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Reexamining International Space Collaboration: The Perspective from the Democratic Peace Theory

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ABSTRACT

This paper studies the space collaboration between the US and Russia in the International Space Station (ISS). The Democratic Peace Theory states that democratic and nondemocratic countries are less likely to cooperate than two democratic countries. However, the US-Russia partnership in the ISS is an exception, as the two countries established substantial collaboration. This paper proposes two hypotheses to explain this exception. I argue that other than regime types, countries' differences in relative comprehensive capacity and countries' specific domain capacity should be considered in determining the likelihood of international collaboration. To support the hypotheses, the paper closely examined both historical records and quantitative data. The study demonstrates that US-Russian space cooperation was viable due to asymmetries in power and specialized aerospace technology capacity. The paper predicts that future US-China partnerships could only occur with the two requirements above and further analyzes the partnership under the Prisoner's Dilemma Lens.

Keywords: *International Relations, International Space Collaboration, Democratic Peace Theory, International Cooperation, Space Diplomacy, International Space Station, US-Russia Space Cooperation, Comprehensive National Capability (CINC)*

A near consensus in International Relations is that nations of different regime types, particularly democracy and non-democracy, rarely cooperate. However, the United States and the USSR/Russia did so in space programs—a domain historically marked by Cold War rivalry. This paper argues that **democratic peace theory (DPT)** inadequately explains such cooperation and develops implications for prospective U.S.–China space collaboration.

The International Space Station (ISS) originated with the 1984 U.S. proposal for *Space Station Freedom* and, by the late 1990s, expanded into a joint project with the United States, Canada, Japan, Russia, and European partners. In contrast, in 2011 China launched its own *Tiangong* space station without international collaboration. That same year, the U.S. Congress passed the Wolf Amendment, which prohibits NASA from using government funds for bilateral cooperation with Chinese government entities. The amendment sharply reduced opportunities for U.S.–China space collaboration. These dynamics unfold against a backdrop in which the U.S. and China represent divergent governance systems, making their relationship a central issue in international politics.

According to DPT, China's absence from the ISS is unsurprising, as the theory predicts that democracies seldom cooperate deeply with non-democracies. Yet despite also being a non-democratic state, Russia has collaborated extensively with the United States on the ISS. This puzzle motivates the paper: why was Russia included but China excluded, and what does this suggest for the future of U.S.–China cooperation in orbit?

The analysis proceeds in five steps. Sections 2 and 3 define DPT and review its four core mechanisms as identified in the literature. Section 4 develops alternative explanations for U.S.–Russia cooperation despite regime differences. Section 5 presents empirical evidence supporting these mechanisms. Sections 6 assess the prospects for U.S.–China cooperation—particularly with *Tiangong*—through the lens of a **Prisoner's Dilemma** framework. Section 7 concludes by situating the findings within broader debates on international cooperation in dual-use domains.

THE DEMOCRATIC PEACE THEORY

The Democratic Peace Theory (DPT) posits that democracies are generally more peaceful and less likely to wage war against one another than they are against non-democracies. Scholars explain this tendency through several mechanisms, including transparency of information, economic interdependence, intergovernmental organizations (IGOs), and shared political values. Together, these mechanisms suggest that regime type shapes both the likelihood of conflict and the depth of international cooperation.

Cold War alignments illustrate the logic of DPT: the United States primarily allied with democratic partners such as Western Europe, Japan, and Canada, while rivalry with the authoritarian Soviet Union defined the era. This contrast highlights how regime type influenced patterns of trust, alliance, and confrontation.

Mechanism 1: Information

Democracies generate transparent information flows. Parliamentary debates, legislative votes, and treaty ratifications are typically public, allowing other states to assess intentions with fewer uncertainties. When two democracies interact, mutual transparency fosters trust and reduces the risk of miscalculation (Gartzke, 2001). For example, U.S. Senate votes on international treaties are publicly available. Such transparency signals U.S. preferences and constraints, reassuring partners and encouraging cooperation.

