ANTITRUST SIMILARITIES AND DIFFERENCES BETWEEN BROWSER COMPETITION AND AI COMPETITION

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In both the 1990s browser competition and today's generative AI competition, there was a first-mover disruption by an upstart (Netscape, OpenAI), which prompted an aggressive "code red" response by large incumbents (Microsoft, Google) that leveraged their wide product distribution channels. However, at least three notable differences in the competitive dynamics warrant continued attention from antitrust regulators and practitioners. First, AI carries a positive marginal cost per use, unlike browsers' near-zero marginal cost, which gives a competitive advantage to vertically integrated providers and those able to cross-subsidize from other businesses. Second, consumers multi-home across different AI products, unlike browser users, who defaulted to a single product, which makes a winner-take-all outcome less likely. Third, AI's continuous innovation cycles and portable human capital make competitive dynamics more fluid and fast-paced.

I. INTRODUCTION

In the mid-1990s, the web browser transformed the internet from an academic network to a mass-market platform and reshaped how people accessed information, communicated, and conducted commerce. Three decades later, generative AI is similarly transforming how people search, write, code, and reason.[2] In both situations, an upstart company introduced a breakthrough product that caught a dominant incumbent by surprise and prompted an aggressive response. Will history repeat itself? This article examines the similarities and differences between browser competition in the 1990s and AI competition of today. It also identifies AI competitive dynamics that warrant continued attention from antitrust regulators and practitioners.[3]

II. BROWSER COMPETITION

In December 1994, Netscape Communications introduced Netscape Navigator 1.0, a browser that would reshape how ordinary people accessed the internet and lay much of the technical groundwork for modern internet publishing.[4] Netscape Navigator improved dramatically on its predecessor, Mosaic, by displaying text while images were still loading.[5] The browser quickly gained popularity: within four months of launch, three-quarters of internet users had adopted Netscape.[6] At first, Microsoft, the dominant maker of Windows and desktop software, did not view the browser as a serious threat. That changed in May 1995, when Bill Gates, co-founder of Microsoft, wrote "The Internet Tidal Wave," a memo in which he identified the internet as a fundamental paradigm shift.[7]

Microsoft responded with Internet Explorer, but its early versions did not perform well.[8] The turning point came with Internet Explorer 3 in 1996, which was still slightly technologically inferior to Netscape.[9] However, Microsoft had control over the distribution of Windows, the most popular operating system and a complementary product to Internet Explorer. This was an advantage that Netscape did not have. By bundling Internet Explorer for free together with the personal computer and strategically restricting the distribution of Netscape, Microsoft was able to slow the diffusion of Netscape while increasing the usage share of Internet Explorer.[10] Outside of the Windows operating system, "Microsoft even started giving away Internet Explorer for Macintosh and Unix computers to make sure that commercial markets for browser software never emerged."[11] Although the marginal costs of selling another browser are minimal, Netscape needed to earn revenue from the browser market to recoup its R&D costs. [12],[13] Having lost access to the most cost-effective distribution channels, and seeing commercial prospects for paid browsers dim due to Microsoft's strategic choice to make Internet Explorer available for free, Netscape's paid browser model ultimately collapsed, and it was pushed

2 Throughout this article, AI refers to modern generative AI that was popularized in the early 2020s, characterized by large frontier models capable of generating text, code, and images across open-ended tasks, in contrast to earlier AI, which was typically rule-based and focused on predictive and classification tasks.

3 The issues of AI competition are also comparable to those that arose in the Web 2.0 competition among Big Tech digital platforms where competitive issues included network effects, competitive advantages stemming from data accumulation, and self-preferencing. Moreover, since many of the large Web 2.0 platforms are also players in the current AI space, antitrust lessons from Web 2.0 competition is also of interest.

4 "Netscape helped to sustain the exponential growth of Web publishing to more than 10,000 servers by the end of 1994." THOMAS HAIGH & PAUL E. CERUZZI, A NEW HISTORY OF MODERN COMPUTING (HISTORY OF COMPUTING) (2021).

