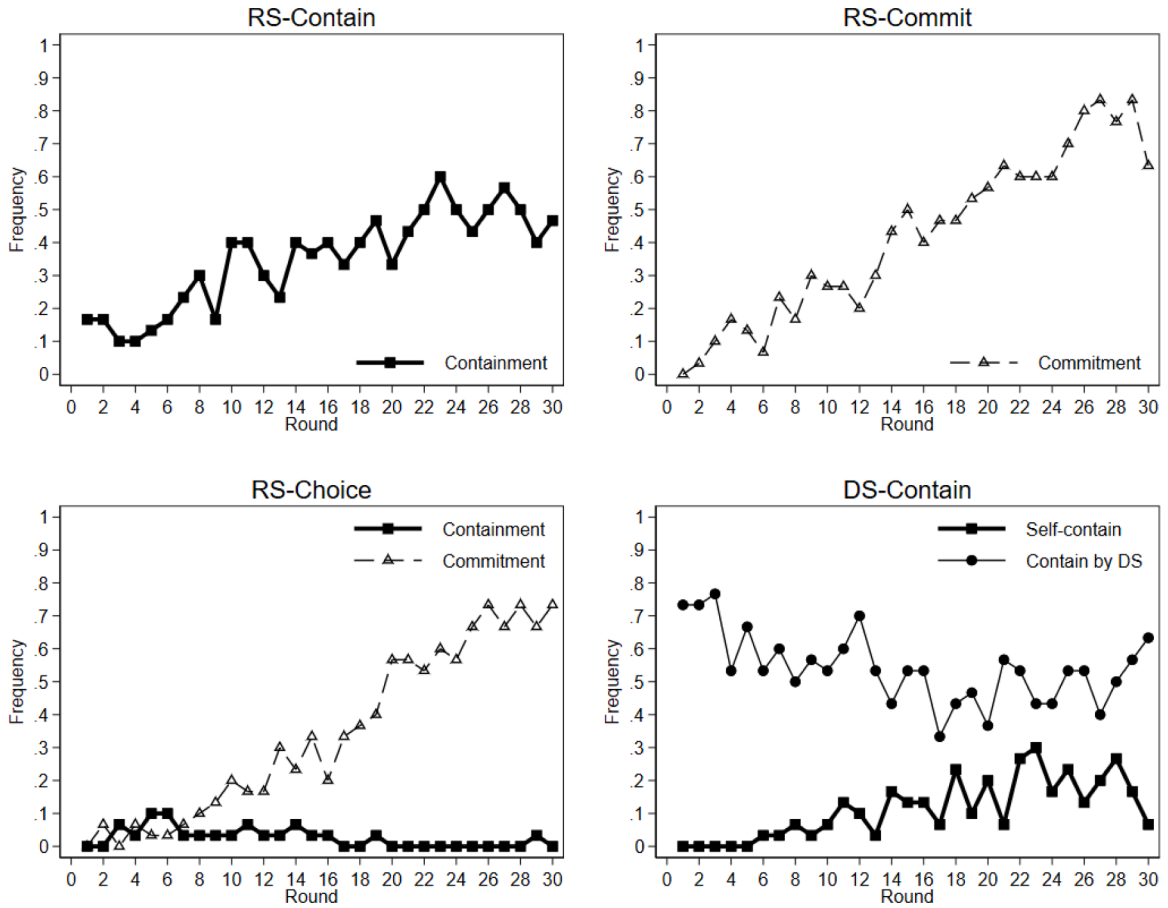

Fig. 2. Policy choices over time. *Notes:* In RS-Commit and RS-Choice, we define that the commitment policy is adopted when the combined Stage 1 offer exceeds 11 points.