Mechanism 2: Economic Interdependence

Democracies tend to cultivate strong economic ties with one another, and high levels of trade interdependence increase the costs of conflict. Entering war would endanger vital markets and supply chains, making peace the economically rational choice (Oneal & Russett, 1999). A prominent case is postwar Europe. France and Germany, once frequent adversaries, became deeply intertwined through the European Union. German exports of machinery and electronics complement French exports of automobiles and aircraft components, making each indispensable to the other's prosperity. This mutual dependence has coincided with more than seven decades of peace between the two.

Mechanism 3: Intergovernmental Organizations (IGOs)

Democracies are more likely to join and actively participate in IGOs, which provide institutional frameworks for cooperation and dispute resolution (Oneal & Russett, 1999). Organizations such as NATO and the EU strengthen ties between democracies, constrain unilateral actions, and mitigate commitment problems by monitoring compliance and enforcing agreements. For instance, NATO has played a stabilizing role in easing tensions between Turkey and Greece, both of which have longstanding territorial disputes. The alliance's security guarantees and mediation mechanisms helped prevent escalation into war.

Mechanism 4: Shared Political Values

Finally, DPT emphasizes the role of shared political norms and identities. Democracies often recognize each other as legitimate and trustworthy because they are built on similar institutions and values (Russett, 1993). This shared identity strengthens alliances and solidarity. During the Cold War, the United States, the United Kingdom, and France aligned not only because of strategic necessity but also because of their shared democratic foundations. U.S. initiatives such as the Marshall Plan and the Truman Doctrine reinforced this solidarity, supporting democratic reconstruction abroad while containing authoritarian influence.

THE NATURE OF THE PROBLEM

International cooperation allows states to leverage comparative advantages: by pooling diverse strengths, they can lower costs, offset weaknesses, and achieve breakthroughs that would be difficult alone. For example, in electric vehicle production, Germany specializes in automotive engineering, China dominates in battery technology, and the United States contributes advanced software systems. Together, they can produce more competitive and innovative products than any one country acting in isolation.

Yet cooperation is less common between states with different regime types. Democratic Peace Theory suggests that mutual distrust between democracies and authoritarian regimes creates barriers to collaboration. Beyond political mistrust, cooperation also entails risks, such as technology transfers or spillovers that may empower a potential rival.

The U.S.–Russia relationship in space highlights the puzzle. Despite Russia's authoritarian character, the two countries have collaborated extensively on the International Space Station (ISS). By contrast, U.S.–China cooperation in space has been minimal, even though both Russia and China are non-democracies. This discrepancy challenges the predictions of Democratic Peace Theory and suggests that regime type alone cannot explain patterns of international collaboration.

To address this gap, I propose two additional factors that condition the prospects for cooperation: (1) *relative comprehensive capacity* and (2) *specific domain capacity*.

Relative comprehensive capacity refers to a nation's overall power and resources across economic, technological, and military dimensions. Large disparities in capacity make cooperation more likely, since the weaker partner poses little threat of overtaking the stronger. Conversely, when countries are near peers, cooperation may be avoided to prevent one side from gaining a strategic edge. China's infrastructure projects in Ethiopia under the Belt and Road Initiative illustrate this logic: a powerful China can invest heavily in a far weaker Ethiopia with little fear of being rivaled.

Specific domain capacity captures a country's strength in a specialized policy area. Even states with limited overall power may contribute significantly if they are leaders in a niche field. Israel, for example, has modest comprehensive capacity but plays a leading role in cyber technology. Similarly, France and Japan, both with advanced nuclear and fusion expertise, have been central partners in the International Thermonuclear Experimental Reactor (ITER). In such cases, specialized competencies create incentives for collaboration despite broader power asymmetries.

HYPOTHESIS

Hypothesis 1 (Comprehensive Capacity Gap):

The United States is more likely to cooperate with the USSR/Russia when its overall national capabilities substantially exceed those of its partner. A significant disparity in comprehensive relative capacity reduces the risks of competition and makes cooperation strategically safer for the stronger state.