5 James J. Heiney, *Release of Netscape Navigator 1.0*, EBSCO, https://www.ebsco.com/research-starters/computer-science/release-netscape-navigator-10.

6 Heiney, *supra* note 5.

7 *U.S. v. Microsoft: Proposed Findings of Fact*, U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION, https://www.justice.gov/atr/us-v-microsoft-proposed-findings-fact ("Gates announced to the rest of Microsoft that he assigns 'the Internet the highest level of importance. In this memo I want to make clear that our focus on the Internet is critical to every part of our business.'").

8 James K. Sebenius, *Negotiating Lessons from the Browser Wars*, MIT SLOAN MANAGEMENT REVIEW (May 15, 2002), https://sloanreview.mit.edu/article/negotiating-lessons-from-the-browser-wars/.

9 Andrei Tiburca, *Why Did Netscape Fail?, AIRFOCUS* (January 16, 2023), https://airfocus.com/blog/why-did-netscape-fail/.

10 *U.S. v. Microsoft: Proposed Findings of Fact*, U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION, https://www.justice.gov/atr/us-v-microsoft-proposed-findings-fact ("Despite the existence of this separate demand for browsers and operating systems, Microsoft tied its browser to its Windows operating system, and refused to offer an unbundled option, for the purpose of hindering the development of Netscape and other browsers.").

11 HAIGH & CERUZZI, *supra* note 4.

12 *United States v. Microsoft Corporation,* 253 F.3d 34 (D.C. Cir. 2001) ("Marginal costs are essentially zero.").

13 Direct Testimony of Franklin M. Fisher, United States v. Microsoft Corporation, No. 98-1232 (D.D.C. January 5, 1999), 57, https://www.justice.gov/sites/default/files/atr/legacy/2006/06/26/213457.pdf ("'Our business model works even if all Internet software is free,' says Mr. Gates. 'We are still selling operating systems.' Netscape, in contrast, is dependent upon its Internet software for profits[.]").

out of the market.[14] Microsoft's use of these and other aggressive tactics led to the landmark antitrust case *United States v. Microsoft Corp.*, in which the U.S. government prevailed in its case against Microsoft for abusing its operating system monopoly to crush browser competition. The case became a defining moment in modern tech regulation, particularly on platform power and bundling.

After Microsoft had effectively displaced Netscape, browser competition continued with Mozilla Firefox launching in 2004 and Google Chrome in 2008. Chrome's speed and suitability for modern web applications helped it overtake Internet Explorer by around 2012, and it remains the dominant browser on personal computers today.

III. AI COMPETITION

Competition in the modern generative AI space picked up in November 2022 after the then relatively small research lab OpenAI released a conversational interface, ChatGPT.[15] It reached 100 million monthly active users within two months, the fastest consumer adoption rate on record at the time.[16] The underlying transformer architecture had been published by Google researchers five years earlier in 2017, but wide-scale commercial success in modern generative AI was first achieved by OpenAI, not Google.[17]

In response to OpenAI's success, Google accelerated its AI efforts and released Bard (later rebranded as Gemini), which did not initially replicate ChatGPT's adoption success.[18] However, Google controlled many of the relevant upstream inputs, including research capacity, computing power to build and operate AI systems, and distribution assets. Through strategic distribution channels, Google subsequently reorganized its AI efforts and integrated Gemini more broadly across its product portfolio. Today, despite Google's slow start in the AI arena, Google, OpenAI, and Anthropic are considered the main frontier model providers.[19]

Understanding AI competition requires distinguishing three vertically related industry segments: upstream inputs, midstream model development, and downstream applications.[20] The upstream segment includes compute hardware and cloud infrastructure. Supply at this level appears relatively concentrated. Nvidia supplies a dominant share of the specialized Graphics Processing Units ("GPUs") used in training and inference, and Compute Unified Device Architecture ("CUDA") reinforces that position by creating switching costs for developers.[21],[22] The major cloud providers — Amazon Web Services, Google Cloud, and Microsoft Azure — occupy an important intermediary role between hardware and model developers. This upstream layer (compute hardware and cloud providers) of the AI stack may be relatively insulated from downstream product competition.

