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How AI diffusion shapes
economic competition:
An interview with
Jeffrey Ding



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Jeffrey Ding is an assistant professor of political science at George Washington University and one of the more original thinkers working at the intersection of technology and geopolitics. His recent book challenges the dominant narrative around technological leadership, arguing that the AI race may ultimately be decided less by who innovates first than by who is best able to diffuse across the wider economy.

Instead of focusing on who innovates first (as most commentary does), Ding argues the real determinant of national power is diffusion – the unglamorous process by which a general-purpose technology spreads from frontier labs to the factory floor. Drawing on three industrial revolutions, he shows how Britain’s early lead in steam power eventually gave way to US and German dominance, and how the US later outpaced Japan in computing by being better at diffusing key general purpose technologies throughout their economies.

Ding’s framework has immediate implications for today’s AI race. It reorients attention away from benchmark scores and frontier model releases toward questions of talent pipelines, institutional linkages and ‘skill infrastructure’ (education and training ecosystems) that determine how broadly and deeply a technology can penetrate an economy.

For investors trying to assess who wins the AI era, **Ding’s work offers both a corrective and a compass.**

His perspective helps shift the relevant questions away from which models are most powerful and toward which firms, sectors and economies are best positioned to translate that power into productivity. After all, if diffusion is what ultimately determines economic winners, then the most important signals may not be coming from the frontier labs at all, but from the subtler processes of adoption playing out across the rest of the economy.



Jeffrey Ding
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Jeffrey Ding is Assistant Professor of Political Science at George Washington University. His research focuses on emerging technologies, international politics, the political economy of innovation and great-power competition.

Your book challenges the idea that AI and general-purpose technology (GPT) leadership is about who innovates first. What is your key insight from this reframing?

One of the central insights of my analysis is that success is less about which country can cultivate the best and brightest experts or develop the most cutting-edge research at the frontier labs. Instead, it is more about which country can build connections between those frontier institutions (the leading labs, firms and universities) and transfer specific knowledge, skills and technologies to a small or medium-sized business in the Midwest or a firm in a county town in Qinghai Province in China that never features in English-language coverage.

Whenever technology is discussed in investment reports or on the pages of the Financial Times or Wall Street Journal, it is almost always that first step that receives attention. The historical insights from the book try to redirect attention toward the road less traveled.

Electricity and the steam engine famously took decades to show up in productivity data. What observable signals should we be looking for to judge whether AI diffusion is happening vs. being over-hyped?

It is a critical question, and genuinely hard to measure. But progress is being made, and there are a few buckets of indicators worth tracking.

The first is human capital. To what extent are we seeing more job postings for algorithm engineers, machine learning engineers or human-machine interaction specialists in a given sector? Prompt engineering is itself now a field tied directly to AI adoption. So talent flows (where firms are actually hiring, and for what) can be a leading indicator of whether AI is being integrated into productive work rather than experimented with at the margins.

The second bucket is token usage (a token is the basic unit of data an AI model reads and generates). **More organizations are beginning to measure how many tokens are being consumed across different sectors and applications.** It is an imperfect signal – usage could be inefficient, or recreational – but it is a rough proxy for the extent to which organizations are paying for and deploying AI models at scale. Microsoft’s AI Economy Institute has done some work on measuring token usage across countries; while firm-level data is harder to come by it is an area worth watching.

What I would actively discount is survey-based evidence. When 90% of businesses in a sector report that they are “using AI,” that number probably misleads more than it informs. How respondents interpret the question and how much they embellish their answers makes such figures close to meaningless for serious analysis.

You use case studies from the previous three industrial revolutions to construct your analysis. Which of these transitions is most instructive for thinking about AI investment cycles?

The parallel that comes to mind most readily is US-Japan competition over the computer, and how information and communications technologies were adopted across the US economy more effectively than in Japan. That transition also featured boom-bust cycles – most famously, the dot-com crash – but **over the long term, computing and the internet ultimately did transform productivity.** That arc may be a helpful parallel for current debates about an AI bubble.

There is probably a real risk that many of today's capex investments in ultra-large-scale clusters and data centers will not pay off in the near term for the companies making them. But that may simply be the normal course of events when there is significant excitement and speculation around transformational technology. Over the long run, I do think AI will continue to take up a growing share of the energy budget, and we will eventually see broad productivity gains across the economy.