Hypothesis 2 (Domain-Specific Capacity):

The United States is more likely to cooperate with the USSR/Russia when the latter possesses strong, specialized capabilities in a specific domain—such as space technology—that can make a unique and valuable contribution to the partnership.

EMPIRICAL RESULTS

The collaboration between the United States and the USSR/Russia in space programs can be explained by the interaction of two conditions: (1) a widening gap in their relative comprehensive capabilities, and (2) Russia's continued strength in specific technological domains. While the U.S. held a decisive overall advantage as Soviet power declined, the USSR—and later Russia—retained advanced expertise in space technology. This combination allowed cooperation to emerge: the United States could engage a weakened peer without fearing strategic displacement, while still benefiting from Russia's specialized contributions.

Quantitative Assessment

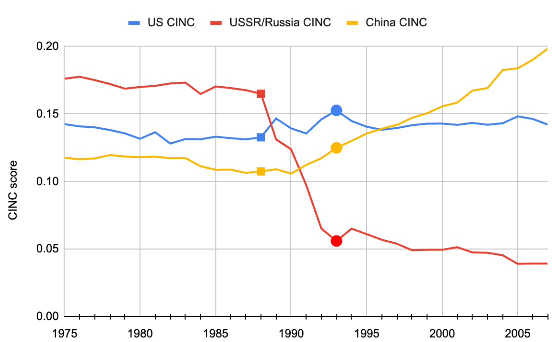
To evaluate these dynamics, this section draws on quantitative indicators of national power and space activity. Specifically, I analyze (1) the **Composite Index of National Capability (CINC)** as a proxy for overall state capacity, and (2) data on human spaceflight to capture domain-specific capabilities in aerospace technology. In addition, I examine the number of astronauts and cosmonauts deployed to the International Space Station (ISS) since its inception.

The **CINC dataset** (Correlates of War Project) compiles six dimensions of national power—iron and steel production, military expenditures, military personnel, primary energy consumption, and urban population—providing annual capability scores for all major states from 1816 onward. For this study, I focus on the period beginning in **1975**, the year of the Apollo–Soyuz Test Project, which marked the first joint human spaceflight between the U.S. and the USSR. Figure 1 presents the CINC trajectories of the United States, Russia (and the Soviet Union prior to 1991), and China from 1975 to 2007.

These data enable a direct assessment of **Hypothesis 1** (the role of relative comprehensive capacity) and provide historical context for subsequent cooperation on the ISS. Complementary evidence on astronaut launches and ISS crew participation further informs **Hypothesis 2**, highlighting Russia's continued relevance in space despite its declining aggregate power.

Figure 1

Composite Index of National Capability Score between the US, China, and Russia, from 1975 to 2005



Note. Squares mark countries' CINC scores in 1988. Dots mark countries' CINC scores in 1993

Figure 1 shows that prior to the 1990s, the Soviet Union possessed the greatest overall national capability among the three countries. In 1988—marked by the square on the figure—the United States once again approached the USSR for aerospace collaboration, following their initial joint venture in the Apollo–Soyuz Test Project of 1975 (Correlates of War). That same year, however, Soviet national capacity entered a sharp decline, culminating in the state's collapse in 1991. Russia inherited the Soviet space program but continued to experience a steady decrease in its aggregate capabilities.

By 1993—indicated by the round dot in the figure—the U.S. formally invited Russia to join the International Space Station (ISS) partnership. At this point, Russia's CINC score had fallen well below that of the United States and would continue to decline into the 2000s. China, by contrast, had a CINC score nearly equal to the U.S. in 1993 and thereafter rose steadily, eventually surpassing the United States in the early twenty-first century (Correlates of War). These contrasting trends illustrate **Hypothesis 1**: U.S.–Russia cooperation became viable only after a significant gap emerged in their comprehensive relative capacities, reducing the strategic risk of partnership.

