LUX Q4 2024 REPORT

JOSH WOLFE · FEBRUARY 13, 2025 · 12 MIN READ

Superlatives

Imagine blacking out in 2019, waking up in 2025, and realizing that history is a Milius strip—Trump leads the White House in the midst of a self-induced trade war, SoftBank is in the headlines investing in real estate (Jesse Lee's centers this time), and the dragons of the Game of Thrones universe are once again streaming. Yet, the stakes—and the superlatives—have never been greater. DeepSeek's launch of R1 triggered the largest single-day market loss in history, while OpenAI announced the largest private corporate initiative ever with its Stargate Project. The Nasdaq and Bitcoin hit record highs as the most expensive ever recorded, while a polar vortex led to record snowfall in Miami. The world's most active conflicts around the world rival at any time since World War II.

This surreal sense of returning to a world both changed and unchanged underscores the fundamental reality of markets and geopolitics—while the players and headlines shift, **the underlying forces of uncertainty, disruption and spiral competition remain constant**, challenging investors to distinguish between transient noise and durable trends.

In a world of superlatives, our quality of reasoning and the fortitude of our actions must match the extreme risks and opportunities the world presents. Geopolitical and technological fault lines are shifting faster than conventional wisdom can keep up. This serves as the next big pattern in investment and has profound implications. Nonlinear scenario analysis—an area where Lux's Ridgeirning gives us an edge. As markets move from one set of pre-bound rates and unlimited liquidity to one of more normalized monetary conditions, the premium on discernment rises. Quantitative observations and analysis can reveal the what, but only **you can define the why** and **anticipate the what next**.

Markets in 2025: A Tour of Contradictions and Correction

As we enter 2025, the rapid shift in expectations and market quantos is moderating as **markets are balanced between consensus and contradiction, stability and risk, promise and peril**. Apple nearly reached a $4 trillion market cap in December as Bitcoin hit its highest price ever, yet the highest inflation in a generation stalled the S&P 500 rose the fastest for a new administration since Reagan in 1985, even as credit defaults reached their highest level since the aftermath of the Great Recession. We recently hosted Jason Zweig and the family of Ben Graham at Lux for the release of the newest edition of The Intelligent Investor, in which Graham notes that the **market is a pendulum that forever swings between unsustainable optimism and unjustified pessimism**.

While the post-pandemic surge and scare has tempered and soft-landing optimism treats 2%-3% growth as the fixture of reality, one widening crack appears remarkably tight. Any power is anything but and the real economy is already showing signs of structural strain. Rising operating costs and consumer spending are forcing tough but is subtle but noticeable uptick in restaurant and store closings. This **undercurrent of weakness, combined with ever-shifting political rhetoric, sets the stage for a turbulent year**—one where Trump is likely to blame Biden and Powell for any economic miseries, potentially paving the way for Kevin Warsh's appointment as the Fed. Even as the Fed Funds Rate is forecast to dip to 3.7%, debate lingers about how long rates will remain elevated, a reminder that **markets and monetary policy are rarely harmonious for long**.

Inflation is not just a fleeting concern but a structural reality. The trillions in global liquidity that were injected to stave off economic collapse after the pandemic now also set the stage for a prolonged inflationary way. Trump's push for re-industrialization centers on infrastructure and energy, but tariffs and geopolitical constraints on trade and the intensification of climate disruption are core human staples.

We continue to hold the view that **the natural cost of capital is higher and rising, dry powder** in private equity and venture capital is **"wet"**, (due to older reserves and overallocation) and **50-50% of venture firms will exit the market** from failed succession planning, partner in-fighting and other bitterness. Nonetheless, New entrants are also struggling; 2024 was the worst fundraising year for deal funds in a decade.

Broadly elevated valuations cast a long shadow over equities and credit markets alike. The perpetual **quest to dampen volatility often achieves the opposite**—allocators fleeing public mark-to-market transparency have, in private credit and leveraged private equity, merely displaced risk in time rather than eliminating it. Meanwhile, **record retail participation** (a classic contra-indicator), the structural distortions of passive investing, (**heavily concentrated in U.S. tech**), along with soaring valuations herald not just a "Golden Age of America" but the familiar arithmetic of **high multiples and low future returns**. The United States may remain the best market for funding innovation, but that doesn't preclude it from being the most expensive, pricing in its own inevitability.

