AI Hardware as Fast-Depreciating Capital: Research for VoxEU Article

Executive Summary

This research brief supports a VoxEU article linking the theoretical framework of AI hardware as high-depreciation capital (~33% annual economic depreciation, ~7 quarter half-life) to timely empirical evidence from hyperscaler capex cycles, GPU rental markets, and emerging macroprudential concerns. The evidence strongly validates the paper's core argument and reveals significant policy misalignment across tax treatment, financial stability oversight, and international regulatory divergence.

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1. The Timeliest Hook: Q1 2026 Hyperscaler CapEx Explosion

The opening weeks of 2026 provide an extraordinary empirical moment. Meta's January 28, 2026 announcement of **$115-135 billion** in planned 2026 capex—nearly doubling from $70-72 billion in 2025—represents the most dramatic single-year expansion in AI infrastructure history. Combined hyperscaler spending (Microsoft, Google, Meta, Amazon) is projected to reach **$455-521 billion in 2026**, up from ~$370 billion in 2025. Deriv

Capital intensity has reached unprecedented levels. Microsoft is spending **45% of revenue** on capex; Oracle **57%**. This represents a fundamental departure from historical technology company capital structures. Goldman Sachs projects **$1.15 trillion** in cumulative hyperscaler capex for 2025-2027—more than double the $477 billion spent 2022-2024.

The financing structure has shifted dramatically. Hyperscalers raised **$108 billion in debt** during 2025, with Bank of America projecting they would need to spend **94% of operating cash flow** on AI buildouts. Amazon's free cash flow dropped **69%** year-over-year despite record revenues. IG This debt-financing shift creates new macroprudential risks for rapidly-depreciating assets.

Key executive quotes revealing investment dynamics:

- Mark Zuckerberg: "We want to make sure we're not underinvesting"
- Google VP Amin Vahdat: "We must double serving capacity every 6 months"
- Microsoft CFO Amy Hood: "$368 billion of contracted backlog we need to deliver"

Microsoft

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2. GPU Price Dynamics: Direct Validation of ~33% Annual Depreciation

The GPU rental market provides remarkably clean validation of the paper's depreciation assumption. **H100 spot rental rates collapsed from ~$8/hour at peak (mid-2023) to ~$2.10/hour by late 2025—** Silicondata a 74% decline over approximately 2.5 years, implying **35-40% annual depreciation** in rental value.

Current Pricing Landscape (January/February 2026)

GPU Type	Spot/Discount Providers	Major Cloud Providers
H100	$1.50-$2.50/hr	$3.00-$4.20/hr
H200	$1.99-$3.80/hr	$3.72/hr (GCP spot)
B200/Blackwell	$2.44-$4.99/hr	Limited availability
A100 (previous gen)	$0.52-$1.29/hr	Becoming commodity

AWS triggered industry-wide repricing with a 44% H100 price cut in June 2025, forcing competitors to follow. Silicondata Intuitionlabs Silicon Data's SDH100RT Index—now published on Bloomberg terminals— Silicondata tracked H100 hovering at ~$2.10/hour through late 2025. CITP Blog

Secondary Market Evidence

Oplexa secondary market data reveals clear age-based depreciation:

- **<1 year old H100**: $18,000-$25,000 (vs. $25-40K new)
- **1-2 years old**: $12,000-$18,000
- **2+ years old**: $7,000-$12,000

This implies **28-37% first-year depreciation** and **25-33% subsequent annual depreciation**—directly aligned with the paper's ~33% assumption.

The Accounting-Economic Gap

Hyperscalers use **5-6 year depreciation schedules** for AI hardware:

- Amazon, Google, Microsoft: 6 years
- CoreWeave: 6 years
- Lambda Labs: 5 years
- Nebius: 4 years

Princeton CITP researcher Mihir Kshirsagar estimates actual technical lifespan of **1-3 years** for heavily-utilized GPUs. Michael Burry estimates this depreciation mismatch will understate costs by **~$176 billion between 2026-2028**. Barclays has cut hyperscaler earnings forecasts by up to 10% to account for more realistic depreciation assumptions. CITP Blog

Jensen Huang's revealing statement: "When Blackwell starts shipping in volume, you couldn't give Hoppers away... There are circumstances where Hopper is fine. Not many." Techbuzz

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3. Historical Parallel: The 1990s Telecom Boom-Bust

The telecom equipment investment cycle of 1996-2002 provides the closest historical analog to current AI infrastructure dynamics—and supports the paper's prediction of rapid adjustment cycles for high-depreciation assets.

Quantitative parallels:

- Communications equipment investment grew from **$62B to $135B annually** (1996-2000)— Substack a 118% increase in 4 years
- Cumulative investment: **$500+ billion**, plus $800B in M&A (1999) Fabricated Knowledge
- Post-bust decline: CLEC capital spending fell **nearly 80%** from peak Federal Reserve Bank of San Franci
- S&P telecom firms lost **$700 billion** in market cap (2000-2002) Federal Reserve Bank of Richmond

Structural similarities:

1. Massive debt financing ($500B+ in telecom bonds 1996-2001; My WordPress $200B+ in data center debt 2025)
2. Narrative-driven overinvestment ("doubling every 100 days" then; "scaling laws" now)
3. Under-utilization risk (less than 5% of fiber "lit" at peak My WordPress → potential

"stranded compute"?)

