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By Allen P. Grunes¹

Businesses continue to migrate IT functions to the cloud at a rapid pace. One estimate predicts cloud services will grow by more than 20% this year.² Moving computing, storage, networking, and other IT functions to the cloud is more attractive than buying and managing hardware or software only to see it become obsolete or insecure within a few years. And, especially in the era of Big Data and AI, the need to be able to “scale up” makes the cloud even more compelling.

The problem is that the cloud is dominated by a trio of Big Tech companies. Amazon (AWS), Microsoft (Azure) and Google (Google Cloud) represent about 65% of the worldwide market.³ And there are no signs the market is becoming less concentrated.

For years, concern has grown about “lock-in” in the digital economy.⁴ Lock-in occurs when the high cost of switching from one provider of technology to another effectively locks users into their current provider.⁵ It is one of the most persistent issues customers (and consumers) have faced with the Big Tech giants.⁶ Encouraging lock-in is attractive to Big Tech because it is profitable and applies across many digital products and services, including the cloud. Besides causing headaches to consumers, lock-in also makes it harder for new

or emerging companies to enter, compete, or expand in a market. New companies run into the same problem as customers if switching providers is difficult.

Through a combination of technological and contractual means, AWS, Microsoft, and Google make it difficult, expensive and burdensome for customers to switch between cloud providers, or to move work back and forth between the public cloud and their own data centers (or “private clouds”).⁷

Ideally, businesses should be able to obtain the benefits of a more competitive cloud market without customer lock-in.

There are potentially three paths to this goal: legislative, regulatory and market-based. The ACCESS Act, one possible legislative solution to Big Tech lock-in, died in the last Congress amid a flurry of lobbying activity.⁸ The ACCESS Act would have required large tech companies to ensure data portability and interoperability.⁹ Problems with related legislation in Europe may run deeper: the proposed European Data Act takes analytical shortcuts, particularly in attempting to apply the concept of “equivalence” to cloud services. Paradoxically, as Professors Sean Ennis and Ben Evans have pointed out, the EU Data Act as currently structured is likely

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² *Gartner Forecasts Worldwide Public Cloud End-User Spending to Reach Nearly \$600 Billion in 2023: Inflationary Pressures Creating a Push and Pull Effect for Cloud Spending*, GARTNER (Oct. 31, 2022), <https://www.gartner.com/en/newsroom/press-releases/2022-10-31-gartner-forecasts-worldwide-public-cloud-end-user-spending-to-reach-nearly-600-billion-in-2023>.

³ Felix Richter, *Big Three Dominate the Global Cloud Market*, Statista (Apr. 28, 2023), <https://www.statista.com/chart/18819/worldwide-market-share-of-leading-cloud-infrastructure-service-providers/>.

⁴ See, e.g., CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY (1998), as excerpted in Working Knowledge, Harv. Bus. Sch. (Oct. 12, 1999), <https://hbswk.hbs.edu/archive/information-rules-avoiding-lock-in-in-the-information-economy>.

⁵ *Id.*

⁶ See, e.g., Antoine Prince Albert III, *Big Tech, Big Problems, & Big Solutions: The Legislative Package to Reinvigorate Platform Competition*, Public Knowledge (Sept. 15, 2021), <https://publicknowledge.org/big-tech-big-problems-big-solutions-the-legislative-package-to-reinvigorate-platform-competition/> (describing and discussing lock-in as a key problem with large tech firms).

⁷ Ofcom, *Cloud Services Market Study, Interim Report 7–8* (Apr. 5, 2023), https://www.ofcom.org.uk/data/assets/pdf_file/0029/256457/cloud-services-market-study-interim-report.pdf.

⁸ See Augmenting Compatibility and Competition by Enabling Service Switching (ACCESS) Act, H.R. 3849, 117th Cong. (2021).