Meanwhile, the "Magnificent Seven" tech giants, which drove over 50% of the S&P 500's returns in 2024, embody both the opportunity and the complacency risk embedded in today's market. Microsoft's valuation leadership **may flatter in 2025 as mounting cost of inflation crescendo into a clarion call**. Widespread adoption of generative AI remains a boon for Nvidia, but the sheer capital expenditure required with competition from the chinese to semi-against it and thrice. The dominant tech markets have also recalibrated for a second Trump term expecting **more DOGE less DOJ**, the possibility of exit euphoria and a revival of a "capitalism without cheapness" arises. Trump loves his supporters, and the markets are waiting for him to act.

Superlative Science from Speculative Fiction

We love being involved in science's superlative secrets. One such secret is **eDensity**. There are 8 billion people in the world, 10 people live in outer space, and only two people are today living with a kidney transplant from a genetically-engineered pig. The number of organ transplantation was commonly cited as the tyranny of biological compatibility. In 2025, that constraint is fading—first for a few humans and then for hopefully many—those who are in the right place at the right time, and it's just not overly distributed.

Superlatives like this abound across Lux's portfolio. **Varda** is one of only three companies in the world to have ever flown a vehicle from space to Earth. **Anduril** was one of only two companies selected for the U.S. Air Force's Collaborative Combat Aircraft program to build and operate hundreds of autonomous jet fighters, a rare win for a non-legacy defense company. **Physical Intelligence** has constructed the largest robot dataset ever assembled, while **Hugging Face** has more AI models available for machine learning researchers than any other platform. Cognition's Devin scores in the tenses **Together AI, RunwayML, Applied Intuition, Deductive, Eliun** and many more.

These accomplishments seem straight out of science fiction, and that's because they are. **Science fiction has a history of becoming science fact, but rarely at this pace**—a pace we are accelerating. We are finding and funding brilliant founders at the intersection of the 20 physical world in robotics, energy, manufacturing, maintenance (or what we at Global **Reverse**) and defense. **In addition to biology and robotics, we are funding ventures** that are pushing the frontiers of **transcend the crystalline cartography and alien determination of traditional chip design**. Like the emergence of biological complexity from simple cellular automata, these machine-evolved circuits represent a critical shift where artificial cognition charts paths through electromagnetic possibility spaces that our carbon-based witness can't fully fathom.

Art imitates life, but increasingly, life takes its cues from art. **We once looked to science fiction for escape; now, we look to it for instruction**. The increasing divide between sci-fi and sci-fact reflects a dynamic where our scientists and storytellers seem locked in a symbiotic exchange of ideas. The stories our consumers don't just entertain—they mold our perceptions, influence our choices, and convene us in a shared dialogue about the moral and technological boundaries we choose to frame. History suggests that fiction is not just a mirror of reality—it's also an oracle.

Consider the recurring themes of several upcoming new TV series and movies in 2025. Mickey 17 follows an expendable—a clone that takes on highly dangerous tasks—who unexpectedly survives against its destiny, highlighting the tension between the authority of biotechnology and society. The Electric State chronicles a teenager's journey through a technologically ravaged landscape, reflecting on the human cost of unchecked innovation, while Prime Target dramatizes the high-stakes moral catalysts of technological advancement through the lens of what should control theoretical knowledge.

The interplay between these speculative fictions and our real-life events is undeniable truth: just as market prices discount the future, our cultural zeitgeist anticipates it. The stories we consume shape the moral and technological dilemmas we will soon confront. Whether in a galaxy far, far away, a corporate boardroom, or the ruins of a shattered world, these narratives are never mere diversions—they are blueprints.

Nonetheless, **it is disconcerting, and it puts our propensity to tell stories on stensils**. Our widest inaugurations no longer take decades of assiduous training to realize as film or prose, but can be conceived today with the gift of **AI. Yet it's not merely automation; it is augmentation of human cognition at scale**. If the stories we consume shape the future, then AI itself is the next story-refiller—reshaping the narrative, feeding reality to its scripts.

Digital Doppelgangers, Simulacra of Self & Breaking Free

One of the superlative technical works on AI recently is Westworld. In the first episode, a human guest—tentative, probing—asks a robotic host with scrutinizing uncertainty, *Are you real?* Her response is chilling in its philosophical simplicity: *If you have to ask, does it matter?*

Spoiler alert: in the series unfolds, we learn that the hosts aren't merely responding to human guests—they're learning from them and training them, testing and improving their models until they can digitally (and eventually, physically) replicate them in every facet. The guests come for entertainment but leave behind their behavioral data, choices and desires, all feeding a system that increasingly knows them better than they understand themselves. **If you think twice before accepting all cookies on a website, you might think three about what it denotes from you**—not just what you explicitly give it, but everything it silently infers.

