THE COMPETITIVE RELATIONSHIP BETWEEN CLOUD COMPUTING AND GENERATIVE AI

CHRISTOPHE CARUGATI

Cloud computing providers and generative artficial intelligence (GenAI) providers nurture a close, interdependent relationship: GenAI providers need cloud providers to train, run and deploy their GenAI solutions, while cloud providers see GenAI providers as a business driver to grow their market shares in cloud and related markets, such as productivity software or search engines. The cloud/GenAI relationship takes various forms, including exclusive and strategic partnerships, especially between large cloud providers and GenAI providers across all parts of the cloud market, including infrastructure, platforms and software.

Competition benefits and risks are likely to result from the relationships. Competition benefits arise from increased competition and innovation in the cloud and GenAI sectors. Risks relate to potential concentrations arising from the partnerships between cloud and GenAI providers, and from anticompetitive practices, including discrimination in the supply of IT equipment by dominant IT providers, interoperability obstacles to switching, use of business-user data, self-preferencing of cloud services over third parties, tying and pure bundling.

Merger control and antitrust laws can address some of the competition risks, while laws, including the European Union's Digital Markets Act and Data Act, can deal with competition issues in digital markets and the cloud sector. Nevertheless there are gaps. The European Commission should amend existing EU instruments, including by changing the definition of a concentration under merger control, and should specify interoperability requirements for cloud providers under the Data Act. The Commission should also closely monitor developments in and outside Europe through market investigations, including with international counterparts, and should intervene to tackle imminent competition risks using fast procedural tools, such as interim measures.

Christophe Carugati (christophe.carugati@bruegel.org) is an Affiliate Fellow at Bruegel

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1 Introduction

Cloud computing and generative artificial intelligence (GenAI) are central to the economy's digital transformation[1]. Via the cloud, infrastructure, platforms and services are accessible online, including GenAI applications, such as the OpenAI-owned natural conversational language application ChatGPT. GenAI applications use natural language processing, such as text summarisation, to generate output from input data.

The cloud sector was worth an estimated €84.76 billion in Europe in 2022, with the expectation that this will double to €175.87 billion by 2027[2]. The same trend of very rapid growth can be seen in the GenAI sector. It was worth an estimated $6.33 billion in Europe in 2022 and expects sixfold growth to $35.94 billion in 2027[3].

Cloud providers and GenAI providers rely on one another. GenAI providers need cloud infrastructures to train, run and deploy their applications, while cloud providers see GenAI as a business driver to grow their market size in the cloud and other related markets, including productivity software, search engines, web browsers, e-commerce and advertising.

As demand soars for cloud computing and GenAI, competition intensifies. Cloud providers compete by adapting their infrastructures and services to GenAI needs. At the same time, GenAI providers compete by frequently releasing models and applications.

Competition risks are already present. Competition authorities worldwide have highlighted a trend in the cloud sector towards concentration in the hands of a few firms, including Amazon, Microsoft and Google[4]. These firms are deemed 'hyperscalers' by competition authorities and the industry as they enjoy large economies of scale in hosting capabilities and services, and economies of scope in the provision of an array of services. They can also afford high fixed costs because of their investment capabilities. While authorities have highlighted competition between cloud providers to attract customers, some of the practices identified pose competition issues by making it harder for customers to switch from one cloud provider to another or to use multiple cloud providers. Obstacles including exit fees or so-called 'egress fees' and interoperability issues.

The hyperscalers are investing heavily in GenAI. They are developing exclusive or strategic partnerships with GenAI providers to deploy their models on their cloud infrastructures and services.

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[1] In the EU, the European Commission has set a target for 75 percent of businesses to use cloud services, big data or AI by 2030.
[2] Statista, 'Cloud Computing Market Size in Europe From 2017 to 2030, by Segment, June 2023', https://www.statista.com/forecasts/1235161/europe-cloud-computing-market-size-by-segment.
[3] Statista, 'Generative AI Europe', https://www.statista.com/outlook/tmo/artificial-intelligence/generative-ai/europe.
[4] Competition authorities in Japan, South Korea, the Netherlands and France (Autorité de la concurrence, 2023) have already published cloud sector reports. Competition authorities in the United States and the United Kingdom are at time of writing investigating the cloud sector.