⁹ See *id.*; Katharine Trendacosta et al., *The ACCESS Act Takes a Step Towards a More Interoperable Future*, Electronic Frontier Foundation (June 11, 2021), <https://www.eff.org/deeplinks/2021/06/access-act-takes-step-towards-more-interoperable-future>.

to harm innovation and product variety in the European cloud market.¹⁰

On the regulatory front, the Federal Trade Commission (FTC) is just starting to focus on lock-in by large cloud providers as a competitive concern. It recently launched a Request for Information aimed at examining market power and business practices in the cloud (as well as data security issues).¹¹ Across the Atlantic, British telecom regulator Ofcom has also assessed lock-in.¹² It has cautioned that competitive concerns in the cloud market are likely to get worse: “Looking ahead, we think there is a significant risk that the market becomes more concentrated as it matures, with less intense competition between the leading players.”¹³

As for market-based solutions, the prospect of “multi-cloud” or “hybrid-cloud” strategies, by which enterprises move data and run workloads on different environments (such as on a private cloud or various public clouds) offer arguably the greatest potential for enhancing competition and innovation while reducing lock-in. However, any increase in competition in the cloud marketplace rests primarily on the rise of architectures and tools that provide enterprises with the ability to run workloads and move data easily and efficiently on and across different platforms. And to state the obvious: the dominant cloud providers have little interest in enabling such architectures, which might become a significant competitive threat.

VMware is one of the companies that creates “virtualization” software, which acts as hardware and underpins businesses’ use of and enthusiasm for the cloud.¹⁴ VMware has the potential to counteract the lock-in power of the largest public cloud companies and to facilitate a more competitive environment in the cloud through its core virtualization technology, multi-cloud tools, and cloud-native software.

Together, these capabilities could result in a compelling offering for a software-defined on-premises data center or private cloud, as well as capabilities that enable enterprises to choose which environments are best to run different workloads. However, that potential has not been realized, in part because VMware’s constituent products use different interfaces and are released on different cycles. These problems prevent VMware from competing more effectively with the dominant cloud companies.

Broadcom’s planned acquisition of VMware would be transformative for Broadcom, which will move from being predominantly a hardware company to one that creates both hardware and infrastructure software. It will also be beneficial for VMware, as Broadcom has announced plans to invest billions of dollars strengthening VMware’s R&D and customer support.¹⁵ To state what is perhaps obvious, if you are going to go after the combined resources and know-how of Amazon, Microsoft, and Google, you had better be prepared to invest the time and money for a big fight.

Coupling VMware’s virtualization software with Broadcom’s vision and planned multi-billion-dollar investment would make private data centers and private clouds more viable options for customers and improve workload mobility. This has two important benefits.

First, it will enhance the ability of enterprises and their IT departments to implement multi-cloud architectures whereby they can more effectively source cloud capacity from multiple vendors. This will increase competition within the public cloud where Big Tech dominates. Notably, it also aligns well with thinking within the U.S. government: the Department of Defense is looking to several cloud providers to build different capabilities that will have to

¹⁰ See generally Sean Ennis & Ben Evans, *Cloud Portability and Interoperability under the EU Data Act: Dynamism versus Equivalence* (Mar. 31, 2023) (unpublished manuscript), <https://ssrn.com/abstract=4395183>.

¹¹ U.S. Fed. Trade Comm’n, Off. of Tech., *An Inquiry into Cloud Computing Business Practices: The Federal Trade Commission Is Seeking Public Comments*, (Mar. 22, 2023), <https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/03/inquiry-cloud-computing-business-practices-federal-trade-commission-seeking-public-comments>.

¹² See generally Ofcom, *supra* note 7.

¹³ *Id.* at 8.

¹⁴ IBM, *What is virtualization?*, <https://www.ibm.com/topics/virtualization>.

¹⁵ Broadcom, *Accelerating VMware’s Growth*, <https://www.broadcom.com/blog/accelerating-vmwares-growth>.

interoperate as a multi-cloud system.¹⁶ The same can be said for the European Union and its member states, which will need multi-cloud systems to make their investments in sovereign clouds viable.¹⁷

Second, the planned investment would help VMware develop software tools for customers to better move data across data centers and different cloud environments. This would in turn make it harder for large cloud providers to lock in customers, thereby creating greater customer choice and forcing the providers to compete and innovate to maintain or grow their customer base. Companies wishing to use a platform-agnostic, hybrid strategy will have improved alternatives. And there is evidence that many companies prefer a hybrid strategy and would implement one if they could.¹⁸

As the FTC and other competition authorities review Broadcom's proposed acquisition of VMware, they should center on the question of whether and how the deal would positively affect VMware's ability to further competition with and between major cloud providers. This is consistent with Chair Khan's call for a more holistic approach to identifying competitive harm.¹⁹

It is also worth thinking about the alternatives if Broadcom doesn't end up acquiring VMware. There are four scenarios. First, VMware remains a standalone company, without the new investments needed to drive innovation in its own products and in the cloud marketplace.

