

An Exploration of AI and Power Transition Theory

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Abstract

Renewed great power competition, driven by the rise of China, coincides with mounting concern over artificial intelligence and its anticipated impact across the military, economic, and political domains. Yet scholarship struggles to specify how AI bears on the strategic rivalry between the United States and China, tending to treat it as a discrete capability or a sectoral phenomenon rather than a factor that reshapes the sources of power itself. This paper argues that power transition theory is well suited to close that gap. Because the theory already conceives of power as generated through demographic, economic, and political capacity, a general-purpose technology like AI that acts on those very inputs becomes a natural object of analysis. The paper develops this pairing conceptually, clarifying how AI may reshape the trajectories of capacity change that power transition theory places at the center of transition.

Keywords: power transition theory; great power competition; artificial intelligence; U.S.-China

Introduction

Great power competition between the United States and China is intensifying. The unipolar moment that defined the post-Cold War era is fading with China emerging as a serious challenger. At the same time, artificial intelligence (AI) is advancing rapidly, and there is a growing consensus that the two great powers are now engaged in a technological race. Precisely how this rivalry will unfold remains uncertain. As technology develops and competition intensifies, scholars across various disciplines are grappling with how to understand the relationship between these two phenomena. The argument that AI is a general-purpose technology is persuasive. Traditionally, power is measured by indicators such as GDP, military hardware, or population, but AI is fundamentally different. It is more akin to electricity: its effects are not limited to a single sector, nor can its value be easily quantified. Ultimately, AI acts as an input that transforms the very process by which power itself is produced and accumulated (Trajtenberg 2019).

The academic literature on AI and its implications for security, conflict, and power has largely focused on its use in specific contexts, for instance, escalation dynamics and crisis situations (Horowitz and Lin-Greenberg 2022; Johnson 2021; Scharre 2018). Other scholars have examined the economic dimensions of AI, including its effects on productivity, employment, and competition (Ding 2024; Horowitz 2018). While the field is expanding rapidly and a range of perspectives have been advanced, a notable gap remains. AI is, as previously noted, a general-purpose technology, yet its broader implications have not been systematically addressed within a theoretically informed framework.

One theory that has not yet been applied in this context is Power Transition Theory (PTT). PTT provides a means to assess the relative power of a dominant and rising actor and to identify the conditions under which conflict becomes more or less likely (Tammen 2008; Lemke 2002;

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Organski and Kugler 1980; Organski 1958). But it is particularly relevant in today's context for two key reasons: first, it provides a framework for thinking about power in the first place. It emphasizes that power is a function of demographic, economic, and political factors, i.e., that larger, more industrialized countries, with the necessary political will to govern, coordinate, and direct resources, have a fundamental advantage over others. Since it's understood that AI will have an impact on power, starting with PTT's understanding of what power is offers a productive point of analysis. Second, PTT captures the intensifying competition between the United States and China as well. It models conditions under which a rising and dominant power is more likely to go to war. In sum, it captures both phenomena within a single framework.

A degree of caution is warranted while reading this paper. The framework presented here is exploratory in nature. It stems from a recognition that more research on AI should be grounded in established theories of international relations to address strategic questions concerning its impact and to inform theoretically grounded predictions about the future. Rather than offering a definitive account, this framework is intended as an initial step for subsequent scholarly critique, development, and application. Certain elements are comparatively robust, owing to the foundation provided by existing PTT literature, while others require further examination. In a context marked by rapid advances in AI and ongoing efforts to understand its implications, this framework aims to provide a preliminary structure to guide future inquiry.

AI and PTT

Scholars of international relations have been obsessed with power since the field began. Who has it? How is it acquired? What is it, in the first place? Such fundamental questions are still debated. What makes PTT particularly interesting, however, is that it examines power in the specific context of a dominant actor being threatened by a rising side that is approaching power parity. That context seems to capture the current-day environment. PTT's answer for power is that it represents a function of demographic, economic, and political variables.

Demographically, larger populations provide human capital that can support economic productivity, military personnel, and post-conflict recovery. Economically, industrial capacity converts demographic potential into tangible outputs such as wealth, military production, and technological progress, enabling states to exert influence internationally. Politically, states mobilize and coordinate resources, implement national strategies, and direct activity toward increasing relative power. Together, these variables determine a state's power potential in the international system (Organski and Kugler 1980). Additionally, power growth can be understood as a cycle in which states industrialize, harness demographic potential, and strengthen political capacity. The power growth cycle resembles an S-curve: it starts slowly, but once the country industrializes, it experiences rapid growth that then plateaus as it reaches maturity (Tammen et al. 2000; Organski and Kugler 1980). The dominant power has largely completed this process, so its growth appears only marginal. A rising power, on the other hand, is growing quickly. But, when it will reach power parity, and whether it will reach it at all, are still unknown.