The midstream segment consists of model development and training. Entry at this layer has generally favored firms that are able to make large fixed investments in computing, talent, and data. This assumption was called into question when DeepSeek claimed that their models

14 *AOL to Acquire Netscape*, N.Y. TIMES (November 24, 1998), https://archive.nytimes.com/www.nytimes.com/library/tech/98/11/biztech/articles/24aol.html.

15 ChatGPT is optimized for accessibility through reinforcement learning from human feedback. Long Ouyang et al., *Training Language Models to Follow Instructions with Human Feedback*, ADVANCES IN NEURAL INFORMATION PROCESSING SYSTEMS, 27730–27744 (2003).

16 Krystal Hu, *ChatGPT Sets Record for Fastest-Growing User Base — Analyst Note*, REUTERS (February 2, 2023), https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01/.

17 Ashish Vaswani et al., *Attention Is All You Need*, in ADVANCES IN NEURAL INFORMATION PROCESSING SYSTEMS 30 (Isabelle Guyon et al. eds., 2017); Alec Radford et al., *Improving Language Understanding by Generative Pre-Training*, OPENAI (2018).

18 Sissie Hsiao, *Try Bard and Share Your Feedback*, GOOGLE (March 21, 2023), https://blog.google/technology/ai/try-bard/ ; Martin Coulter and Greg Bensinger, *Alphabet shares dive after Google AI chatbot Bard flubs answer in ad*, REUTERS (February 8, 2023), https://www.reuters.com/technology/google-ai-chatbot-bard-offers-inaccurate-information-company-ad-2023-02-08/.

19 "Frontier models are the most advanced AI models available at a given moment, trained on massive datasets to deliver state-of-the-art performance across many tasks, representing the leading edge of AI capability." *What Are Frontier Models?*,, NVIDIA, https://www.nvidia.com/en-us/glossary/frontier-models/.

20 Whether these segments correspond to distinct antitrust markets is a separate question that would require formal analysis.

21 "GPUs are important for AI because they can accelerate the training and inference processes. This allows AI models to be developed and deployed more quickly and efficiently than using CPUs." *What is a GPU and its role in AI?,* GOOGLE CLOUD, https://cloud.google.com/discover/gpu-for-ai.

22 Max A. Cherney, *Nvidia's Dominance in AI Chips Deters Funding for Startups*, REUTERS (September 11, 2023), https://www.reuters.com/technology/nvidias-dominance-ai-chips-deters-funding-startups-2023-09-11/; Saif M. Khan and Alexander Mann, *AI Chips: What They Are and Why They Matter*, CENTER FOR SECURITY AND EMERGING TECHNOLOGY (April 2020), https://cset.georgetown.edu/publication/ai-chips-what-they-are-and-why-they-matter/ . GPUs are designed to accelerate the rendering of 3-D graphics and are popular for use in AI. CUDA is the software interface through which AI models communicate with GPU hardware. The extensive tooling and libraries built around CUDA create switching costs that constrain the adoption of competing hardware.

delivered performance approaching that of frontier models at a small fraction of the reported cost.[23] If near-frontier performance can be achieved at substantially lower cost, the minimum efficient scale for model development may be lower than previously thought. DeepSeek's release has altered stock market expectations about how competitive this layer of the AI stack may be.[24]

The downstream segment includes consumer-facing assistants, enterprise APIs, developer tools, and vertical applications.[25] Competitive conditions here appear different from those upstream and midstream. On the consumer side, switching costs appear relatively low, and users often rely on multiple products for different tasks (multi-homing). In enterprise settings, however, switching costs may be more durable insofar as AI systems are embedded in proprietary workflows, and customers make complementary investments in tools, data pipelines, compliance systems, or employee training tied to a particular provider.