They also offer GenAI models and applications. Some even integrate their GenAI applications into their families of services. These behaviours might reinforce the positions of the hyperscalers and raise competition concerns related to discrimination in the supply of IT equipment by dominant IT providers, interoperability obstacles to switching, usage of business-user data, self-preferencing of cloud services over third parties, tying and pure bundling. Competition authorities in the United Kingdom and Portugal have already issued reports on competition and GenAI, and the G7 competition authorities have pledged to closely monitor GenAI[5].

In this context, this Working Paper examines the relationship between cloud providers and GenAI providers. It describes how the relationship works, then outlines the competition benefits and risks of the relationship. It highlights how competition laws and regulations can respond to competition issues. Finally, it concludes with some policy recommendations.

2 The cloud/GenAI relationship

Cloud providers that utilise shared infrastructure supply three main categories of solution: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS)[6]. We examine in turn each of these and their use by GenAI providers.

2.1 Infrastructure (IaaS)

The infrastructure offered by cloud providers includes computing power resources, servers, storage and networks. Several cloud providers offer IaaS, including Amazon Web Services (AWS), Google Cloud, Microsoft Azure, OVHcloud, Outscale and Scaleway.

GenAI providers need this infrastructure to train, run and deploy their machine-learning models. These require massive amounts of data and computing resources to generate natural language output from input data, including text, images or video.

GenAI providers scale up or down their storage and computing resources. In particular, they need access to large storage and computing resources when training their models for several weeks. Then, once models are made available on the market, their needs depend on how extensively users use the model to generate outputs. Cloud providers are indispensable to GenAI providers to ensure this flexibility, without GenAI providers needing to invest in high fixed-cost and hardly scalable infrastructure.

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[5] Competition authorities are already studying potential competition risks in GenAI. See CMA (2023), Autoridade da Concorrencia (2023), G7 competition authorities (2023), Carugati (2023c).
[6] Information about the functioning of public cloud providers is based on the French cloud sector report (Autorité de la concurrence, 2023). This paper focuses only on public cloud providers as opposed to private cloud providers, which use their own infrastructures. Information about machine-learning models is based on Carugati (2023c).

Hyperscalers support GenAI providers financially through exclusive or strategic partnerships. For instance, Microsoft has invested more than $11 billion since 2019 in an exclusive partnership with OpenAI to support the deployment of OpenAI technologies exclusively via its cloud service, Microsoft Azure[7]. The exclusive partnership enables the cloud partner to invest in infrastructure specifically designed for the GenAI partner.

However, the exclusive partnership raises competition risks. The GenAI partner and their customers cannot easily switch to alternative cloud infrastructures. Other hyperscalers also have strategic partnerships with GenAI providers for non-exclusive hosting on their cloud infrastructures. These strategic partnerships allow GenAI providers to be available on alternative cloud providers and cloud providers to host several GenAI providers, thus raising fewer competition concerns. Non-exclusive partnerships include Google Cloud with Cohere in 2021[8], AWS with Stability AI in 2022[9], AWS with Hugging Face in 2023[10], AWS with Anthropic in 2023,[11] and Google Cloud with Anthropic in 2023[12].

As part of such partnerships, cloud providers mobilise their massive computing resources to run and deploy GenAI models at scale. For instance, Microsoft has developed and deployed a specialised supercomputing system specifically and exclusively designed to train OpenAI models. Google[13] and Amazon[14] have developed proprietary AI semiconductors to optimise the performance and costs of AI workloads.

However, most of the chips necessary to power AI applications are supplied by Nvidia (estimated global market share of 88 percent in 2022[15]). The press reported in September 2023 a temporary