Figure 2 shifts attention from overall capability to domain-specific expertise in space technology. Using data from the Aerospace Security database, I calculated the annual number of astronauts launched by the U.S., the USSR/Russia, and China between 1961 and 2021. The dataset counts only astronauts who reached altitudes of at least 100 kilometers—the internationally recognized threshold of outer space.

The results confirm Russia's enduring strength in human spaceflight even amid declining national power. The Soviet Union led the world by sending Yuri Gagarin into orbit in 1961 and maintained a consistent record of astronaut launches through the Cold War. After

1991, Russia continued this activity under its own program. The U.S. expanded its space missions sharply during the 1980s and 1990s, often launching more than 30 astronauts per year, while China entered the field much later, conducting only six major human spaceflight missions by 2021. Importantly, the data exclude astronauts deployed through multinational ventures such as the ISS, focusing instead on launches managed by national programs.

Taken together, Figures 1 and 2 demonstrate that U.S. cooperation with Russia on the ISS reflected both a **broad asymmetry in overall power** (supporting Hypothesis 1) and Russia's **continued possession of specialized capabilities in human spaceflight** (supporting Hypothesis 2).

Figure 2

Number of Astronauts being Launched by the US, the USSR/Russia, and China from 1961 to 2021

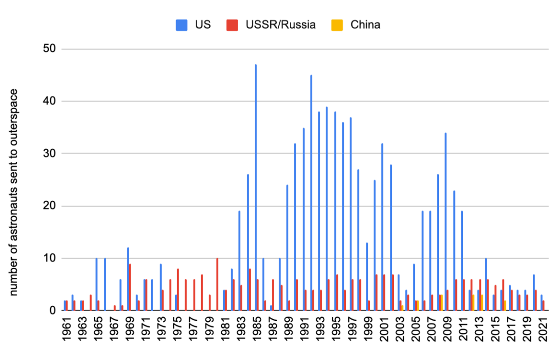


Figure 2 charts the annual number of astronauts launched by the United States, the USSR/Russia, and China. The Soviet Union led early human spaceflight, beginning with Yuri Gagarin in 1961, and maintained a steady pace of roughly 4–5 cosmonauts per year until 1991, a pattern largely sustained by Russia thereafter (Roberts, 2022). Prior to the 1980s, the U.S. and USSR/Russia launched comparable numbers of astronauts—generally fewer than ten annually. Between 1976 and 1980, however, the United States experienced a hiatus, while the USSR continued consistent launches.

From the 1980s through the 2000s, U.S. activity surged, often exceeding 30 astronaut launches per year, particularly during the 1990s. In contrast, China entered the field much later: its first crewed mission occurred in 2003 with Yang Liwei aboard *Shenzhou V*. By 2021, China had conducted only six major human spaceflight missions, each carrying 2–3 astronauts, underscoring its still-limited experience relative to the U.S. and Russia (Roberts, 2022). In the early 21st century, the U.S. averaged 17 astronaut launches annually between 2004 and 2012, then stabilized at about five per year. Russia continued to maintain a steady output of around four cosmonauts annually after 2000 (Roberts, 2022).

While Figure 2 captures national launch capacity, it excludes astronauts deployed through multinational programs such as the International Space Station (ISS). To capture this dimension, **Figure 3** compiles the number of U.S. and Russian crew members sent to the ISS annually from 1998 to the present. The data also account for dual-nationality astronauts, though notably none held both U.S. and Russian citizenship. This figure highlights the scale and balance of U.S.–Russian contributions to ISS operations, complementing the earlier analysis of national spaceflight activity.