We've already made the leap to sci-fact. Many of the companies we've backed—from **Metaforpart** (3D scanning) to **Auris** and now **Mendaxon**—are constructing digital twins, simulacra that replicate reality with ever-finer precision. The more they do, the more we are interested in it the digital twinning of software APIs to agentic AI, which **we believe will eventually lead to the death of APIs and require a rethink of the SaaS investor playbook**. When APIs provided standardized exchanges between client and server, it made it easier for developers to build, navigating obstacles and reducing reliance on traditional integration points. The new battleground might not be who owns the API, but who controls access, permissions and the flow of the medium of information.

Yet it's the digital twinning of ourselves through AI that we are most intrigued by. **Every interaction is a data point, every hesitation is signal, every repetition is training loop**. AI doesn't just learn what you type, but how you type, the rhythm of your keystrokes, the insertions and deletions and follow-up questions that reveal your evolving thought process. Imagine this as a kind of **digital reincarnation—an invisible but intimately form-fitting mesh, adhering to you like a Marvel superhero's suit**, but instead of merely replicating your physical contours, it maps your essence.

We've all asked an AI model to rewrite a draft article in the punchy financial satire of Matt Levine, the florid fictional prose of Oscar Wilde or the acerbic, unsentimental tone of Rachel Cusk or Christopher Hitchens. **It's a cultural flying test in action—AI's creative range is derivative, but they are increasingly indistinguishable**. Yet, with the right training, we can go further. Future AI reasoning models could actually write in the same way as us, stopping at a thought process that needs rewriting or pausing to think outside (and perhaps actually observe a digital twin of a garden for inspiration). Some of today's thinkers emerge that the only goal should be to train AI to imitate our unique personalities and thought patterns—to effectively build their digital doppelgängers as well as possible and sell them.

Yet, there are limits. How will we evolve our tastes? How will we retain our pasts? Today, even as algorithms show us content that we have liked before, never letting us escape our former selves, Carl Al hands agency? Or will the data exhaust you leave behind—the weights and biases of neural networks—be recycling like a programmed Python script, defining you, calling around you, constructing and constraining? Will you be forever locked in the caricature of your past, unable to break free, unable to disrupt your own patterns, unable to author a new version of you? When AI models forget you?

Offensive openness: Open talent, open source, and decentralized compute

When it comes to superlatives, no country offers more extremes than China. A decade ago, the U.S. was the undisputed leader in nearly every critical technology. More than one-third of its empirical today, China commands roughly 57 out of 64 of key fields, from materials and agricultural sciences to photonic sensors and electric batteries. China now controls the majority of the world's mined ores, high-impact research across these domains, in some cases generating five-to-ten times the volume of predictive work as the U.S. Meanwhile, **China's state-led strategy translate immediately to commercial or military dominance, but they are the strongest platform of who will control supply chains, information flows and economic leverage in the coming decades**.

Our approach in America must be **offensive openness, doubling down on precisely the strategies that made America great** the past century. We must continue to attract the world's brightest minds, continue to open our software so that our leading talent has access to the best tools and can become the most ambitious and competitive entrepreneurs in the world, and continue to deploy our digital infrastructure to ensure its resiliency, adaptability and speed in the rapidly changing world ahead.

Today, 50% of undergraduate AI researchers worldwide hail from China, and nearly 40% of AI researchers in the U.S. were originally trained there. Our visa policies have intentionally made it harder to retain these critical workers. Over the past decade, the U.S. has seen significant decline in international student enrollment, from 275k in 2020 to 187k. **The AI arms race won't be won with silicon alone—it's a war for minds. Lose the talent, lose the future**. Just as Silicon Valley was built on Europe's best minds in the service of peace and prosperity, any future war with China will be fought by AI engineers alongside dissident Chinese scientists who seek the freedom and liberty and are willing to fight to return those values to their homeland. Open-source AI and CBRN will also be battlefield arms, alongside drones and algorithms; earlier, **Today, Shi'ulzhi's global army of zombies now outnumber the Pentagon's contractor workforce** 58:1. Drones delay in daylight—dictatorships train in darkness.

Open talent begets the importance of open-source software. DeepSeek's R1 model re-opened the minds of investors about the leading role of open-source AI. Having poured tens of billions of dollars into models that could be replicated for only commoditized, investors in large foundation models are now left reassessing their strategies.