4. Incumbent adaptation struggles alongside new entrant over-investment

The telecom bust demonstrated that rapid-depreciation capital creates extreme investment volatility—consistent with the paper's theoretical prediction of ~7 quarter half-life vs ~11 years for conventional capital.

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4. Policy Misalignment: Tax Treatment and Depreciation Rules

US Tax Policy

Current US treatment creates significant mismatch with economic reality:

- **5-year MACRS** recovery period for computer equipment TaxGPT (implying ~20% annual depreciation)
- **100% bonus depreciation** reinstated permanently under OBBBA (January 2025+) RSM US Elliott Davis
- **Section 179**: Up to $1.225 million immediate expensing (2025) TaxGPT

The combination of 100% bonus depreciation with 5-year recapture creates complex incentive structures. Full expensing eliminates timing distortion for profitable firms but masks the underlying mismatch between statutory and economic asset lives.

Germany as Reform Benchmark

Germany's 2021 reform set computer hardware useful life to **1 year**—remarkably aligned with the paper's framework. This treats computers and software as immediately expensible, acknowledging technological obsolescence. France uses **3-year straight-line** (33.33% annual—almost exactly matching the paper's assumption), Rzilient while Spain permits only maximum 26% annual depreciation. Limit Consulting

Policy Gap Identified

No jurisdiction has implemented **AI-specific depreciation rules** distinguishing accelerators from general computer equipment. The tax code treats a 2020 GPU identically to a 2025 H100, despite vastly different obsolescence patterns and economic depreciation rates. This represents a clear policy gap the paper could address.

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5. Emerging Macroprudential Concerns

Scale of AI Infrastructure Lending

The financial system's exposure to rapidly-depreciating AI assets has grown dramatically:

- **$30 billion** in US data center financings (2024)
- **$60 billion** projected (2025)
- **$200 billion** total debt raised for data centers (2025)
- **$27 billion** Meta-Blue Owl Capital single transaction (largest private credit deal ever)
- **$5.3 trillion** estimated needed through 2030 (JP Morgan)

Regulatory Attention

The **Bank of England has initiated a probe** into data center lending amid "AI bubble fears," examining interconnected deal structures, circular financing, and securitized investments. The BOE explicitly noted: "If the projected scale of debt-financed AI and associated energy infrastructure investment materializes over this decade, financial stability risks are likely to grow."

Morgan Stanley is reportedly considering **significant risk transfers** to offload data center exposure. Goldman Sachs paused a $1.3 billion mortgage bond sale for CyrusOne following a data center outage, revealing mark-to-market sensitivity.

Collateral Value Dynamics

The paper's framework has direct implications for asset-backed lending. With **~33% annual depreciation**, AI hardware collateral could enter "negative equity" within 2-3 years of financing—similar to rapid-depreciation dynamics in auto lending. Current lending structures increasingly focus on **facility financing** (real estate) rather than equipment, effectively shifting obsolescence risk to tenants.

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6. EU-US Policy Divergence

EU AI Act Compute Provisions

The EU AI Act establishes compute-based regulatory thresholds:

- **10^{23} FLOPs**: Threshold for GPAI model classification

- **10^{25} FLOPs**: Presumption of "systemic risk" requiring enhanced obligations
- **Training compute reporting** required for all GPAI models (30% error margin permitted)
- **Energy efficiency documentation** mandatory for GPAI providers

These requirements will generate unprecedented data on AI infrastructure utilization—potential future empirical resources.

Investment Gap

The EU-US AI infrastructure investment gap is substantial:

- **Cumulative private AI investment (2013-2024)**: EU ~$50B vs US $470B (US 9x larger) Federal Reserve
- **2024 annual**: EU $45B vs US $300B (US 6.7x larger) North Atlantic
- **Global data center capacity**: EU 18% vs US 37% McKinsey & Company

The EU has announced **€200 billion** mobilization through InvestAI (2025-2030), FinTech Weekly but no accelerated depreciation framework for AI hardware. Policy think tanks recommend harmonized R&D tax credits and accelerated depreciation for sustainable data centers, but no legislative proposals have advanced. Groupe d'Etudes Géopolitiques

Implications

The EU's focus on transparency and reporting (rather than investment incentives) may widen the infrastructure gap. The paper could argue that failure to align depreciation rules with rapid obsolescence creates implicit disincentives for EU AI investment relative to 100% bonus depreciation in the US.