Another competitive consideration at the downstream layer is the channel through which users access AI, as large platform providers increasingly integrate AI into their existing ecosystems. Google has integrated Google's Gemini into Search, Android, Chrome, and Workspace; Microsoft has integrated Microsoft's Copilot into Windows, Office, and GitHub Copilot. A potential concern is that only a few large incumbent platforms may become the main gateways through which users access AI. Whether that raises foreclosure concerns (e.g. bundling/tying) depends on factors including market definition, user choice, and the terms of the relevant distribution agreements. So far, firm strategy has varied across the AI stack. OpenAI initially prioritized broad consumer distribution through ChatGPT; Google leaned on existing distribution channels and product integration; Anthropic focused on enterprise and regulated-industry use cases; and Meta pursued a more open-access approach with Llama. The coexistence of these approaches suggests that the industry has not yet settled on a dominant commercial strategy. Firms appear to be experimenting not only with model architecture and performance, but also with commercialization strategy, governance structure, and degree of openness.

IV. COMPARISON BETWEEN BROWSER AND AI COMPETITIONS

In both the browser and AI settings, an innovation by an upstart, less-adequately resourced firm triggered an incumbent's "code red" response.[26] In both cases, the incumbent regained competitive advantage by leveraging its deeper capital and broader product portfolio to offer similar-quality product features at a lower price.

However, there are at least three notable key differences.

A. Differences in Cost Structure

Although the upfront cost of developing a browser can be substantial, once it is built, copying and distributing it to additional users costs virtually nothing, leaving the marginal cost of serving each user near zero.[27] Moreover, while features have been added over time, the core function of a browser has remained simple: rendering requested web pages.

In contrast, AI products are not only expensive to build but also costly to serve because each user interaction consumes computing power, infrastructure capacity, and electricity.[28] Unlike a browser, with its straightforward usage pattern, AI usage cost can escalate significantly as users adopt it as a default layer for search, writing, planning, and everyday decision-making, pushing total query volume to an extraordinary scale. These cost dynamics are even more pronounced for agentic AI which can plan multi-step tasks, write computer program to execute those tasks, validate results and correct errors, and continue iterating for hours.

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23 Cornell University, DeepSeek-AI, *DeepSeek-V3 Technical Report*, arXiv:2412.19437 (December 27, 2024), https://doi.org/10.48550/arXiv.2412.19437; Cornell University, DeepSeek-AI, *DeepSeek-R1: Incentivizing Reasoning Capability in LLMs via Reinforcement Learning*, arXiv:2501.12948 (January 22, 2025), https://doi.org/10.48550/arXiv.2501.12948.

24 Sinéad Carew, Amanda Cooper & Ankur Banerjee, *DeepSeek sparks AI stock selloff; Nvidia posts record market-cap loss*, REUTERS (January 27, 2025), https://www.reuters.com/technology/chinas-deepseek-sets-off-ai-market-rout-2025-01-27/ .

25 Enterprise APIs (application programming interfaces) allow businesses to exchange information between internal applications and external systems.

26 Nico Grant & Cade Metz, *A New Chat Bot Is a 'Code Red' for Google's Search Business*, NEW YORK TIMES (December 21, 2022), https://www.nytimes.com/2022/12/21/technology/ai-chatgpt-google-search.html.

27 *U.S. v. Microsoft: Proposed Findings of Fact*, U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION, https://www.justice.gov/atr/us-v-microsoft-proposed-findings-fact ("'upfront costs of writing the software' and the fact that marginal costs of distributing it are 'essentially zero[.]'").

28 James O'Donnell & Casey Crownhart, *We Did the Math on AI's Energy Footprint. Here's the Story You Haven't Heard.*, MIT Technology Review (May 20, 2025), https://www.technologyreview.com/2025/05/20/1116327/ai-energy-usage-climate-footprint-big-tech/.

However, providers with substantial financial resources and/or broad product portfolios can hold significant competitive advantages in terms of their ability to offer comparable quality at lower prices over smaller providers whose primary revenue comes only from AI offerings.