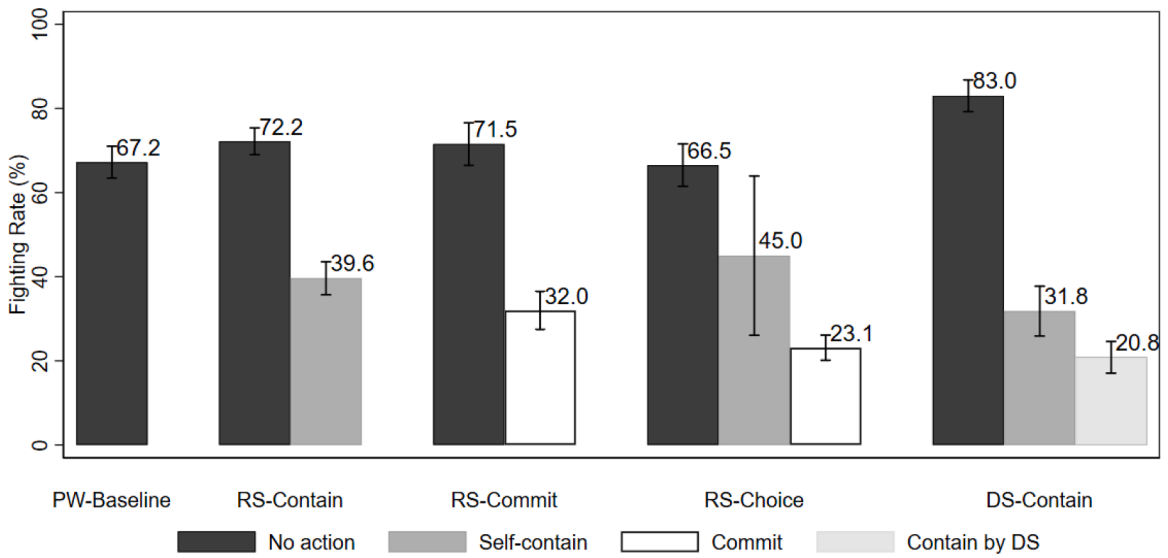

Fig. 3. The frequency of preventive wars by policy choices. *Notes:* Error bars represent one standard error of means clustered at the session level. In RS-Commit and RS-Choice, we define that the commitment policy is adopted when the combined Stage 1 offer exceeds 11 points. In RS-Commit, "no action" indicates that the combined Stage 1 offer must not exceed 10 points, while in RS-Choice, it indicates that the rising state explicitly chooses to take no action.

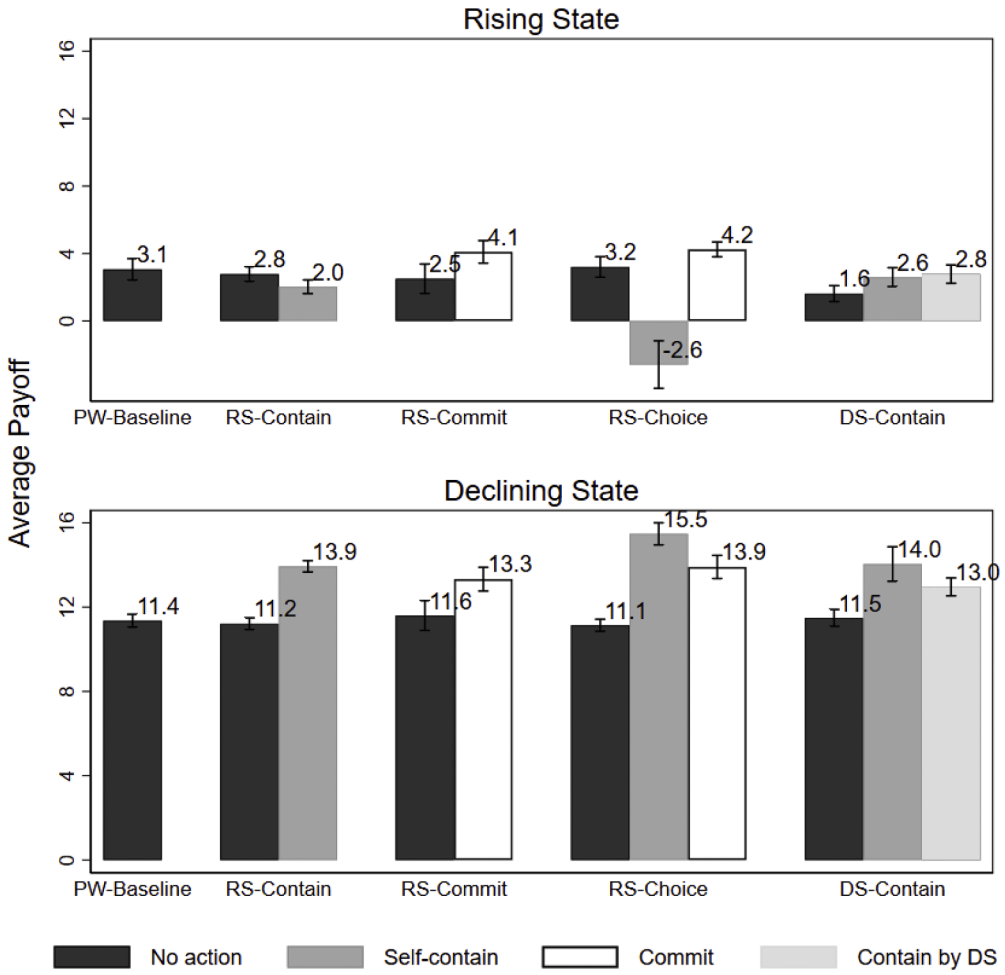

Fig. 4. The rising state's and declining state's average payoffs (excluding 5 points endowment). *Notes:* Error bars represent one standard error of means clustered at the session level. In RS-Commit and RS-Choice, we define that the commitment policy is adopted when the combined Stage 1 offer exceeds 11 points. In RS-Commit, "no action" indicates that the combined Stage 1 offer must not exceed 10 points, while in RS-Choice, it indicates that the rising state explicitly chooses to take no action.

state signaled its good intentions by self-containment.[23] Conversely, in RS-Commit, both states experienced a more equitable split of the total payoff, with each state enjoyed slightly higher payoffs under the commitment policy than in its absence.[24] These results may explain why the containment policy is adopted less frequently than the commitment policy.[25]

Although rational theory forcefully contends that the rising state should optimally choose self-containment to avert preventive war, our experimental results indicate that the potential of the containment policy in mitigating the risk of such wars is limited. This is especially telling when we compare the rising state's much greater inclination to adopt the alternative commitment policy.