[7] OpenAI Blog, 'Microsoft invests in and partners with OpenAI to support us building beneficial AGI', 22 July 2019, https://openai.com/blog/microsoft-invests-in-and-partners-with-openai; Dina Bass, 'Microsoft Invests $10 Billion in ChatGPT Maker OpenAI', *Bloomberg*, 23 January 2023, https://www.bloomberg.com/news/articles/2023-01-23/microsoft-makes-multibillion-dollar-investment-in-openai#xj4y7vzkg.
[8] Cohere, 'Cohere and Google Cloud Announce Multi-Year Technology Partnership', 17 November 2021, https://www.globenewswire.com/news-release/2021/11/17/2336632/0/en/Cohere-and-Google-Cloud-Announce-Multi-Year-Technology-Partnership.html.
[9] Amazon, 'Stability AI Selects AWS as Its Preferred Cloud Provider to Build Artificial Intelligence for the Future', 30 November 2022, https://press.aboutamazon.com/2022/11/stability-ai-selects-aws-as-its-preferred-cloud-provider-to-build-artificial-intelligence-for-the-future.
[10] AWS, 'AWS and Hugging Face collaborate to make GenAI more accessible and cost efficient', 21 February 2023, https://aws.amazon.com/blogs/machine-learning/aws-and-hugging-face-collaborate-to-make-generative-ai-more-accessible-and-cost-efficient/.
[11] Amazon, 'Amazon and Anthropic Announce Strategic Collaboration to Advance GenAI', 25 September 2023, https://press.aboutamazon.com/2023/9/amazon-and-anthropic-announce-strategic-collaboration-to-advance-generative-ai.
[12] Lizette Chapman, Katie Roof and Julia Love, 'Google Bets $2 Billion on AI Startup Anthropic, Inks Cloud Deal', *Bloomberg*, 27 October 2023, https://www.bloomberg.com/news/articles/2023-10-27/google-to-invest-2-billion-in-ai-startup-anthropic-wsj-says#xj4y7vzkg.
[13] Cloud, 'Accelerate AI Development with Google Cloud TPUs', https://cloud.google.com/tpu.
[14] AWS, 'AWS Trainium', https://aws.amazon.com/machine-learning/trainium/.
[15] Wallstreetzen, 'Nvidia Corp Statistics & Facts', https://www.wallstreetzen.com/stocks/us/nasdaq/nvda/statistics.

shortage of Nvidia chips because of capacity issues at Taiwan Semiconductor Manufacturing Company (TSMC), Nvidia's main supplier[16]. The shortage adds to previous chip shortages arising from supply and demand shocks from the low supply during the COVID-19 pandemic. and high demand from AI applications, which impacts cloud providers[17]. In this context, as noted below, competition authorities are monitoring Nvidia's sales of chips and how it allocates supply among cloud providers, potentially privileging some customers over others. Thus, in addition to increased concentration in the hands of hyperscalers arising from the partnerships, competition risks arise from discrimination in the supply of IT equipment by dominant IT providers, and interoperability barriers when switching from one cloud provider to another.

2.2 The platform level (PaaS)

Cloud providers supplying PaaS enable their customers to access software and tools to develop their applications. These tools include databases, data analysis, tools for developers, AI tools, services for internet of things (IoT) devices, IT containers and security. PaaS is offered by several cloud providers, including AWS, Google Cloud, Microsoft Azure, OVHcloud and Scaleway.

GenAI providers offer AI tools to cloud providers so that cloud customers can use and develop AI applications. For instance, OpenAI provides its machine-learning models on Microsoft Azure with Azure OpenAI service[18]. AWS provides access to various models from AI21 Labs, Anthropic, Cohere, Meta, Stability AI and Amazon through its AWS Bedrock service[19]. Google Cloud also offers access to various proprietary, open-source and third-party models[20]. Cloud providers and GenAI providers thus compete for the provision of AI tools, with potential competition risks, including legitimate use of the data of business users for reasons such as the provision of data analysis services, and also potentially illegitimate reasons, such as development of competing services and self-preferencing.

2.3 Software (SaaS)

Cloud providers supplying SaaS enable cloud customers to provide applications to their users via any connected device. Applications include productivity software such as Microsoft 365 or Google Workspace, or streaming services such as Netflix.

GenAI providers enable cloud providers to integrate their solutions into proprietary SaaS applications. For instance, Microsoft integrates OpenAI solutions into its productivity software, Microsoft 355

[16] Cheng Ting-Fang, 'TSMC Sees AI Chip Output Constraints Lasting 1.5 Years', *Nikkei Asia*, 6 September 2023, https://asia.nikkei.com/Business/Tech/Semiconductors/TSMC-sees-AI-chip-output-constraints-lasting-1.5-years.
[17] Alex Woodie, 'The Chip Shortage Seems to be Impacting AI Workloads in the Cloud', *Datanami*, 12 March 2021, https://www.datanami.com/2021/03/12/the-chip-shortage-seems-to-be-impacting-ai-workloads-in-the-cloud/.
[18] Microsoft Azure, 'Azure OpenAI Service', https://azure.microsoft.com/en-us/products/ai-services/openai-service#Features.
[19] AWS, 'Amazon Bedrock', https://aws.amazon.com/bedrock/.
[20] Google Cloud, 'GenAI on Google Cloud', https://cloud.google.com/ai/generative-ai.

