Effects of Cloud Market Concentration

The global cloud-services market, particularly for Infrastructure as a Service (IaaS), exhibits several symptoms of market concentration: domination by a small number of hyperscale cloud providers,[1] network effects, economies of scale, and relatively high barriers to entry. The size and sophistication of the leading cloud providers offer considerable benefits to their customers, including tightly integrated development platforms, centralized security, and software services on their infrastructure. But the market concentration also reduces competition, amplifies the risks posed by cloud outages, and potentially creates a situation wherein massive market dependence on a handful of cloud providers might encourage them to assume business risks that would have to be borne by governments and major customers.[2]

Key Considerations

- *Unclear optimal structure of cloud market.* Given that market concentration can produce effects that are both socially beneficial and harmful, governments and providers may disagree on the optimal level of concentration in the cloud market.
- *Barriers to entering the cloud market.* Companies must make massive upfront investments to establish cloud infrastructure (for example, data centers). Moreover, to be able to offer the scope and quality of services offered by the established hyperscale providers, new entrants incur significant operational costs associated with maintenance, regularly updating hardware, and expanding offerings.
- *Market concentration presents systemic risks.* The concentration of the cloud market amplifies the consequences of cloud service disruptions, posing a systemic accumulation risk to vital sectors and national economies.
- *Vendor lock-in.* Certain business practices by the major providers—such as bundling services and imposing high egress fees—restrict customers' ability to choose other providers for different services and easily transfer data to a new provider. This is especially important as customers seek greater flexibility to adjust their dependence on the cloud, recognizing that the cost effectiveness of cloud services varies greatly over the life of a business.[3] Additionally, vendor lock-in enables providers to unilaterally adopt and change terms of service (for example, liability, duration, cost, and quality), which could undermine confidence in the cloud as a long-term, stable operating environment.[4]
- *Antitrust tools are potentially inadequate for the cloud market.* Traditional antitrust measures may be inadequate to address the unique dynamics of the cloud market, for example, because the cost of cloud services, specifically for IaaS, has been decreasing over time,[5] and enforcing antitrust rules often depends on measuring the negative impact of concentration by its effects on the price of goods and services. Moreover, this issue is being

debated around the world, both on its merits and as a way to prop up local providers against competitors from foreign companies.

- ***Unfair privileging of first-party applications.*** Market concentration allows providers to privilege first-party applications and services over third-party equivalents (through service bundling, preferential pricing, technical and operational barriers).[6] At the same time, the practice of privileging first-party applications exacerbates the effects of concentration by, for example, increasing the likelihood of vendor lock-in.

- ***Customer choice restricted by cloud dependence.*** High levels of dependence on the cloud and the existence of only a few large providers raise concerns about providers constraining customer choice by restricting portability and interoperability, incorporating volume minimums and egress fees in standard contracts, the aggressive acquisition of nascent competitors, and undercutting third-party applications that facilitate multi-cloud/hybrid arrangements.

- ***Difficult to oversee and regulate cloud provider practices.*** Complex, opaque, and rapidly evolving operations, technology, and business practices make it challenging to effectively regulate cloud providers. Moreover, the mandate for regulating the cloud often falls across several different agencies in national governments. As a result of the ambiguity and divided responsibility within national and sub-national governments, providers may feel less pressure to protect against risks they know exist but do not think regulators can monitor.

Stakeholder Perspectives

Government	Providers	Customers	Others
o Seek to prevent providers from using their market power to artificially limit customer choice.	• Wish to avoid being the targets of government antitrust legislation and enforcement.	• *Enterprise customers:* Want to maintain the ability to choose, move between, or simultaneously use multiple cloud providers with relative ease.	• N/A
o Seek to support the conditions for sustained innovation in the cloud market.	• Oppose developments that will erode their market share (for example, the creation of alternative domestic providers).	• Want to access, but not become dependent on, cutting-edge, secure, affordable cloud services from a wide range of providers. This often requires greater portability	
o Want to ensure that the cloud market structure does not excessively concentrate the risks of cloud service disruptions	• Often seek to acquire nascent competitors and other small providers to stay		

and also induce common mode failures.[7]

o Those with domestic providers have an interest in supporting their growth into international markets.

o Vary in their desire to regulate or curtail the power of foreign providers in their jurisdiction.

ahead of their competition and expand their market share.[8]

and interoperability between different cloud environments.