Result 1. While the containment policy effectively reduces the likelihood of preventive wars when adopted, it is chosen with less than half of the time and primarily benefits the declining state at the expense of the self-contained rising state. In contrast, the commitment policy is at least equally effective in lowering the risk of preventive war, is adopted much more frequently, and benefits both the rising and declining states.

[23] Table C2 in Online Appendix C provides statistical evidence using regression analyses for both the rising state (H0: Contain = 0, $p = 0.003$) and the declining state (H0: Contain + Contain×DS = 0, $p < 0.001$). However, the payoff decrease for the rising state is not significant during the last 10 rounds. The regression results additionally suggest that when the containment policy is not adopted, both states' payoffs are not significantly different from their counterparts in PW-Baseline (H0: RS-Contain + RS-Contain×DS = 0, $p = 0.714$).

[24] Table C3 in Online Appendix C suggests that only the payoff increase for the declining state is statistically significant (H0: Commit + Commit×DS = 0, $p < 0.001$).

[25] See Fig. C9 in Online Appendix C for the average payoffs of both states in the last 10 rounds, which suggests the pattern is persistent over rounds.

Table 4
Random effects probit regressions on the frequency of preventive wars in RS-Choice.

	All rounds		Last 10 rounds	
	(1)	(2)	(3)	(4)
RS-Choice	–0.230***	–0.062	–0.412***	–0.074
	(0.042)	(0.074)	(0.034)	(0.092)
Contain		–0.359*		
		(0.195)		
Commit		–0.431***		–0.431***
		(0.053)		(0.064)
Clusters	12	12	12	12
N	1800	1800	600	599
H0: Contain = Commit		$p = 0.529$		

Notes: This table reports the average marginal effects on the declining state's decision of launching preventive war in RS-Choice. Standard errors clustered at the session level are in parentheses. The variables "Contain" and "Commit" indicate that the containment policy and the commitment policy are adopted, respectively. We define that the commitment policy is adopted when the combined Stage 1 offer exceeds 11 points. The variable "Contain" cannot be estimated for the last 10 rounds in column (4) because there are only two instances of the containment policy being chosen. The PW-Baseline treatment serves as the benchmark in all regressions. *** $p < 0.01$, * $p < 0.10$.

4.2. Focusing on RS-choice: does the rising state prefer the containment or commitment policies?

We observed that when the only alternative was to take no action, both the containment and commitment policies were often adopted to mitigate the risk of preventive wars, with the latter appearing to be more favored. Next, we turned to the RS-Choice treatment, in which the rising state could choose between both policies. Our purpose was to explore which policy was more likely to be adopted and the consequence of each policy choice. As shown in Table 2, the overall frequency of preventive wars in RS-Choice was significantly lower than in PW-Baseline, and the difference widened over rounds (47.9% vs. 67.2% for all rounds, $p < 0.001$; 39.7% vs. 75.0% for the last 10 rounds, $p < 0.001$, see columns (1) and (3) of Table 4).[26]

Fig. 2 illustrated a clear preference for the commitment policy in RS-Choice. As in RS-Commit, we defined that the commitment policy was implemented when the rising state first chose to make an advance allocation and the combined Stage 1 offer exceeded 11 points, aligning with the theoretical prediction. Over time, the commitment policy became the dominant policy choice, while the containment policy was rarely selected. Notably, during the last 10 rounds, while the commitment policy was adopted 65% of the time, the containment policy was almost never used, at just 0.3%. Because of this strong preference for the commitment policy, the overall preventive war frequency in RS-Choice did not significantly differ from that in RS-Commit (47.9% vs. 49.4% for all rounds, $p = 0.470$; 39.7% vs. 43.3% for the last 10 rounds, $p = 0.546$; p-values were estimated from random effects probit regressions using RS-Commit as the benchmark).

Further, as shown in Fig. 3, the frequency of preventive wars associated with each policy choice aligned closely with our findings from RS-Contain and RS-Commit. Both policies effectively reduced the likelihood of preventive wars when adopted; however, the effect of the containment policy was less precisely estimated due to the limited number of observations (see Table 4, column (2) for statistical evidence from a regression using data from all rounds, and column (4) using data from the last 10 rounds).

Next, we briefly examined the patterns of bargaining offers and conditional fighting responses. As the containment policy was rarely chosen, we focused on the cases where either the commitment device was activated or no policy was chosen. Here, we defined that the commitment device was activated when the rising state chose to make an advance payment, without imposing restrictions on the combined Stage 1 offer. Overall, the observed patterns resembled those observed in RS-Commit. As shown in Fig. C11 in Online Appendix C, when the commitment device was activated, the rising state's combined Stage 1 offer increased over time, stabilizing at around 13 points. In contrast, when neither policy was adopted, the Stage 1 offer converged to almost 10 points, similar to what was seen in PW-Baseline. In Stage 2, the offer dropped to almost zero in both cases. Further, Fig. C12 showed that when the (combined) Stage 1 offer in either case did not exceed 11 points, the conditional fighting rate in Stage 1 remained relatively high. However, once the combined offer exceeded 11 points, as it became a feasible option upon the adoption of the commitment policy, the conditional fighting rate decreased sharply.[27]

[26] See Fig. C10 in Online Appendix C for the frequency of preventive wars round-by-round in RS-Choice relative to PW-Baseline.