Copilot, its web browser, Microsoft Edge, its search engine, Microsoft Bing, and its operating system (OS), Microsoft Windows Copilot. Google does the same with its productivity software, Google Workspace and its search engine, Google Search. Some SaaS act as a platform enabling third-party developers to develop applications that complement and interact with their services. For instance, Microsoft enables third-party developers including OpenTable and Expedia to develop third-party plugins that interact with OpenAI ChatGPT, Microsoft Bing, Microsoft Dynamics 365 Copilot, Microsoft 365 Copilot and Microsoft Windows Copilot[21]. Cloud providers and GenAI providers are thus vertically integrated, bringing potential competition risks, including tying and pure bundling.

3 Competition risks

While the cloud/GenAI relationship brings with it many competition benefits, as discussed in the previous sections, the relationship also creates risks related to potential concentration (section 3.1.) and anticompetitive practices (section 3.2.).

3.1 Potential concentration issues

In choosing cloud providers, there is a risk that GenAI providers use mostly hyperscalers, increasing the trend toward concentration in the hands of the hyperscalers.

First, GenAI providers use the infrastructures, platforms and software of hyperscalers. Accordingly, GenAI providers and their consumers become *de facto* cloud customers of the hyperscalers.

Second, the partnership between cloud providers and GenAI providers might reinforce the position of cloud providers in the cloud market and related markets. The extent of the reinforcement depends on the nature and conditions of the partnership, thus requiring a case-by-case analysis.

By contrast, some smaller cloud providers also have partnerships with GenAI providers, such as Scaleway with Meta and Hugging Face at the national level[22]. However, smaller cloud providers might not be able to compete with hyperscalers at global level because they might lack the investment capabilities and infrastructure required to train, run and deploy GenAI models and applications globally at scale.

In other words, GenAI providers can be a vector of growth, mainly for hyperscalers. Nevertheless, the degree of concentration in the hands of hyperscalers resulting from GenAI will hinge on the share of revenue sales and cloud customers using cloud resources for GenAI, which is just a part of overall cloud activities.

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[21] Frank X. Shaw, 'Microsoft Build Brings AI Tools to the Forefront For Developers', *Official Microsoft Blog*, 23 May 2023, https://blogs.microsoft.com/blog/2023/05/23/microsoft-build-brings-ai-tools-to-the-forefront-for-developers/.
[22] Meta Blog, 'Meta Partners with Hugging Face & Scaleway to Support Open Source', 8 November 2023, https://about.fb.com/news/2023/11/meta-partners-with-hugging-face-scaleway-to-support-open-source/.

The potential competition risks from increased concentration in the cloud sector are twofold. First, while concentrated markets can be competitive, it becomes harder for smaller providers and newcomers to compete in and to enter concentrated markets, especially markets, like cloud markets, characterised by strong economies of scale and scope (Cremer, de Montjoye, and Schweitzer, 2019). Concentrated markets are thus less contestable, with customers having few options. Second, concentrated markets are more prone to anticompetitive practices arising from abuse of dominance and collusion because of their oligopolistic natures, with customers facing an imbalance of power with the available options. These competition risks from increased concentration are the origin of regulations in digital markets, including the European Union's Digital Markets Act (DMA, Regulation (EU) 2022/1925; see section 4.2).

3.2 Potential anticompetitive practices

The relationship between cloud providers and GenAI providers might also lead to potential anticompetitive practices at the IaaS, PaaS and SaaS levels. The risks relate to discrimination in the supply of IT equipment by dominant IT providers, interoperability obstacles to switching, usage of business user data, self-preferencing of cloud services over third parties, tying and pure bundling. Table 1 indicates the potential competitive benefits, anticompetitive risks and anticompetitive effects of these business practices.

Discrimination in the supply of IT equipment by dominant IT providers. Dominant IT providers allocate the supply of IT equipment, like GPUs, amongst cloud customers. In the context of a shortage of chips, the French competition authority stated in its cloud sector study that hyperscalers benefit from privileged access to certain IT equipment because of their large purchasing volumes (Autorité de la concurrence, 2023). In other words, dominant IT providers might discriminate amongst its customers how it allocates it supply. This potential anticompetitive practice already raised antitrust scrutiny in France, Europe, the United States, and China[23].