One such advantage is through vertical integration, which incentivizes the vertically integrated firm to reduce final product prices through the elimination of double marginalization.[29] Many small players must rely on purchasing upstream inputs to serve their AI models. Anthropic and OpenAI, for example, must purchase large amounts of computing power and cloud infrastructure from external providers.[30] Two of the three largest cloud providers are Google and Microsoft — the very firms with which Anthropic and OpenAI compete in downstream applications. Unlike those AI startups, Google designs its own AI chips and operates its own cloud infrastructure, giving it a potential cost advantage that may allow it to offer comparable downstream applications at lower price.[31] Even when vertically integrated firms do purchase external upstream inputs, the credible option to self-supply strengthens their bargaining position, enabling them to negotiate lower purchase prices and potentially pass the savings on.

A second competitive advantage available to providers with broad product portfolios is the ability to cross-subsidize AI offerings using profits generated elsewhere. Google could draw on the enormous cash flow from its search business to subsidize lower-priced downstream applications with more generous token limits or bundle advanced models into existing Google ecosystem products at little apparent charge to users.[32] Anthropic and OpenAI, by contrast, must finance massive training and infrastructure costs primarily through profits generated by their AI offerings or through external funding, and cannot yet sustain profits.[33]

Similar competitive advantages were seen in browser competition: Microsoft enjoyed a competitive advantage over Netscape through distribution with Windows and its ability to offer Internet Explorer on non-Windows platforms for free, financed by its Windows profits. However, unlike browsers, the marginal cost for serving AI is positive, such that any advantage large players have in offering lower prices would be one of the key factors for determining which providers succeed.

While offering higher quality at lower prices through cross-subsidization and vertical integration is indeed beneficial for consumers and not inherently anticompetitive,[34] the capital-intensive nature of the AI industry will likely push it toward an oligopolistic structure dominated by a few providers. Antitrust regulators and practitioners should therefore continue to monitor whether cross-subsidization is funded through anticompetitive conduct in other product segments; whether vertical integration is used to foreclose rivals' access to viable distribution channels; and, given network effects that make entry harder once a large incumbent emerges, whether dominant incumbents impose significant barriers to entry or expansion for smaller players through anticompetitive acquisitions or other exclusionary means.

B. Differences in User Interaction

During browser competition of the 1990s and 2000s, consumers overwhelmingly chose a single default browser and used it as their exclusive gateway to the web. The functionality of a browser is basically the same and straightforward across providers. Switching costs were also minimal (e.g. losing access to bookmarks or autofill data).

In contrast, with generative AI, multi-homing across providers is far more common.[35] Many users hold simultaneous subscriptions or free accounts across ChatGPT, Claude, and Gemini. While there are default AI models tied to a particular ecosystem (e.g. Copilot for Windows

29 A single integrated firm sets one profit margin over the combined marginal cost of production and distribution rather than having separate upstream and downstream firms each add their own markup.

30 Recently, Anthropic signed a deal with Google to expand its use of Google Cloud and TPUs. Press Release, Anthropic, Expanding Our Use of Google Cloud TPUs and Services (October 23, 2025); Andrew Harnik, *Anthropic tTaps Elon Musk's SpaceX for More AI Compute Power*, BUSINESS INSIDER (May 6, 2026), https://www.businessinsider.com/anthropic-deal-to-use-elon-musks-colossus-data-center.

31 Amin Vahdat, *Our Eighth Generation TPUs: Two Chips for the Agentic Era*, GOOGLE (April 24, 2026), https://blog.google/innovation-and-ai/infrastructure-and-cloud/google-cloud/eighth-generation-tpu-agentic-era/.

32 Whether Google has an incentive to adopt such a strategy, would actually find it profitable to do so, is a separate question.