[27] Table C4 in Online Appendix C provided statistical evidence showing that the fighting rate in Stage 1 was significantly lower when the combined Stage 1 offer exceeded 11 points. In contrast, when the offer was no higher than 11 points (either when neither policy was chosen in RS-Choice or when the commitment policy was chosen but the combined offer was no higher than 11 points), the fighting rate was not significantly different between RS-Choice and PW-Baseline using observations from all rounds.

Finally, we turn to the average payoff in RS-Choice. Fig. 4 shows that when the commitment policy is chosen, both the rising state's and the declining state's payoffs increased. However, it is worth noting, albeit with caution due to the small number of observations, that when the containment policy is selected, only the declining state's payoff increased at the expense of the rising state's payoff. This finding is consistent with our earlier observations in RS-Commit and RS-Contain.[28]

Overall, our findings from the RS-Choice treatment did not support the theoretical claim that the rising state should optimally contain its own growth under the shadow of preventive war. In fact, the containment policy was never empirically appealing, even from the beginning of the experiment, when the alternative commitment policy was available. This suggests that the reluctance to adopt the containment policy was less about the rising state's negative experience (due to lower payoffs relative to PW-Baseline) and more about the counterintuitive nature and inherent risk of the containment policy, as it rendered the rising state more vulnerable should conflict arise in the future.

Result 2. When both the containment and commitment policies are available, the rising state predominantly chooses the commitment policy and rarely adopts the containment policy.

4.3. Comparing RS-contain and DS-contain: does the declining state adopt the containment policy?

So far, we have observed that the rising state was reluctant to self-contain to reduce the likelihood of preventive war. This hesitation was understandable, as such a policy eventually hurt the rising state's final payoff by allowing the declining state to exploit its vulnerability, securing a larger share of the total bargaining pie than what it could have obtained through preventive fighting. In this subsection, we examined the DS-Contain treatment, in which the declining state could proactively pursue its own containment policy before the rising state took any action. Our goal was to explore whether the declining state was willing to adopt this costly containment policy to forestall the potential power shift that the rising state might be reluctant to address (at no cost).

As DS-Contain was built directly upon RS-Contain, we used RS-Contain as the reference to evaluate the treatment effects of allowing the declining state to pursue its own containment policy. Table 2 revealed that the overall frequency of preventive wars in DS-Contain was the lowest among all treatments. In particular, the fighting rate was significantly lower than in RS-Contain (43.2% vs. 60.1% for all rounds, $p < 0.001$; 36.3% vs. 53.7% for the last 10 rounds, $p = 0.023$, see columns (1) and (3) of Table 5).[29]

Fig. 2 showed that the declining state chose to contain the rising state approximately 54% of the time, with this frequency remaining relatively stable across rounds. When the declining state did not choose the containment policy, the rising state was still more likely to take no action than to adopt self-containment; across all rounds, the conditional frequency of self-containment was only 25%, rising to 38% during the last 10 rounds. This behavior contradicted the SPE prediction but aligned with our conjecture discussed in Section 3. Further, Fig. 3 indicated that the declining state was least likely to fight if it adopted the containment policy against the rising state (see columns (2) and (4) of Table 5 for statistical evidence from regressions). Additionally, this conditional fighting rate dropped to just 10% during the last 10 rounds (see Fig. C4). The fighting rate was also slightly lower when the rising state chose to self-contain, following the declining state's decision not to contain it, compared to the similar scenario in RS-Contain, although the difference became insignificant and reversed direction during the last 10 rounds (see the negative estimate of the interaction term Self-Contain×DS-Contain in column (2) of Table 5 and the insignificant estimate in column (4)). It was important to note that these findings did not necessarily imply that the declining state's pursuit of the containment policy was more effective in reducing the likelihood of preventive war compared to the rising state's self-containment. A potential selection effect complicated this interpretation: some individuals playing the role of the declining state and choosing the containment policy might be inherently less prone to fighting, while others might be more predisposed toward conflict. This possibility aligned with the observation in Fig. 3, indicating that the highest fighting rate occurred in instances of "no action."

Next, we briefly discuss the patterns of bargaining offers and conditional fighting responses, which generally mirrored those observed in RS-Contain. Fig. C14 in Online Appendix C showed that when the containment policy was chosen, the Stage 1 offer and Stage 2 offer revolved around 8 points and 6 points, respectively. Additionally, Fig. C15 showed that the fighting rate was lower across all Stage 1 offers when the containment policy was adopted than when it was not. Thus, whether the containment policy was pursued by the declining state or the rising state did not significantly affect the patterns of bargaining offers and conditional fighting rates. Finally, regarding average payoffs, Fig. 4 showed that when the containment policy was chosen by either state, both states' payoffs increased.[30]

The main takeaway from the DS-Contain treatment is that even when the containment policy entails costs, the declining state was far more likely to adopt this policy to preclude any potential power shift, thereby allowing it to bargain from a position of strength. In contrast, the rising state remained reluctant to pursue self-containment, even though it incurs no direct cost. These results further undermine the theoretical argument that the rising state can be relied upon to rationally contain its own growth to eliminate motives for preventive war.