Interoperability obstacles to switching. Cloud providers might have the ability and incentive to limit the interoperability of GenAI solutions with other cloud providers, with a potential exclusionary effect. Cloud providers can impose or withhold technical requirements that limit GenAI solutions and their customers from switching from one cloud provider to another, or prevent them from multi-homing with

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[23] Autorité de la concurrence press release of 27 September 2023, 'The General Rapporteur of the Autorité de la concurrence Indicates that an Unannounced Inspection was Carried Out in the Graphics Cards Sector', https://www.autoritedelaconcurrence.fr/en/press-release/general-rapporteur-autorite-de-la-concurrence-indicates-unannounced-inspection-was. See also, Form 10-Q Nvidia Corporation, 21 November 2023, https://investor.nvidia.com/financial-info/sec-filings/sec-filings-details/default.aspx?FilingId=17074143: "*Our position in markets relating to AI has led to increased interest in our business from regulators worldwide, including the European Union, the United States, and China. For example, the French Competition Authority collected information from us regarding our business and competition in the graphics card and cloud service provider market as part of an ongoing inquiry into competition in those markets. We have also received requests for information from regulators in the European Union and China regarding our sales of GPUs and our efforts to allocate supply, and we expect to receive additional requests for information in the future*" (p.42).

more than one cloud provider, so-called 'multi-cloud'. Cloud providers might have the incentive to do so to keep GenAI providers and their customers on their cloud services.

Usage of business user's data. Cloud providers might have the ability and incentive to use data from GenAI providers and their customers, which might have an exploitative effect. Cloud providers have the ability to use the data provided or generated by GenAI providers and their customers as they store this data on their cloud infrastructure. They might have the incentive to do so in order to provide, improve or develop related cloud services, such as data analysis, AI tools or even proprietary GenAI solutions. As noted above, this data usage might be for legitimate reasons, such as the provision of data analysis services. Or it might be done for potentially illegitimate reasons, such as developing competing services, which might constitute a potential contract breach and anticompetitive practice. However, this exploitative strategy is self-harming as it undermines trust between cloud providers and their GenAI providers and their customers, which might lead the latter to withdraw business from cloud providers. Cloud providers might thus lose significant business opportunities and suffer reputational harm. Accordingly, while theoretically possible, it is questionable whether cloud providers will engage in this strategy in practice, as trust, business opportunities and reputations might be more valuable than the development of competing services or products.

Self-preferencing of cloud services over those of third parties. Cloud providers might have the ability and incentive to promote their own cloud services over third parties, with potential exclusionary effects on third parties. Cloud providers are able to promote over third parties their proprietary GenAI tools and models on their platforms. They might have the incentive to do so to increase the sales of their proprietary GenAI offerings.

Tying. Cloud providers might have the ability and incentive to implement tying strategies, which might have exclusionary effects. Cloud providers might tie the provision of non-dominant cloud services to the provision of related dominant services, with GenAI as a connector between them. For instance, a non-dominant cloud provider with a dominant position in productivity software or operating systems (OS) could require or strongly encourage software developers to use its proprietary or exclusive third-party GenAI solutions, available only on its non-dominant cloud, to develop third-party GenAI applications that complement and interact with its proprietary dominant productivity software or OS. Cloud providers have the incentive to do this to increase sales of their non-dominant cloud services.

Pure bundling. Cloud providers might have the ability and incentive to implement bundling strategies, with potential exclusionary effects. Cloud providers can provide their proprietary or third-party exclusive GenAI models and applications together with their non-dominant cloud services. They might seek to do this to increase sales of their non-dominant cloud services. However, as the GenAI sector is still developing with intense competition between various GenAI providers[24], this practice is unlikely to have a negative impact on cloud providers as there are not yet dominant GenAI providers. This implies

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[24] As of September 2023, the UK Competition and Markets Authority (CMA) counted 160 foundation models since 2018 (CMA, 2023).

that GenAI customers can use alternative GenAI providers available on different cloud providers. However, assuming a GenAI provider becomes dominant, the bundling strategy might have procompetitive benefits and anticompetitive risks.