Tensions with Other Cloud Governance Issues

- *Commercialization of Customer Data*: Smaller cloud providers may struggle to comply with requirements that they compensate customers for commercializing their data.
- *Portability and Interoperability*: Market concentration reduces providers' incentives to offer portability and interoperability between hyperscale cloud providers. The aggressive acquisition of small companies that offer provider-agnostic solutions for portability and interoperability also reduces customer choice.
- *Localization and Routing Requirements*: Large providers in highly concentrated markets may be better positioned to comply with data localization requirements around the world because they have the necessary financial and personnel resources to comply with the fragmented regulatory landscape.

Potential Ways Ahead

Government

- Promote interoperability and portability standards and multi-cloud arrangements.
- Use existing antitrust

Providers

- Participate in industry-led dialogues to develop and advance technical standards for portability and interoperability

Customers

- N/A

Others

- N/A

investigative and enforcement powers, including merger review and enforcement.
- Monitor and analyze evolving cloud services markets to understand when and how they might trigger competition policy concerns.
- Work with industry to develop and publish nonbinding standards for liability allocation, fairness in contracting, pricing, and so on.

between major providers.[9]
- Adopt standards on fairness and transparency in contracting, pricing, and liability.

Recent Examples

- The 2020 Investigation of Competition in Digital Markets, by the U.S. House of Representatives.

Notes

[1] Katie Costello and Laurence Goasduff, "Gartner Says Worldwide IaaS Public Cloud Services Market Grew 31.3% in 2018," Gartner, July 29, 2019, https://www.gartner.com/en/newsroom/press-releases/2019-07-29-gartner-says-worldwide-iaas-public-cloud-services-market-grew-31point3-percent-in-2018.

[2] Iain Withers and Huw Jones, "For bank regulators, tech giants are now too big to fail," Reuters, August 20, 2021, https://www.reuters.com/world/the-great-reboot/bank-regulators-tech-giants-are-now-too-big-fail-2021-08-20/.

[3] Sarah Wang and Martin Casado, "The Cost of Cloud, a Trillion Dollar Paradox," Andreessen Horowitz, May 27, 2021, https://a16z.com/2021/05/27/cost-of-cloud-paradox-market-cap-cloud-lifecycle-scale-growth-repatriation-optimization/; and "Do the costs of the cloud outweigh the benefits?" *The Economist*, July 3, 2021,

https://www.economist.com/business/2021/07/03/do-the-costs-of-the-cloud-outweigh-the-benefits.

[4] Alison DeNisco Rayome, "Google Photos' unlimited free storage is gone. Here's how to get more space," CNET, October 19, 2021, https://www.cnet.com/tech/services-and-software/google-photos-unlimited-free-storage-has-ended-heres-what-to-do-now/.

[5] Jerrold Nadler and David N. Cicilline, Investigation of Competition in Digital Markets, (Washington, DC: U.S. House of Representatives, 2020), 115, https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf?utm_campaign=4493-519.

[6] Major cloud providers manage digital marketplaces for the sale of cloud applications and other services. Often, third party app developers will offer their applications in these marketplaces. However, some allege that cloud providers such as Amazon, Microsoft, and Google place their first-party applications (that is, those they develop and produce) in more prominent places relative to those developed by other companies. See: Sebastian Moss, "House reports on tech monopolies: Here's what it says about Amazon Web Services," Data Center Dynamics, October 7, 2020, https://www.datacenterdynamics.com/en/analysis/heres-what-house-tech-antitrust-report-says-about-amazon-web-services/.

[7] Science Direct, "Common Mode Failure," Science Direct, n.d., https://www.sciencedirect.com/topics/engineering/common-mode-failure.

[8] This is a common practice both in the technology sector and beyond, however many see this practice as playing an outsized role in stifling competition in the technology sector. See: Tony Romm, "FTC will review past mergers by Facebook, Google and other Big Tech companies," The Washington Post, February 11, 2020, https://www.washingtonpost.com/technology/2020/02/11/ftc-will-review-past-mergers-by-facebook-google-other-big-tech-companies/.

[9] For example, SWIPO IAAS Drafting Group, "Code of Conduct for Data Portability and Cloud Service Switching for Infrastructure as a Service (IaaS) Cloud services," SWIPO AISBL, May 27, 2020, https://swipo.eu/wp-content/uploads/2020/10/SWIPO-IaaS-Code-of-Conduct-version-2020-27-May-2020-v3.0.pdf; and SWIPO AISBL, "Switching and Portability of data related to Software as a Service (SaaS)," SWIPO AISBL, July 8, 2020, https://swipo.eu/wp-content/uploads/2020/07/SWIPO-SaaS-Code-of-Conduct.pdf.