[28] Table C5 in Online Appendix C suggests that when using observations from all rounds, the payoff increase for the declining state is statistically significant both when the containment policy is chosen (H0: Contain + Contain×DS = 0, $p < 0.001$) and when the commitment policy is chosen (H0: Commit + Commit×DS = 0, $p < 0.001$). However, the increase for the containment policy is not significant during the last 10 rounds.

[29] See Fig. C13 in Online Appendix C for the frequency of preventive wars round-by-round in DS-Contain conditional on containment decisions by RS or DS.

[30] Table C5 in Online Appendix C suggests that the payoff increase for the declining state is statistically significant when the containment policy is chosen by either the declining state (H0: Contain by DS + Contain-by-DS×DS = 0, $p = 0.006$) or the rising state (H0: Self-contain + Self-contain×DS = 0, $p = 0.025$).

Table 5
Random effects probit regressions on the frequency of preventive wars in DS-Contain.

	All rounds		Last 10 rounds	
	(1)	(2)	(3)	(4)
DS-Contain	–0.202***	0.100	–0.250**	–0.008
	(0.038)	(0.064)	(0.110)	(0.133)
Self-Contain		–0.288***		–0.416***
		(0.029)		(0.046)
Self-Contain×DS-Contain		–0.195**		0.070
		(0.087)		(0.081)
Contain by DS		–0.564***		–0.557***
		(0.066)		(0.099)
Clusters	12	12	12	12
N	1800	1800	600	600

Notes: This table reports the average marginal effects on the declining state's decision of launching preventive war in RS-Choice. Standard errors clustered at the session level are in parentheses. The variables "Self-contain" and "Contain by DS" indicate that the containment policy is adopted by RS and DS, respectively. The RS-Contain treatment serves as the benchmark in all regressions. *** $p < 0.01$, ** $p < 0.05$.

Result 3. The declining state often adopts the costly containment policy, even though the rising state could have chosen the same policy at no cost. The DS-Contain treatment yields the most peaceful outcome among all treatments considered in this paper.

5. Evidence from a representative survey on public opinions of foreign policies and their effectiveness

In this section, we present evidence from a representative survey fielded on U.S. residents, aiming to examine whether public opinions on foreign policies align with our lab evidence. The survey was distributed online by the commercial survey company Dynata in July 2024. The average completion time was 24 minutes, and the median was 20 minutes. Participants were compensated with a variety of rewards, such as gift cards or points, which tend to attract a broad cross-section of respondents, including higher-income individuals. However, the specific compensation details are not publicly disclosed by Dynata.[31] To ensure the quality of responses, we excluded potentially inattentive respondents whose response time was less than 200 seconds or more than 10,000 seconds, which accounted for 2.0% of the initial sample.[32] Additionally, we dropped respondents who self-reported their inattention (to be explained below, 0.72% of the sample). The final sample comprised 541 individuals. Our results were robust when including all respondents. Table 6 presented the sample characteristics in comparison with the U.S. population statistics. By design, the final sample statistics closely matched the population demographics for the targeted dimensions of gender and age. Further, the sample was broadly representative on other dimensions such as employment status, marital status, race, and political affiliation. However, survey respondents tended to have higher incomes and higher levels of education than the general population, which was typical for online survey panels.[33]

5.1. Survey questions

The full questionnaire is available in Online Appendix B. Upon entering the survey, respondents were first shown a consent page that informed them that their participation in our academic study was entirely voluntary and that all identifying information would remain confidential. They were instructed to answer honestly and read the questions carefully before responding. After consenting, respondents were asked to provide background socioeconomic information, including their gender, age, highest level of education obtained, employment status, income, race, marital status, number of children, place of residence, and political orientation. Following the recommendation of Stantcheva (2023), we included a question not only to gauge self-reported attention but also to encourage respondents to consider the subsequent questions thoughtfully.[34]

[31] See Stantcheva (2023) for a detailed discussion on how these online commercial survey platforms typically recruit and compensate respondents, as well as an evaluation of their sample representativeness compared to population statistics.

[32] In some cases, respondents took several hours to finish the survey because the platform allowed them to pause and return later. However, we can only observe the total elapsed time from the moment they first opened the survey to the moment they submitted it, without information on any intermediate breaks.

[33] Around 16% of respondents entered the survey but then dropped out at various points without completing it. For many of these respondents, we collected demographic information before they dropped out, which allowed us to examine the attrition issue. Overall, older and/or retired respondents were more likely to drop out. This was likely due to the length of our survey (59 questions in total). However, since our sample was already representative of the general population in terms of age, we did not view this attrition as a serious issue for our research design.

[34] The question was "Before proceeding to the next set of questions, we want to ask for your feedback about the responses you provided so far. It is vital to our study that we only include responses from people who devoted their full attention to this study. This will not affect in any way the

Table 6
Survey sample characteristics.