33 Dave Smith, *OpenAI Says It Plans to Report Stunning Annual Losses through 2028 — and Then Turn Wildly Profitable Just Two Years Later*, FORTUNE (November 12, 2025), https://fortune.com/2025/11/12/openai-cash-burn-rate-annual-losses-2028-profitable-2030-financial-documents/; Berber Jin, *Anthropic Is on Track to Turn a Profit Much Faster Than OpenAI*, WALL STREET JOURNAL (November 10, 2025), https://www.wsj.com/tech/ai/openai-anthropic-profitability-e9f5bcd6.

34 Francine Lafontaine & Margaret Slade, *Vertical Integration and Firm Boundaries: The Evidence*, J. ECON. LIT., 629–685 (2007).

35 Beatrice Nolan, *ChatGPT's Market Share Is Slipping as Google and Rivals Close the Gap, App-Tracker Data Shows*, FORTUNE (February 5, 2026), https://fortune.com/2026/02/05/chatgpt-openai-market-share-app-slip-google-rivals-close-the-gap/ ("One in five AI users now uses multiple apps, suggesting users might be finding different tools useful for various tasks[.]").

and Microsoft 365, Gemini for Android and Google products), these defaults are unlikely strong enough to lock in users, who can freely access any provider through a browser.[36] The trend is partly driven by fierce competition among providers to match rivals' features.[37]

In addition, generative AI offerings cover a far wider variety of uses — coding, writing, research, document analysis — than browsers, whose main functionality has largely remained rendering requested web pages. Given this, each provider of generative AI offers slightly different features that suit different customer needs. A user may turn to ChatGPT for everyday conversation, Copilot for notetaking during client calls, Claude for coding and analytical work, and Gemini's NotebookLM for podcast-type audio summaries of documents.

Standard economic reasoning sheds light on why the multi-homing trend is more prevalent for AI than for browser competition. Browsers are largely homogenous goods (i.e., each provider offers functionally equivalent features), so there is no clear gain from combining different features by signing up for multiple providers. In contrast, generative AI tools are differentiated goods (i.e. each provider offers a distinct bundle of features that other providers cannot fully replicate, which is especially pronounced for outputs in natural language), so there is a benefit in using multiple products.

While the competitive landscape remain in flux, all else equal, the prevalence of multi-homing makes a winner-take-all outcome less likely. Competition from open-source models will continue to exert pricing and quality pressure on incumbents. That said, consumers are increasingly customizing models to their workflows with enterprise versions which could create user lock-in that goes well beyond anything browser defaults ever achieved. If data generated by these locked-in consumers enables providers to refine their products in ways that competitors that lack access cannot replicate, it could create a meaningful barrier to entry.

Antitrust regulators and practitioners should encourage interoperability across providers to lower switching costs and prevent consumer lock-in. Finally, as AI agents come to exert heavy influence over users' day-to-day purchasing decisions (e.g. agents booking hotels autonomously), antitrust enforcement should be alert to signs of anticompetitive conduct involving exclusionary practices, foreclosure, and self-preferencing.

C. Differences in Innovation Cycles

Innovation in browser technology was relatively episodic and product bound.[38] Technical advances often arrived through annual software releases embodied in the browser product itself. In contrast, AI innovation occurs at a much higher frequency, and new model releases can shift performance across multiple dimensions at once, including reasoning, multimodality, coding, and inference efficiency.[39]

The relevant competitive assets are also different. In browsers, the main competitive asset was the browser quality and its distribution channel. In AI, by contrast, a significant share of frontier capability appears to reside in tacit human capital, meaning specialized knowledge held by a relatively small group of researchers and engineers. Because human capital is portable across organizational boundaries, innovation capacity in AI can move with people rather than remaining embedded primarily within the incumbent firm. This dynamic is illustrated by Anthropic, one of the leading AI companies cofounded by former OpenAI employees in 2021.[40]

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36 In the 1990s, Microsoft was worried about this "middleware threat." Because internet browsers ran on multiple operating systems (not just Windows), they enabled developers to write programs that run across those operating systems, threatening Microsoft's operating system monopoly. *U.S. v. Microsoft: Proposed Findings of Fact*, U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION, https://www.justice.gov/atr/us-v-microsoft-proposed-findings-fact ("Middleware technologies -- principally Internet browsers and Java, which are designed to run on top of an operating system -- threaten to facilitate the creation of competition to Windows by reducing the importance of Windows APIs and thereby eroding the applications barrier to entry.").