Table 1: Summary of potential anticompetitive practices in cloud/GenAI

Practice	Procompetitive benefits	Anticompetitive risks	Potential anticompetitive effect
Discrimination in the supply of IT equipment by dominant IT providers	The practice enables cloud providers with already-scalable cloud infrastructures and investment capabilities to adapt them quickly for GenAI providers.	The practice might prevent smaller cloud providers from accessing chips in a timely way for their cloud infrastructures.	Potential anticompetitive exclusionary effect of putting smaller cloud providers at a competitive disadvantage against hyperscalers – smaller providers cannot offer cloud services to GenAI providers because they do not have the required IT equipment. Though chip shortages might be temporary, they can have lasting impacts on competition because GenAI providers, attracted to the hyperscalers' processing capacities, might continue to use the hyperscalers' infrastructures after the end of shortages.
Interoperability obstacles to switching	The obstacles provide incentives to invest in infrastructure, platforms and software specifically and/or exclusively designed for the needs of GenAI providers and their customers, thus promoting investment and innovation.	The obstacles might prevent GenAI providers and their customers from switching to alternative cloud providers and multi-cloud, resulting in customer lock-in.	Potential anticompetitive exclusionary effect of excluding alternative cloud providers.
Usage of business users's data	The practice enables cloud providers to use the required data to	The practice might unduly exploit the data of GenAI providers and	Potential anticompetitive exploitative effect of

	offer their related cloud services.	their customers to develop proprietary AI solutions that then compete with the latter.	exploiting the data of potential competitors in order to develop competing services or products.
Self-preferencing of cloud services over those of third parties	The practice enables cloud providers to improve their platform's offerings.	The practice might demote third parties' offerings based on non-objective criteria.	Potential anticompetitive exclusionary effect of excluding third parties' offerings.
Tying	The practice might ensure that software developers can develop third-party applications for productivity software or OS of the cloud provider that work seamlessly with the GenAI solution provided by the cloud provider.	The practice might prevent third-party developers from using alternative GenAI solutions available from different cloud providers to develop applications. As the productivity software or OS are dominant and are must-haves for third-party developers to reach their customers, they might have no choice but to use the GenAI solutions and the cloud of the dominant productivity software or OS.	Potential anticompetitive exclusionary effect of excluding or marginalising alternative GenAI solutions available from different cloud providers, which in turn might exclude those cloud providers that host alternative GenAI solutions.
Pure bundling	The practice might ensure that the dominant GenAI provider works seamlessly with cloud infrastructure specifically and exclusively designed for the dominant GenAI provider, leading to a positive quality user experience without inconvenience, such as latency.	The practice might prevent the dominant GenAI provider's customers from using alternative cloud providers.	Potential anticompetitive exclusionary effect of excluding or marginalising alternative cloud providers.

Source: Bruegel.

4 Competition law and regulatory responses

The competition risks arising from cloud computing and GenAI can be tackled either by competition laws, including merger and antitrust rule (section 4.1.) and regulations, including the EU Digital Markets Act and Data Act (section 4.2.).

4.1 Competition laws

The European Commission and national competition authorities (NCAs) in the EU seek to tackle practices that might distort competition by intervening *ex-ante* to assess potential concentration issues before a concentration occurs in the context of merger control law (European Merger Regulation 139/2004, EUMR), and *ex-post* to assess potential anticompetitive practices after the practice takes place in the context of antitrust law. Such practices include abuse of dominance (Article 102 of the Treaty on the Functioning of the EU) and collusion (Article 101 TFEU).

Partnerships between cloud providers and GenAI providers might be assessed under merger law, which tackles concentration. In Europe, concentration occurs when a change of control on a lasting basis arises from the merger of two or more independent firms or the acquisitions of assets. The control, including through rights or contracts, results in the ability to exercise a decisive influence on a firm (Article 3 EUMR). Accordingly, if cloud/GenAI partnerships result in a situation of control, they might fall under the definition of a concentration under EU merger law.

However, as full legal information about such partnerships is confidential, it is not possible for an external researcher to derive decisive conclusions about whether the partnerships amount to concentration in the meaning of the EUMR because of the existence of a situation of control. If it is a concentration, the review of the concentration by the Commission will depend on whether the partnerships fall under the EU merger control threshold (Article 1 EUMR) or meet the conditions for a referral to the Commission from an EU country (Article 22 EUMR). Should the Commission review a partnership, it will be able to assess *ex-ante* before the concentration occurs the abovementioned potential concentration and anticompetitive risks, and it will be able to impose structural (eg divestiture of assets) or behavioural (eg interoperability requirements, data access) remedies when required.