	U.S. population	Survey
Male	0.49	0.51
18–24 years old	0.11	0.12
25–34 years old	0.17	0.17
35–44 years old	0.19	0.22
45–54 years old	0.17	0.15
55–64 years old	0.16	0.12
65–74 years old	0.14	0.14
75–84 years old	0.07	0.08
$0–$19,999	0.35	0.15
$20,000–$39,999	0.21	0.16
$40,000–$69,999	0.21	0.29
$70,000–$99,999	0.10	0.19
$100,000–$149,999	0.07	0.13
$150,000+	0.06	0.09
Four-year college degree or more	0.43	0.57
High-school graduate or less	0.33	0.17
Employed	0.59	0.62
Unemployed	0.02	0.09
Retired	0.19	0.22
Married	0.41	0.44
White	0.58	0.67
Black/African American	0.11	0.12
Hispanic/Latino	0.21	0.09
Asian/Asian American	0.07	0.07
Democrat	0.25	0.41
Republican	0.25	0.28
Independent	0.49	0.31
Sample size		541

Notes: The U.S. population statistics on gender, age, income, race, education, marital status, and employment status are from the IPUM-CPS, ASEC (Annual Social and Economic Supplement) data set for March 2023 (Flood et al., 2023). The population statistics on party affiliation for March 2023 are from Gallup (2023).

Respondents were then directed to the main question block on international relations. The key questions were designed to ensure that respondents' answers were comparable to the states' strategic decisions in our lab experiment. At the start of this block, respondents read two paragraphs outlining facts about the evolving U.S.-China economic and military balance of power, emphasizing that China had become stronger relative to the U.S. in both aspects over the past few decades. The purpose of presenting these facts was to frame China as a rising power and the U.S. as a status quo power. Subsequently, respondents were asked to predict the probability of war between the U.S. and China within the next decade and to indicate how certain they were about their prediction, following the method of measuring cognitive uncertainty proposed by Enke and Graeber (2023).

Subsequent questions focused on the predicted probability of China adopting policies reminiscent of containment (i.e., slowing down military buildup) and commitment (i.e., making economic concessions and domestic structural reforms). Respondents were then asked to assess whether the probability of war between the two states would increase, decrease, or remain unchanged, and to provide a point estimate of this probability if either policy were hypothetically adopted. Additionally, respondents were asked to predict the probability of war if the U.S. took proactive actions to contain China's economic and military expansion, paralleling the containment policy by the declining state in the DS-Contain treatment of our lab experiment. These key questions allowed us to examine public perceptions about the rising state's willingness to self-contain and the effectiveness of each foreign policy in reducing the risk of war.

Next, respondents were asked to adopt the perspective of the top leaders of either the U.S. or China and to evaluate their approval of different foreign policies. These questions aimed to examine public expectations regarding the attitudes of political elites. By posing the same questions from the perspective of U.S. and Chinese elites separately, we could investigate whether discrepancies in perceived attitudes of elites from both nations contributed to the predicted effectiveness of each policy. Finally, we asked a series of questions

payment you will receive for taking this survey. In your honest opinion, should we use your responses, or should we discard your responses since you did not devote your full attention to the questions so far?"

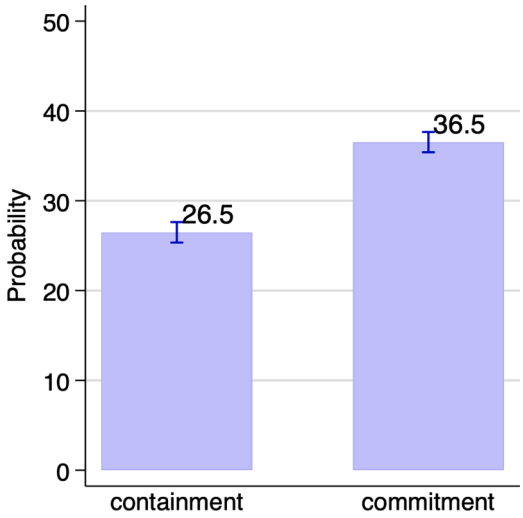

Fig. 5. The perceived probability of China adopting containment or commitment policy. *Notes:* Error bars represent one standard error of means. The data are based on the continuous variables "Containment" and "Commitment" defined in Table C8 of Online Appendix C.

about respondents' general attitudes toward China, their level of nationalism, their interest in news about U.S.-China relations, and their predictions for military spending of the U.S. and China over the next 12 months.[35]

All variables of respondent characteristics are defined in Table C7 and all outcome variables in Table C8 of Online Appendix C.

5.2. Main results

Consistent with the lab evidence, Fig. 5 showed that, on average, respondents believed China was significantly less likely to adopt the containment policy than the commitment policy (26.5% vs. 36.5%, $p < 0.001$, Wilcoxon signed-rank test). Regarding the perceived effectiveness of each adopted policy, Fig. 6 indicated that if China were to adopt the containment policy, 58% of respondents predicted that the probability of war would decrease, while only 20% predicted the opposite. Similarly, though to a lesser degree, if China were to adopt the commitment policy, 37% of respondents predicted a decrease in the probability of war, while 27% predicted an increase. Using the point estimate of the probability of war, Fig. 7 provided consistent evidence that both containment and commitment policies were predicted to reduce the probability of war relative to the benchmark probability when no policy is adopted (containment: 24.6% vs. 32.0%; commitment: 27.7% vs. 32.0%, $p < 0.001$).[36] However, the predicted effectiveness of the containment policy was significantly higher than that of the commitment policy ($p < 0.001$).