What is interesting to track in parallel is China's capex. The leading AI labs in China are not investing at anything like the scale of their US counterparts. This is for several reasons: restricted access to cutting-edge chips, the relative lack of wealth of Chinese AI companies compared to their US peers and, perhaps most importantly, weaker enterprise demand.

Chinese companies are simply less willing to pay for large language model subscriptions at scale, which dampens the demand-side drivers for capital investment.

How should we evaluate a country or company's skill infrastructure?

The first thing I look for is the breadth of the talent pool. More specifically, how many people can do good-enough AI engineering tasks. To make that concrete: a developer who can take an open-source model, fine-tune it on an industry-specific dataset and produce a proof of concept for how it could be integrated into a particular company workflow. That is the baseline. The question is how wide that pool is, not how exceptional its top end is.

The second dimension is systematization. So, to what extent can a country or firm take that knowledge and spread it across different divisions or sectors, rather

than leaving it siloed in one team or one institution. At the country level, this means strong linkages between industry and academia, and effective technology-transfer channels. Germany's Fraunhofer applied research institutes are a good example of what that can look like in practice: bridging institutions that standardize and disseminate engineering knowledge from the frontier to the broader economy.

At the firm level, it might mean a common set of standards and protocols for how data is structured and updated so that it can feed into AI pipelines, or shared benchmarks for evaluating which model to deploy for a given task. The extent to which a firm can ensure that everyone is on the same page about integrating AI into operations (and not just the dedicated AI team) is itself a measure of skill infrastructure.

One area that is often underappreciated at the country level is the legal and institutional environment around university-industry linkages. In the US, it is relatively easy for researchers to spin out start-ups without ceding dominant intellectual property rights to their universities. That has enabled stronger, more porous connections between entrepreneurship and academia; it helps systematize the flow of knowledge across the technology ecosystem in ways that matter for diffusion.

You argue the US holds an edge due to its superior capacity to diffuse AI across sectors, but that it may be over-indexing on restricting technology outflows. Meanwhile, China taking a more active role in managing technology companies could hamper AI adoption at scale. Which is the more damaging?

The overall framing I would offer is that the US has a much larger margin to fail. It is **particularly well positioned to lead what I think of as the AI diffusion marathon.**

Part of what makes that clear is the reframing we discussed earlier. Once you understand that the race is about diffusing a general-purpose technology across the entire economy, it would be very surprising for China to emerge as the leader.

China significantly trails the US and other wealthier economies on overall adoption of cloud computing and the basic digitization of business data records. DeepSeek and others demonstrate that China has exceptional firms at the frontier, and strong frontier universities. But on the diffusion pathway (from frontier institutions to small and medium-sized businesses across the country), the US has a much stronger starting position.

That said, **both countries are doing things that are counterproductive to their own interests.**

The thing that most concerns me about US policy right now is the combination of restrictions on international talent flows and disinvestment from the higher education institutions that have historically been the engine of GPT skill formation. In the US-Japan technology competition, one of the US's decisive advantages was its ability to tap a global pool of software engineering talent, while Japan operated in a much more inward-facing environment. Current US restrictions on international students, combined with reduced support for educational mobility programs and community colleges, risk eroding that advantage.

What research question most interests you right now?

One area I have been thinking about more since the book went to press is the risk of AI-linked accidents and what we can learn from other high-risk technologies, such as nuclear power, civil aviation and the chemical industry.

In those sectors, safety concerns played a significant role in slowing or constraining diffusion.

AI presents a different and more multifaceted risk profile, but the underlying question is similar: which countries or regulatory regimes can strike the right balance between enabling adoption and preventing the kind of accident or public trust collapse that would become a long-term barrier to diffusion?

If you look at nuclear power, a more prudent regulatory framework in certain countries might have paved the way for more intensive long-term

adoption. The same dynamic could play out with AI. A single high-profile failure that erodes public confidence could set back adoption in ways that take years to recover from. This wouldn't represent a death knell, but I don't think it gets enough serious analytical attention, and it could become increasingly central to the diffusion story over the next decade.

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