It is worth noting that Germany's competition authority, the Bundeskartellamt, assessed in November 2023 the partnership between Microsoft and OpenAI under the German merger control law. The Bundeskartellamt found that the partnership is a concentration under the German merger control law, which only requires a material competitive influence. According to the Bundeskartellamt, Microsoft has this influence over OpenAI because of Microsoft's multi-year and multi-billion investment in OpenAI in return for the exclusive use of OpenAI solutions in Microsoft's services. However, the partnership is not subject to merger control because it does not fall under the German transaction-based threshold that would require a merger review. The Bundeskartellamt is monitoring closely whether the partnership

will meet the conditions under German merger control law in the future[25]. The UK's Competition and Markets Authority (CMA), also said in December 2023 that it is scrutinising the partnership between Microsoft and OpenAI under UK merger control rules. At time of writing, the CMA had only asked for information from the parties and interested third parties[26].

Partnerships between cloud providers and GenAI providers might also be assessed under antitrust laws, which tackle anticompetitive practices. Abuse of dominance is relevant to tackling anticompetitive practices, such as when a cloud provider uses the abovementioned tying strategy with the solution of its GenAI partner. Collusion is also relevant for tackling potential anticompetitive agreements between cloud and GenAI partners. For instance, they might agree on a limitation of technical development of GenAI.

Competition risks not arising from cloud/GenAI partnerships can also be assessed under antitrust laws. Currently, abuse of dominance in cloud markets is unlikely due to the *prima facie* absence of a dominant position. Indeed, the French competition authority noted in its cloud sector report (Autorité de la concurrence, 2023) that the definition of cloud services makes it difficult to collect data and estimate market share accurately. According to Autorité de la concurrence estimates of IaaS and PaaS revenues in 2021 in France were divided between AWS (47 percent), Microsoft (17 percent), Google (8 percent), and other providers (29 percent) (Autorité de la concurrence, 2023). To the best of the author's knowledge, there is no accurate estimate of 2022 market share from a European competition authority.

However, the potential identified competition risks are likely to materialise if a dominant IT provider abuses its position to discriminate against customers, or if a dominant productivity software or OS leverages its position in these markets to expand, through tying or bundling, into other markets like the cloud market. Competition authorities and the EU Court of Justice have already found that the abovementioned practices infringed competition laws in several antitrust cases, including the 2004 *Microsoft Windows Media Player (WMP)* (tying), the 2009 *Microsoft Explorer* (tying) and the 2017 *Google Search (Shopping)* (self-preferencing) cases[27].

It is also worth mentioning that some national competition authorities can apply national competition laws that might prohibit the abovementioned practices, such as Section 19a of the German

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[25] B6-34/23 (Case summary), 'Bundeskartellamt Examined whether Partnership Between Microsoft And OpenAI was Subject to Notification Obligation Under Merger Control', 15 November 2023, https://www.bundeskartellamt.de/SharedDocs/Entscheidung/EN/Fallberichte/Fusionskontrolle/2023/B6-34-23.html?nn=3591568.
[26] See CMA press release of 8 December 2023, 'CMA seeks views on Microsoft's partnership with OpenAI', https://www.gov.uk/government/news/cma-seeks-views-on-microsofts-partnership-with-openai.
[27] For an explanation of the cases, see Carugati (2023c).

Competition Act, which prohibits designated digital firms from certain practices, including tying[28]. However, an analysis of national competition laws is beyond the scope of this paper.

4.2 Regulations

The EU has adopted several laws to deal with competition issues in digital markets and the cloud market, including the Digital Markets Act and the Data Act[29].

First, the DMA requires gatekeepers, or unavoidable online gateways, that providing core platform services (CPS), including cloud computing services, and OS (Article 2 DMA), to comply with a list of obligations addressing some practices deemed anticompetitive by the legislators (Articles 5, 6 and 7 DMA)[30]. On 6 September 2023, the European Commission published the first list of six designated gatekeepers covering 22 CPSs[31]. The Commission did not designate any gatekeeper in cloud computing services. Cloud computing services will thus not have to comply with obligations such as the prohibition on use of the data of business users to develop competing products and services (Article 6(2) and Recital 48 DMA).