We also asked respondents to predict the probability of war if the U.S. were to adopt a coercive containment policy toward China. Perhaps surprisingly, Fig. 6 indicated that 54% of respondents actually predicted an increase in the probability of war, while only 22% predicted a decrease. Similarly, as Fig. 7 showed, the point prediction of the probability of war was slightly higher than the benchmark probability, though the difference was not significant ($p = 0.170$, Wilcoxon signed-rank test). While the evidence here was not consistent with the findings in the DS-Contain treatment of our lab experiment, it should be interpreted with caution. Unlike China's hypothetical policies of self-containment and commitment, the U.S. has already implemented such coercive measures against China in reality. Therefore, the observed data likely reflected the public's perception that these actions had intensified the competitive or adversarial relationship with China, thereby increasing rather than decreasing the risk of war.[37] This finding highlights the boundary conditions of our lab findings.

In the survey, respondents were asked to evaluate the approval level of U.S. or Chinese elites for each policy. Fig. C16 in Online Appendix C plots the distributions of their responses. U.S. elites are perceived to approve of China's self-containment more than its commitment ($p < 0.001$, Wilcoxon signed-rank test). By contrast, Chinese elites are perceived by U.S. citizens to favor commitment over self-containment ($p < 0.001$). Both U.S. and Chinese elites are perceived to be least supportive of the U.S. adopting the

[35] The questions that measure respondents' general attitudes toward China and their level of nationalism were adapted from Lee (2023). After answering all questions about international relations, respondents proceeded to answer a series of questions about their macroeconomic and personal expectations. These questions were irrelevant to the present study and therefore not analyzed in this paper.

[36] Respondents' cognitive uncertainty level, measured by their answer regarding the benchmark probability of war, did not affect the relative effectiveness of each policy, although those with a high level of cognitive uncertainty (above median) tended to predict a lower probability of war regardless of whether a policy is adopted or not.

[37] In the survey, we could not identify whether the perceived change in the probability of war was driven by an increased likelihood of preventive war initiated by the U.S. or by a heightened probability of an attack from China. Consequently, the observation that the U.S. containment policy was perceived to slightly elevate the probability of war might be attributed to the public's belief that China was more likely to attack the U.S. in response to curtailed growth.

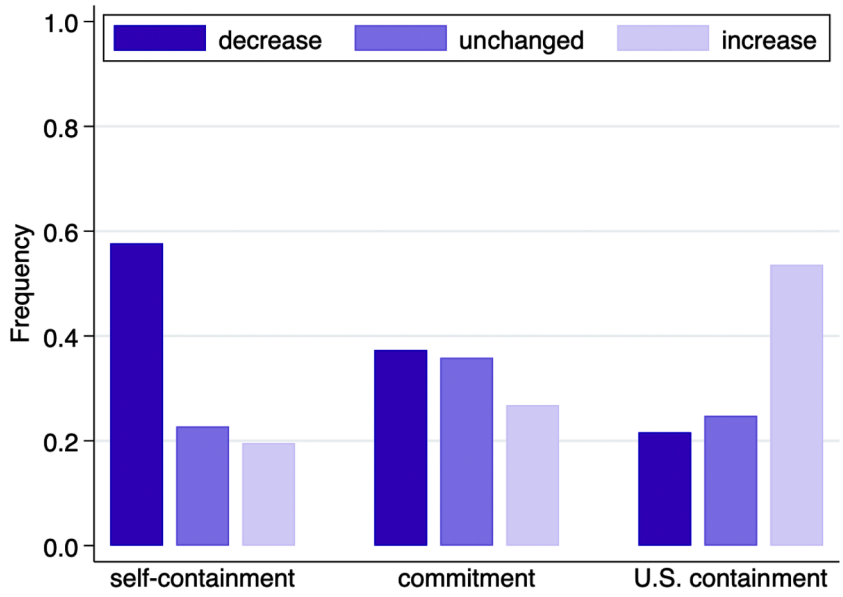

Fig. 6. The distribution of predicted change to the probability of war between the U.S. and China for each policy adopted. *Notes:* The data are based on the categorical variables "Self-containment war decrease", "Commitment war decrease", and "U.S. containment war decrease" defined in Table C8 of Online Appendix C.