Building on these shifts in relative power, PTT suggests that when a rising power approaches parity with the dominant power, the likelihood of conflict increases if the rising power is dissatisfied with the existing international order. The international order, as PTT argues, is established by the dominant power of the day, which creates rules, norms, and institutions that primarily serve itself and support great- and middle-power allies. Therefore, the rising power is dissatisfied with the status quo international order, which maintains unequal benefits for the dominant power and its allies. This dissatisfaction may stem from perceived injustices,

inflexibility, or conflicting interests, which heightens the chances that the rising power will initiate a potential conflict (Bussmann and Oneal 2007; Tammen and Kugler 2006; Geller 1992). Importantly, however, power parity is a necessary but not sufficient condition for conflict between the rising and dominant power. Consider, for instance, that the transition from Britain as the dominant power to the United States took place peacefully, precisely because dissatisfaction was absent.

AI is categorically not a product or a weapon. It is a general-purpose technology that diffuses across all other sectors, continuously improves, and sparks other innovations (OECD 2025; Bresnahan and Trajtenberg 1995). But because of its nature, AI power is difficult to measure: it doesn't represent an output of power in the same way that military weapons or GDP would. Rather, it is an input of power. A source of power. A potential multiplier of power and an enabler for all other things. Conceptualizing AI in this manner means that PTT is well matched because it already understands power from the inside, from inputs of demographic, economic, and political factors. AI bleeds into the sources of power that PTT outlines. It has important consequences for all three inputs of power and, in doing so, forces us to consider the repercussions this has for a potential great power conflict.

Where AI Touches Each of the Three Sources

In this section, we consider how AI affects each of the three sources of power outlined in PTT. Demographically, while PTT emphasizes population size, AI can replicate and, in some cases, replace humans across many domains, including some military functions (Horowitz 2018). The ability of AI to reason, recognize patterns, and sift through vast amounts of data means that it can be more productive than humans in specific contexts. This directly turns the idea that more people equal more productivity on its head. Perhaps the raw headcount of a country no longer matters as much as its composition. Maybe a smaller country with engineers, researchers, and skilled tech workers is able to punch above its weight and be more productive than a larger country with little AI integration. Hence, AI forces states seeking to maintain or transform the current power hierarchy to reconsider whether demographics is as important as it was before. Especially considering the evolution in autonomous drone and robotic warfare, which some speculate could, in due time, replace humans on the battlefield (Scharre 2018)

Population size is also the base from which economic output is drawn; individuals are both the producers of output and the participants required to wage conflict, so population and economic output tend to climb together (Kugler and Swaminathan 2006; Organski and Kugler 1980). This coupling is what AI unsettles: a country can now grow its economic output through automation without growing its population, provided it controls the necessary infrastructure. And just as PTT's developmental stages rested on industrialization, AI rests on a physical base of semiconductors, data centres, and the electricity to run them. Because access to that base determines the pace and scale of AI progress (Sastry et al. 2024), controlling it has become contested ground between the United States and China, most visibly in the fight over semiconductor export controls (Shivakumar, Wessner, and Howell 2025). The shifts AI creates in both the demographic and economic variables of power mean that a process of development that was once mainly internal can now be denied or blocked by an external force. For instance, industrialization spread because knowledge could be taught, copied, and bought. Today, however, advanced computing relies on a physical supply chain controlled by a few countries and corporations. This control gives a dominant power, like the United States, an opportunity to block a rival from accessing advanced computing, all while trying to benefit from AI, which multiplies its power. On the other hand,

China controls significant reserves of critical minerals necessary for those companies to build that infrastructure and maintain those supply chains (Froman 2026), creating a powerful chokepoint that prompted the United States to recently develop policies to bring more of its AI-related supply chain away from adversaries' control and into its own sphere of influence (Executive Order 14415 2026).

Regarding the political variable of power, AI is already being used in myriad ways to run government services. Take, for instance, a rather more extreme example of AI police stations that are run and operated with no human involvement (Oxford Institute of Technology and Justice 2026). Ultimately, AI can, in theory, make the state more efficient at collecting and directing resources, which may expand its political capacity. Yet AI governance will indeed rely upon a country's form of government: democratic states will be cautious about implementing AI in government functions and will recognize the need to mitigate bias and protect privacy rights, while authoritarian states will use AI as an opportunity to grasp more control over their population and to creep the eyes of the state into every corner (Kendall-Taylor, Frantz, and Wright 2020). On the other hand, AI may also be leveraged to undermine a state's control over the political domain through information operations and cognitive warfare, using generative and other AI capabilities to enhance or compound the effects of that manipulation. In turn, readily available and easy-to-use AI tools might enable significant proliferation of cyber capabilities leading to widespread cybercrimes that might make it difficult for a state to maintain order and social cohesion. In this sense, AI might undermine or neutralize political control as much as it might also be used to establish it.