The pendulum has now swung decisively in favor of open source AI, a shift we anticipated and positioned for. **Hugging Face** and **Together** stand as dominant leaders, as do **RunwayML** and **Applied Intuition** with different operational applications, while **Sakana AI**—Japan's foremost AI company where Lux led a founding investment—pushes forward with radically efficient architectures unrelated from the brute force capex scaling laws governing OpenAI and Anthropic. While OpenAI and Anthropic have raised billions, Sakana AI has achieved its milestones with just a few million. Anthropic's complete reliance on Amazon Web Services underscores the critical distribution, while OpenAI faces an insatiable capital appetite, deepening entanglement with Microsoft's lightning rod and the relentless ire of Elon—who, not surprisingly, adjacent to power, can obstruct Sam Altman through Grok-3 in ways that may be underestimated. **The true differentiator for Anthropic is its focus on enterprise data**. If open models match closed-source performance, then those with deep reservoirs of proprietary data (say WhatsApp, Instagram) and distribution—will emerge as kingmakers. Lux's prior letters previously predicted the pivot from unlimited GPU and large-cluster demand toward inference-time compute needs and **the potential resurgence in importance of memory players**. We also expressed skepticism toward the commoditization of modular nuclear, forecasting that natural gas and large-scale nuclear plant restarts would prove more durable.

There's deeper infrastructure change underway beyond open-source models. AI models allow for immense experimentation, so the combinatorial brilliance of millions of scientists using Figma face to edit and update models can unleash. The best ideas often hit a compute wall—re-training models or deploying them for inference often requires massive central and proprietary data centers. Today, ideas that are too out-of-reach of the tinkerer not employed by one of a handful of companies. That's why **we expect a significant shift in capital allocation toward memory and new chip architectures that optimize for efficiency and speed**. Over the next few years, we anticipate that **up to 50% of AI inference will happen on-device**—reshaping the AI value chain. By increasing decentralization of compute, improvements and specialization in base models can rapidly spread among end users, finding their natural customers much faster. **AI winners will not be those who train the biggest models—but those who make them run everywhere, instantly and at near-zero cost**.

AI's announcement isn't just personal—it's structural. **The same forces that threaten to unify individual identity are at play in broader arenas, locking institutions, industries, and even nations into patterns that may be increasingly difficult to escape**. This is the defining struggle of our time: the real battle isn't just human vs. machine but open vs. closed, inertia vs. reinvention, state control vs. market dominance, incumbents vs. insurgents and West vs. CBRM (China, Russia, Iran, and North Korea). At Lux, we don't just see this as an investment opportunity—but a shared imperative. The technologies that will define the next decade (energy, robotics, and autonomous intelligence) can be coded to augment human agency, expand our collective intelligence, and strengthen our institutions. Betting on breakthrough science and advantaged technologies is first and foremost about financial returns—it's also funding the future we want to live in, ensuring that it remains shaped by open societies, free markets and technological leadership rooted in democratic values.

Disrupting These Who Fund the Disrupters

The conventional wisdom about automation has been upended. While many expected blue-collar jobs to be the first casualties, AI's initial disruption has largely targeted white-collar knowledge workers—those who have benefited most from markets. This raises an uncomfortable question: are venture investors next?

We can **imagine a future where every investment decision every pitch meeting, partnership discussion and past outcome—is recorded, transcribed and analyzed. AI could quantify what has long been more art than science, applying Bayesian models to assess past decisions and Kelly criteria to optimize portfolio sizing**. An AI-enhanced investment committee could arrange with specialized models acting as advisory partners: one tuned to founder psychology, another tracking market dynamics, a third stress-testing against historical successes and failures.

But **rather than putting us all on the same "grige" page—a dull, homogenized blend of grey and beige—AI might amplify cognitive diversity**. By surfacing blind spots, identifying hidden biases and challenging consensus, AI could actually increase variance in decision-making, making firms sharper rather than softer. The implications remain uncertain, but one thing is clear: **those who harness AI's potential early may gain an edge in a rapidly evolving landscape**.

The convergence of AI, geopolitics and capital is happening in real-time. What remains constant is the necessity for strategic foresight, an open-minded willing to embrace volatility and a relentless pursuit of differentiated innovation. **Luck remains steadfast in backing the pioneers who will define the future**, and especially in **the pursuit of funding and commercializing cutting-edge science and technology backing that elusive asymptote of truth**.

With all the talk of artificial and fictions, we must remember that **the transitive circular logic of truth is that truth is the pursuit of justice and of scientific adventure is the pursuit of truth**. It was Roman renaissance man Cicero who is thought to have said, "would that I could discover truth as easily as I can uncover falsehood." And French painter George Braque who said, "truth exists, only falsehood has to be invented."

WRITTEN BY

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Josh co-founded Lux Capital to support scientists and entrepreneurs who pursue counter-consensus discoveries to the most vexing puzzles of our time in order to lead us into a brighter future. The more ambitious the project, the more like us, creating matter from light.

Josh is a Director at Aera Therapeutics, Capit Neuroscience, Ekon Therapeutics, Impulse Labs, Kaloyan, Osmo, Variant Bio...

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