Second, a private equity firm buys it—and nothing really changes since VMware is already owned in part by private equity. Third, one of the major cloud providers buys it, reducing VMware's incentive to be agnostic between cloud providers and removing it as a threat. Fourth, a hardware company buys it—perhaps one that makes the CPUs or GPUs that VMware runs on, creating competitive problems similar to NVIDIA/Arm, a deal terminated after the FTC filed a complaint to challenge it.²⁰

None of these alternatives would result in increased market-based competition in the cloud, and several would reduce competition.

In contrast, the risk of harm to competition from Broadcom acquiring VMware is quite small, if not nonexistent. This is arguably a vertical acquisition—Broadcom does not create or sell virtualization software—so the main antitrust concern is whether the buyer could engage in “vertical foreclosure.” But for foreclosure to be a concern, a combined Broadcom/VMware would need to have the incentive and ability to foreclose its rivals. The strategy would need to be profitable, and a significant percentage of the market would need to be foreclosed.²¹

Broadcom makes some of the hardware components for data centers that are inexpensive and relatively low margin compared to VMware's more profitable virtualization technology. VMware has competitors and has been losing share to the public cloud. These dynamics suggest that a foreclosure strategy

¹⁶ Matt Ashare, *Pentagon greenlights \$9 billion contract pool for military cloud spending*, CIO Dive (Dec. 8, 2022), <https://www.ciodive.com/news/dod-cloud-contract-jwcc/638341/>.

¹⁷ See, e.g., Matthew Gooding, *Cloud sovereignty: Why Europe's tech companies are partnering with hyperscalers*, Tech Monitor (Oct. 22, 2021), <https://techmonitor.ai/technology/cloud/european-cloud-sovereignty-google-cloud-thales>.

¹⁸ See R. Scott Raynovich, *Hybrid Cloud Infrastructure Trends and Startups to Watch*, FORBES (Feb. 2, 2023), <https://www.forbes.com/sites/rscootraynovich/2023/02/02/hybrid-cloud-infrastructure-trends-and-startups-to-watch/?sh=63930eae1b0c>.

¹⁹ See Memorandum from Chair Lina Khan to Commission Staff and Commissioners Regarding Vision and Priorities for the FTC (Sept. 22, 2021), https://www.ftc.gov/system/files/documents/public_statements/1596664/agency_priorities_memo_from_chair_lina_m_khan_9-22-21.pdf; Remarks of Chair Lina M. Khan Regarding the Request for Information on Merger Enforcement Docket No. FTC-2022-0003 (Jan. 18, 2022), https://www.ftc.gov/system/files/documents/public_statements/1599783/statement_of_chair_lina_m_khan_regarding_the_request_for_information_on_merger_enforcement_final.pdf.

²⁰ See Press Release, NVIDIA and SoftBank Group Announce Termination of NVIDIA's Acquisition of Arm Limited, NVIDIA (Feb. 7, 2022), <https://nvidianews.nvidia.com/news/nvidia-and-softbank-group-announce-termination-of-nvidias-acquisition-of-arm-limited>.

²¹ See, e.g., Opinion of the Commission, In the Matter of Illumina, Inc., Docket No. 9401 (F.T.C. March 31, 2023), https://www.ftc.gov/system/files/ftc_gov/pdf/d09401commissionfinalopinion.pdf. See also Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2008/C 265/07), <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:265:0006:0025:en:PDF>.

would not be profitable, and that Broadcom would lack the incentive and ability to engage in such a strategy. For a stark contrast, consider the FTC's Opinion and Order in Illumina/Grail, which nicely illustrates what vertical foreclosure looks like.²²

In conclusion, the Broadcom/VMware combination would effectively create an entrant in the cloud market at a time when the FTC and other competition authorities are scrutinizing lock-in by large cloud providers as a competitive concern in that market. A stronger VMware,

backed by Broadcom's planned investment, would be better positioned to compete with Amazon, Microsoft, and Google, and to provide customers with greater choice and flexibility. It is a potentially transformative transaction, in a good way.

Disclosure: Broadcom is a current client of Mr. Grunes's law firm, Brownstein Hyatt Farber Schreck.

²² Opinion of the Commission, In the Matter of Illumina, Inc., *supra*.