All in all, AI bears on all three sources of power in PTT: it lessens the premium on population size, opens new routes to economic development while making the base of that development easier to deny from the outside, and introduces new ways for states to govern. But AI will not accelerate these variables evenly; it will strengthen some states more than others. It therefore holds the capacity either to widen the power gap between the United States and China, in which case great power conflict becomes less likely, or to hasten parity, the more dangerous scenario in PTT's terms. While traditional models would certainly place the United States as the current global power with China as a closing second, in the domain of AI power, depending on how AI is in fact augmenting various power dynamics and capabilities, there may be much more parity between the powers than otherwise expected.

Future Research

Analyzing AI via PTT yields a key insight: AI, touching on all three sources of power, changes the trajectory of the power generation process. Recall the S-curve from earlier: a slow start, a steep middle, and a plateau at maturity. To say that AI changes how efficiently a country turns its potential into tangible power is to say that it changes the steepness of that curve. From that starting point, two lines of inquiry follow. We offer them as the kinds of questions the framework invites us to explore and investigate.

The first concerns speed. If AI accelerates China's climb, the point at which we would expect it to reach parity with the United States should arrive earlier than a projection based solely on static outputs, such as GDP and military spending, would suggest. Calculating this shift empirically, however, would require a settled figure for AI's effect on a country's efficiency in converting resources into power, and that figure remains unresolved, with estimates ranging from negligible to transformative and no agreed way to choose between them. What our exploratory framework does offer is a direction for inquiry. It tells us that this efficiency effect, however hard

to pin down, is the variable that would move the catch-up date, and that it is therefore worth trying to measure once the field has any handle on measuring it at all.

The second concerns the dominant power. PTT places the mature dominant power up on the flat top of its curve, growing only slowly. But a technology that improves how efficiently a state converts resources into power could, in principle, steepen that plateau again, giving the leader an unexpected second burst of growth. This possibility matters because it is the route by which AI might extend the existing order rather than end it, an outcome that much of the AI literature, which tends to assume AI favours the challenger, rarely stops to consider.

This brings us back to conflict. Whichever way AI pushes, it changes the risk of war through PTT's second condition, dissatisfaction, and the order in which we consider the two matters. If AI widens the gap, then for now a challenger's resentment is secondary: however dissatisfied a rising power may be, if it is not near catching up, that dissatisfaction alone does not create the dangerous condition. If AI narrows the gap, dissatisfaction becomes the thing to watch, and measuring it becomes urgent. So, the framework suggests an order of analysis: first gauge the speed of catch-up, then weigh dissatisfaction.

Another important question for understanding potential power dynamics from AI and their effects on dissatisfaction is whether the United States and China think of AI in the same way. It is clear in many ways that the United States perceives AI as a decisive advantage in which it currently has a lead — being home to leading AI models and infrastructure — and is seeking to limit China's rise through export controls and other means. However, there is some indication that China does not perceive AI in a zero-sum manner as the United States does, seeing it as an enhancing technology in industry but not as a decisive strategic tool (ÓhÉigearthaigh 2026). Further, there are doubts as to whether either state can 'win' an AI race at all given the complexity of the technology and its supply chains (Kahl 2025). In either case, AI will certainly change power dynamics significantly, but the perception of the technology and its intended use in each country may determine the race dynamics and what actions are taken to enhance or limit each player's lead in AI-related infrastructure.

A final note on scope. This exploration has been built around great power competition between the United States and China, but PTT has extended its framework to regional powers and to their relationships with the middle and smaller actors nested beneath them (Tammen 2008; Lemke 2002). Middle powers are caught between great-power rivalries. As noted earlier, industrialization and economic development were once largely internal processes, guided by characteristics like population size. AI unsettles that. Because it accelerates power yet rests on a base controlled by a handful of actors, middle powers face the prospect of being cut off altogether or being handed less advanced compute. A trajectory that a state once built for itself can now be sped up or choked from the outside. Middle powers aren't bystanders, however. Consider the Republic of Korea (ROK): its multinationals, SK Hynix and Samsung, control a substantial share of the semiconductor memory market, giving the ROK real influence in this domain (Chorzempa 2023). It can weigh who to trade with and which restrictions to sign on to. These are decisions that feed directly back into the two conditions this framework treats as drivers of conflict, the speed at which the gap closes and the dissatisfaction that builds as it does. Holding a piece of the base, in other words, means a middle power can influence the contest rather than merely absorb it.

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