37 For example, in the last two years, there have been multiple instances where Anthropic pioneered tools (e.g., Model Context Protocol, Skills), and within months the same tools were incorporated by OpenAI and Google.

38 MICHAEL A. CUSUMANO & DAVID B. YOFFIE, COMPETING ON INTERNET TIME: LESSONS FROM NETSCAPE AND ITS BATTLE WITH MICROSOFT (1998); Timothy F. Bresnahan, *The Economics of the Microsoft Case*, (Stanford Institute for Economic Policy Research Discussion Paper No. 00-15, 2001); Richard J. Gilbert and Michael L. Katz, *An Economist's Guide to U.S. v. Microsoft*, J, ECON. PERSP. 25–44 (2001).

39 Nestor Maslej et al., *The AI Index 2025 Annual Report* (Stanford, CA: Stanford Institute for Human-Centered Artificial Intelligence, 2025); Rishi Bommasani et al., *On the Opportunities and Risks of Foundation Models*, Cornell University, arXiv:2108.07258 (August 16, 2021), https://doi.org/10.48550/arXiv.2108.07258; Jared Kaplan et al., *Scaling Laws for Neural Language Models*, arXiv:2001.08361 (January 23, 2020), https://doi.org/10.48550/arXiv.2001.08361; Jordan Hoffmann et al., *Training Compute-Optimal Large Language Models*," Cornell University, arXiv:2203.15556 (March 29, 2022), https://doi.org/10.48550/arXiv.2203.15556; Percy Liang et al., "Holistic Evaluation of Language Models," *Transactions on Machine Learning Research* (2023).

40 Billy Perrigo, *Daniela and Dario Amodei*, TIME (September 7, 2023), https://time.com/collection/time100-ai/6309047/daniela-and-dario-amodei/.

This portability generates two dynamics that were less salient in browser competition. First, established firms can acquire frontier capacity directly through team-level hiring and licensing arrangements, rather than solely through internal R&D or product-market rivalry.[41] Second, departing researchers can form new organizations that reach the frontier on a compressed timeline. Such spin-outs have allowed new entrants to start at a level that would have taken far longer to reach in browser competition.

The implication is a more fluid innovation environment. In browser competition, relative positions changed through a sequence of annual product releases and user diffusion. In AI, they could shift within months because both the frontier and the human capital driving it are more mobile. This matters for antitrust: observed competitive positions may be less persistent than in industries where innovation is slower, more product-specific, and less dependent on portable tacit human capital.

V. CONCLUSION

In browser competition, the key determinants of success included product quality and distribution access. In AI competition, the contest is not simply between individual companies, but between ecosystems competing through talent, technology, capital, infrastructure, and distribution. Competitive outcomes, therefore, depend on a wide array of factors, including who can innovate fastest, hire the best talent, integrate most deeply, distribute most widely, manage costs sustainably, and adapt when the next technological leap arrives.

41 John F. Coyle & Gregg D. Polsky, *Acqui-Hiring*, DUKE L.J., 281–346 (2013); Krystal Hu and Harshita Mary Varghese, *Microsoft Pays Inflection $650 Million in Licensing Deal While Hiring Most of Its Staff*, REUTERS (March 21, 2024), https://www.reuters.com/technology/microsoft-agreed-pay-inflection-650-mln-while-hiring-its-staff-information-2024-03-21/; Kenrick Cai, *Character.AI Signs Licensing Deal with Google, Names Interim CEO*, REUTERS (August 2, 2024), https://www.reuters.com/technology/artificial-intelligence/google-hires-characterai-cofounders-licenses-its-models-information-reports-2024-08-02/.

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