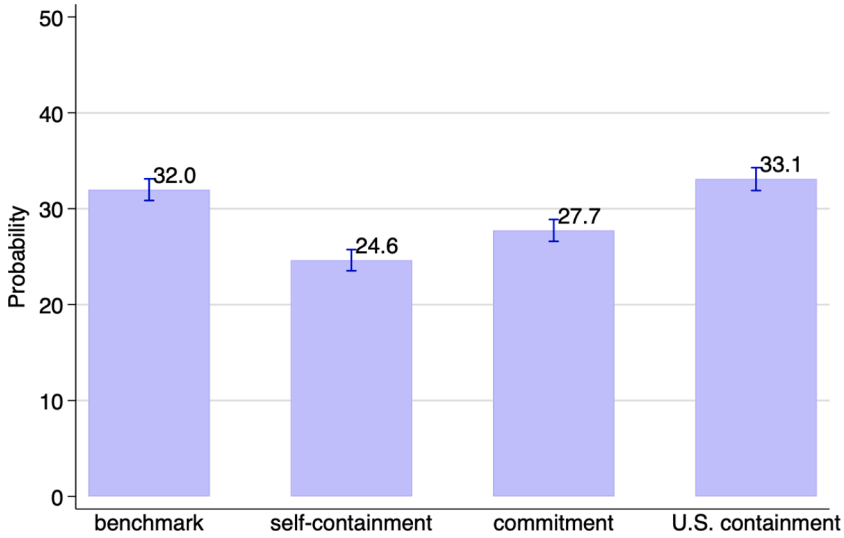

Fig. 7. The predicted probability of war between the U.S. and China for each policy adopted. *Notes:* The data are based on the continuous variables "Benchmark war", "Self-containment war", "Commitment war", and "U.S. containment war" defined in Table C8 of Online Appendix C.

containment policy. This perception of Chinese elites' attitudes aligns with the higher predicted probability of China adopting the commitment policy. Conversely, the perception of U.S. elites' attitudes is consistent with the higher predicted effectiveness of the self-containment policy. Interestingly, at the individual level, Table C9 in Online Appendix C suggests that a larger discrepancy between U.S. and Chinese elites in their perceived attitudes toward a policy correlates with a higher probability of war if that policy is adopted. However, this attitude gap shows no correlation with the predicted effectiveness of the policy relative to the benchmark when no policy is adopted. This suggests that a wider divergence in attitudes between U.S. and Chinese elites is perceived to increase the risk of war, irrespective of specific policies adopted.

Finally, we observe important heterogeneity in the main outcome variables. First, Table C10 in Online Appendix C reports regressions of the probability of China adopting each policy on the full array of respondent characteristics defined in Table C7. Compared to the younger generation, middle-aged (35–44 years old) or elderly (45–64 years old) respondents are less optimistic about China's likelihood of adopting either policy, especially self-containment. By contrast, black/African American respondents, those with higher levels of nationalism, and those who predict a higher likelihood of the U.S. spending more on military in the next 12 months are more

optimistic about China adopting either policy, particularly self-containment. Middle-aged or Republican respondents, or those who predict a higher likelihood of China spending more on military in the next 12 months, perceive greater relative reluctance of China to choose self-containment, while respondents with a higher level of nationalism perceive the opposite. Importantly, Table C10, column (3) shows that the difference in the probability of adopting the two policies is no longer significant after controlling for the full set of respondent characteristics.

Second, Table C11 in Online Appendix C reports regressions of the probability of war conditional on each adopted policy. Older, married respondents, and those who disagree with the idea of China replacing the U.S. as the hegemon in East Asia predict lower probabilities of war. Conversely, black/African American respondents, those who view China as an adversary to the U.S., and those who predict a higher likelihood of increased China's military spending over the next 12 months predict higher probabilities of war. Last but not least, Table C12 reports regressions of predicted changes in the probability of war conditional on each adopted policy relative to the benchmark probability. Older respondents tend to be less optimistic about the effectiveness of each policy, particularly self-containment, in reducing the risk of war (but this is likely due to their already low prediction of the benchmark probability of war as shown in Table C11). Conversely, Republican or independent respondents, those who view China as an adversary to the U.S., those who disagree with the idea of China replacing the U.S. as the hegemon in East Asia, and those who often follow news on U.S.-China relations tend to be more optimistic about the effectiveness of each policy, especially self-containment. However, this evidence should be taken with caution, as the coefficients on these variables are not consistently large or significant.

6. Conclusion

Our study offers new insights into the dynamics of preventive war in the context of endogenous power shifts, employing both experimental and survey methods. Our findings regarding the effectiveness of the commitment policy in mitigating preventive war risk aligned well with the findings in Abbink et al. (2023). Importantly, the current study moved beyond the prior work by revealing a significant reluctance among rising states to adopt the containment policy, despite its theoretical effectiveness in preventing conflict. This reluctance might have stemmed from the fear of signaling weakness by reducing military investments, which could have detrimental domestic and international consequences. Our findings challenged the prevailing critique that the occurrence of preventive war relies crucially on the assumption of exogenous power shifts. We demonstrated that even in scenarios characterized by complete information and endogenous power shifts, the risk of conflict remained substantial. The introduction of coercive containment by declining states—though costly and effective—further highlighted the desperate measures states might resort to in the face of potential threats.

Our representative survey conducted among U.S. residents provided suggestive evidence that the core mechanism, that is, general skepticism toward the likelihood of rising states adopting containment policies, resonated with the broader public. While the public perceived commitment as a more probable and somewhat effective policy, doubts about its enforceability in real-world politics might persist. This discrepancy between theoretical predictions and public perceptions emphasized the challenges in implementing conflict prevention strategies that are both credible and effective.

Our study bridged the gap between theoretical models, abstract lab experiments and real-world applicability by showing broadly consistent patterns across both controlled experimental settings and broader public opinions. We believed that our integrated approach held promise for illuminating research questions, such as those related to war and conflict, that might be considered unsuitable for experimental methods.

Data availability

Data will be made available on request.

Declaration of interests

Authors declare no conflict of interest.

Supplementary material

Supplementary material associated with this article can be found in the online version at 10.1016/j.jtbi.2025.112186

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