Figure 3

US and Russia crew members sent to ISS from 1998 to 2025

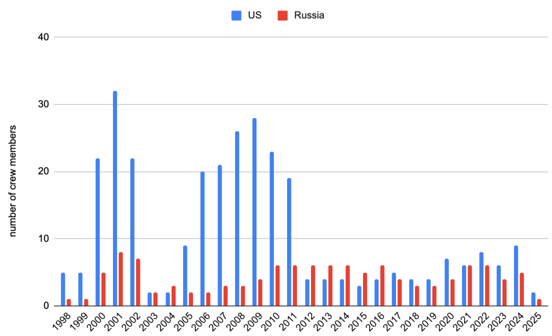


Figure 3 compares the number of U.S. astronauts and Russian cosmonauts sent to the ISS from its launch in 1998 to the present. In the early years of the program (1998–2002, and again 2005–2011), U.S. astronauts outnumbered their Russian counterparts, reflecting the program's heavy reliance on NASA's Space Transport System (STS).

From 2012 to 2016, however, the pattern reversed: Russian cosmonauts outnumbered U.S. astronauts. This shift coincided with the retirement of the STS and the ISS's reliance on Russia's Soyuz spacecraft as the sole means of crew transport. Only later, with the advent of SpaceX's Commercial Crew Program (CCP), did U.S. astronaut launches regain momentum (Garcia, 2025).

These fluctuations underscore the interdependence of the two programs. When American spacecraft dominated, more U.S. astronauts participated; when Soyuz was the only option, Russia provided the bulk of transport. Despite these variations, **both countries maintained a continuous presence on the ISS every year since 1998**, highlighting the durability of U.S.–Russian space cooperation even amid broader geopolitical rivalry.

Taken together with Figures 1 and 2, the evidence supports both hypotheses: U.S. willingness to partner was facilitated by a wide gap in comprehensive capacity, while Russia's specialized strengths—particularly in reliable crew transport—ensured its indispensability as a partner.

Subsection: Space Cooperation between the US and Russia

Three key points emerge from the U.S.–Russian partnership in space: (1) both countries had established strong foundations in space technology before the ISS, (2) negotiations toward joint projects began as Soviet national capacity declined, and (3) the United States explicitly sought Russia as a second major contributor to ISS construction. These points support the broader argument that cooperation occurred only when the U.S. enjoyed a decisive advantage in overall capacity (Hypothesis 1) and when Russia retained advanced domain-specific expertise (Hypothesis 2).

The partnership formally began in 1993, shortly after the dissolution of the USSR. As shown in Figures 1 and 2, the Soviet Union's decline from the late 1980s culminated in its collapse in 1991, leaving Russia with diminished comprehensive capacity. Yet Russia inherited a wealth of space experience from the Soviet era, positioning it as a valuable contributor despite its weakened state.

Both nations had prior experience with space stations. The Soviet Union operated *Salyut* (1971–1986) and *Mir* (1986–2001), while the U.S. operated *Skylab* (1973–1979). They also collaborated in the 1975 Apollo–Soyuz Test Project (ASTP), which successfully docked an American Apollo spacecraft with a Soviet Soyuz. This mission not only demonstrated technical compatibility but also served as a diplomatic breakthrough, creating direct channels of communication between astronauts and cosmonauts and laying the groundwork for future collaboration (Ostovar, 2024; Krishna, 2024).

As Soviet power waned, cooperation deepened. In 1988, the George H. W. Bush administration began discussions on joint space initiatives (Logsdon & Millar, 2001). By July 1991, the two countries had signed an astronaut–cosmonaut exchange agreement, even before the Soviet collapse. In 1992, U.S. aerospace firms were already seeking access to Russian technologies, some of which were more advanced than their American counterparts (Logsdon & Millar, 2001). Following the USSR's dissolution, the newly created Russian Space Agency (RSA) continued this dialogue, and in 1993 the U.S. invited Russia to join the ISS.

The Shuttle–Mir program (1993–1998) served as a precursor, with American astronauts living aboard *Mir* and Russian cosmonauts flying aboard U.S. shuttles (Johnson, 2023). These exchanges provided training in long-duration missions and fostered deeper technical cooperation.