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7. Available Data Sources for Empirical Work

GPU Pricing Data

Source	Coverage	Access
Silicon Data SDH100RT Index	80%+ of H100 rental market	Bloomberg Terminal
ComputePrices.com	49+ providers, 1,067 prices daily	Weekly email alerts
Vast.ai	Marketplace pricing	Public API

Major cloud pricing pages	AWS, GCP, Azure, Lambda	Direct web scraping

Macroeconomic Data

Source	Series	Access
FRED	B935RC1Q027SBEA (Computers & peripherals)	Public API
FRED	A679RC1Q027SBEA (IT equipment & software)	Public API
BEA Fixed Assets	Depreciation by asset type	Interactive tables
SEC EDGAR	Hyperscaler 10-K/10-Q filings	Public

AI Adoption

Source	Coverage	Access
Census BTOS	~200,000 firms bi-weekly	Working papers
Stanford HAI Index	Comprehensive annual	PDF/data tables
OECD.AI	Publications, patents, investment	Public portal

Key gap: No public source for firm-level AI hardware investment. Hyperscaler filings do not separately disclose AI-specific capex. The BEA Digital Economy Satellite Account was **discontinued** in December 2023 due to budget constraints. BEA bea

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8. Recommended VoxEU Article Structure

Optimal Hook (February 2026)

Lead with Meta's January 28 announcement ($115-135B 2026 capex) and the broader hyperscaler capex explosion. Frame the question: "Can $600 billion in annual AI infrastructure spending be sustained when the underlying hardware depreciates at ~33% per year?"

Suggested Structure (800-1,200 words)

1. **Opening** (150 words): Meta capex announcement, aggregate hyperscaler figures, capital intensity unprecedented

2. **Framework** (200 words): Brief description of rapid-depreciation capital model, ~7 quarter half-life vs ~11 years for conventional capital
3. **GPU Market Evidence** (250 words): Rental rate collapse, secondary market data, accounting-economic gap
4. **Investment Cycle Dynamics** (200 words): Telecom parallel, debt financing shift, BOE probe
5. **Policy Implications** (200 words): Tax treatment mismatch, Germany benchmark, macroprudential considerations
6. **Conclusion** (100 words): Research agenda, policy recommendations

Figures to Include

1. **Figure 1**: H100 rental rate trajectory (2023-2026) showing ~74% decline
2. **Figure 2**: Hyperscaler capex growth vs traditional IT investment cycles
3. **Figure 3**: Accounting vs economic depreciation gap (5-6 year schedules vs 2-3 year economic life)

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9. Key Citations for Academic Anchoring

Investment-Specific Technology Shocks:

- Greenwood, Hercowitz, Krusell (2000): "The Role of Investment-Specific Technological Change in the Business Cycle" (European Economic Review) — 30% of output fluctuations from investment-specific tech shocks

AI as Depreciating Capital:

- Brynjolfsson, Rock, Syverson (2017): "Artificial Intelligence and the Modern Productivity Paradox" (NBER WP 24001) — J-curve mismeasurement model

Bonus Depreciation Effects:

- Curtis (2021): "Capital Investment and Labor Demand" (NBER WP 29485) — 10 log-point investment increase from 50% bonus depreciation

Compute Taxation Framework:

- Korinek & Lockwood (2026): "The Future of Tax Policy: A Public Finance Framework for the Age of AI" (Brookings) — Distinguishes capital vs consumption-side AI taxation brookings

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10. Strongest Policy-Relevant Arguments

Tier 1: Lead Article Angles

1. **The Depreciation Mismatch Creates Hidden Risk**: $200B+ in debt financing for assets with 2-3 year economic life but 5-6 year accounting treatment. Bank of England probe validates systemic concern. The telecom bust destroyed $700B in market cap when similar dynamics unwound.

2. **Tax Policy Should Reflect Economic Reality**: Germany's 1-year depreciation rule provides reform benchmark. Current US 5-year MACRS TaxGPT understates true obsolescence even with 100% bonus depreciation available.

3. **Rapid Investment Cycles Are Features, Not Bugs**: The paper's ~7 quarter half-life prediction aligns with observed hyperscaler capex volatility and GPU price dynamics. Policymakers should expect—and plan for—rapid adjustment cycles.

Tier 2: Supporting Arguments

4. **GPU Rental Markets Reveal True Depreciation**: Observable price data shows 35-40% annual declines, validating the paper's ~33% assumption and contradicting accounting treatment.

5. **EU-US Policy Divergence Will Widen Investment Gap**: EU emphasis on transparency without depreciation incentives creates implicit disincentives relative to US full expensing.

Conclusion

The empirical evidence strongly supports the paper's framework of AI hardware as rapid-depreciation capital. The February 2026 moment offers exceptional timeliness: record hyperscaler capex announcements, collapsing GPU rental rates, emerging macroprudential scrutiny, and the telecom bubble historical parallel all converge to support policy-relevant arguments about AI investment dynamics.

The most compelling VoxEU article would lead with Meta's $115-135B capex announcement, TrendForce use GPU rental data to validate the ~33% depreciation assumption, draw the telecom parallel for investment cycle dynamics, and conclude with specific policy recommendations around depreciation rules and macroprudential oversight.

Recommended title: "The AI Hardware Depreciation Puzzle: Why $600 Billion in Annual

Investment May Require New Policy Frameworks"