Phase two began in 1998 with the launch of the ISS itself. Russia contributed crucial modules, starting with *Zarya* (1998), followed by *Zvezda* (life-support and living quarters), *Pirs* (docking and airlock), and *Nauka* (laboratory facilities) (Garcia, 2025). The United States added the *Unity* module, truss structures, solar arrays, and airlocks, among other components. While some modules were nationally designated, the station was deliberately interdependent: critical systems like power and life support span both the U.S. Orbital Segment (USOS) and the Russian Orbital Segment (ROS), making the ISS a genuinely integrated project (Graf, 2024). The two Mission Control Centers in Houston and Moscow jointly manage daily operations (Brazda, 2023).

As Figure 3 shows, both countries maintained a continuous crew presence on the ISS, with their contributions fluctuating depending on transport systems. The U.S. dominated during the Shuttle era, Russia during the Soyuz monopoly after 2011, and both have remained indispensable as new systems like SpaceX's Commercial Crew Program entered service.

Together with the evidence from Figures 1 and 2, this history underscores the dual conditions for cooperation: the U.S. seized the opportunity to partner only once Soviet/Russian comprehensive capacity had sharply declined, but it also relied on Russia's enduring strengths in human spaceflight and station modules. Far from being a passive junior partner, Russia became the second-largest contributor to the ISS. For the United States, this collaboration not only secured a vital partner in building and operating the station but also deepened technical expertise in aerospace missions.

WHAT DOES IT MEAN FOR CHINA?

The analysis suggests two predictions for the future of U.S.–China space collaboration:

1. **Relative Capacity Gap**: A U.S.–China partnership is unlikely to emerge unless the United States holds a decisive advantage in overall comprehensive capabilities.
2. **Domain-Specific Capacity**: As China's space technology approaches U.S. levels, the incentives for cooperation could increase—provided China can contribute unique expertise, as Russia did during the ISS partnership.

Since the end of the Cold War, China has risen rapidly as a global power. As Figure 1 illustrates, China's comprehensive capabilities are now comparable to those of the United States, and at times have even surpassed them. This near parity fosters mutual suspicion rather than cooperation, making collaboration in strategically sensitive domains such as aerospace improbable. The prisoner's dilemma game is illustrative of the dynamics described here as both countries could benefit from cooperation but they are constrained by mutual suspicion. The details of the model are described in appendix A.

At the same time, China remains a relatively new entrant in human spaceflight. As Figure 2 shows, it launched its first crewed mission only in 2003 and, by 2021, had conducted just six major missions—far fewer than either the U.S. or Russia. Unlike Russia in the 1990s, which brought decades of space station experience to the ISS, China still lacks a comparable record of contributions. Without such domain-specific strengths, China is unlikely to be invited into a cooperative framework like the ISS.

In short, the combination of **strategic rivalry at the comprehensive level** and **limited specialized experience in space station operations** makes U.S.–China space cooperation highly improbable in the near future.

CONCLUSION

This essay argues that the U.S.–Russia partnership in the International Space Station represents an important exception to the predictions of the Democratic Peace Theory. Rather than regime type alone, cooperation was shaped by two key factors: a pronounced disparity in overall national capabilities and Russia's continued strength in specific technological domains. The evidence from both quantitative indicators and historical case analysis demonstrates that the U.S. engaged with Russia only after its comprehensive capacity had sharply declined, while still valuing Russia's indispensable expertise in space technology.

Extending this logic, the essay assessed the prospects for U.S.–China space cooperation. Given the near parity in their comprehensive capabilities and China's more limited record in space station operations, meaningful collaboration appears unlikely in the near term. A partnership would require both a renewed asymmetry in overall capacity and China's ability to contribute specialized expertise, replicating the conditions that facilitated U.S.–Russian collaboration.

More broadly, this study highlights the need to move beyond regime type as the sole explanatory variable in theories of international cooperation. By incorporating power asymmetry and domain-specific capacity, we can better account for when and why states with divergent political systems choose to collaborate. That said, the present analysis is limited to the U.S.–Russia case. Future research should extend this framework to a wider set of international partnerships to test its generalizability across issue areas and regions.

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