The DMA also counters some of the abovementioned tying strategies because it requires gatekeepers that provide OSs, including the Microsoft Windows OS, Google Android and Apple iOS, to allow third-party hardware or service providers to interoperate with their OSs for free (Article 6(7) and Recitals 55 to 57 DMA). Finally, the DMA requires gatekeepers to inform the Commission of all intended concentration in the digital sector in the meaning of the EUMR, with a view to triggering a potential merger review following a referral from an EU country to the Commission under Article 22 EUMR (Article 14 DMA)[32].

The Data Act, meanwhile, requires cloud providers to comply with a list of obligations to address some practices deemed anticompetitive by the legislators. The obligations relate to switching between cloud providers (Articles 23 to 31 Data Act). Among other things, the DA would require cloud providers providing IaaS covering the same service type to achieve functional equivalence (Article 2(37) Data Act) in the use of the destination provider. Cloud providers offering PaaS and SaaS would have to provide open interfaces to ensure data portability and interoperability between services free of charge (Articles 30 and 35 Data Act).

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[28] For an overview of the ongoing proceedings under section 19a of the German Competition Act, as of October 2023, see
https://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Downloads/List_proceedings_digital_companies.pdf?_blob=publicationFile&v=15

[29] See Council of the EU press release of 27 November 2023, 'Data Act: Council adopts new law on fair access to and use of data,' https://www.consilium.europa.eu/en/press/press-releases/2023/11/27/data-act-council-adopts-new-law-on-fair-access-to-and-use-of-data/.

[30] For an explanation of the obligations and compliance principles gatekeepers should follow, see Carugati (2023a).

[31] See https://digital-markets-act-cases.ec.europa.eu/search.

[32] For an explanation of the relationship between Article 22 EUMR and Article 14 DMA, see Carugati (2023b).

However, as noted by the Autorité de la concurrence (2023), in its cloud sector report about a similar draft version of the Data Act, the scope and the definition of functional equivalence are unclear, as are the definition and implications of open interfaces (Autorité de la concurrence, 2023). It is thus questionable in the first place whether cloud providers providing IaaS will have to offer functional equivalence of their GenAI solutions. It is also unclear whether cloud providers providing PaaS and SaaS will have to ensure that their GenAI solutions are interoperable with other cloud providers, provided that this is technically feasible. It is worth noting that some national laws, like the French law to Secure and Regulate the Digital Space, have similar provisions to the Data Act, but the analysis of national laws is beyond the scope of this paper.

It is also worth mentioning that several ongoing developments in and outside Europe to regulate GenAI are ongoing, such as the G7 Hiroshima Process International Guiding Principles for Organisations Developing Advanced AI Systems[33]. In Europe, the European Commission has proposed an Artificial Intelligence Act (AI Act) to address AI-related risks. It was agreed in December 2023 to include some specific asymmetric provisions for GenAI providers[34], but these provisions would not address issues related to competition, including in the cloud sector.. However, the AI Act might impact competition in the GenAI sector because of the asymmetric nature of the proposed provisions. However, analysis of the competition impact of the proposed AI Act is beyond the scope of this paper.

5 Policy recommendations

The relationship between cloud and GenAI providers raises several competition risks, some of which can be tackled by competition laws and regulations. However, there are gaps in competition laws and regulations, including in relation to concentration and interoperability issues. The European Commission should address these gaps by amending the existing instruments (section 5.1). Moreover, the cloud and GenAI sectors and regulatory landscapes are evolving quickly in and outside Europe, meaning new competition risks are likely to emerge and new regulations are likely to impact the sectors. The European Commission should thus monitor developments closely (section 5.2).

5.1 Amending existing instruments

Current rules have two major gaps relating to concentration and interoperability.

First, partnerships between cloud and GenAI providers have an impact on competition but might escape regulatory scrutiny by competition authorities under merger control. The EUMR can tackle partnerships only if they meet the definition of a concentration, which refers to a change of control on

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[33] See at the global level, Hiroshima Process International Guiding Principles for Organizations Developing Advanced AI system, https://digital-strategy.ec.europa.eu/en/library/hiroshima-process-international-guiding-principles-advanced-ai-system.
[34] See Council of the EU press release of 9 December 2023, 'Artificial intelligence act: Council and Parliament strike a deal on the first rules for AI in the world', https://www.consilium.europa.eu/en/press/press-releases/2023/12/09/artificial-intelligence-act-council-and-parliament-strike-a-deal-on-the-first-worldwide-rules-for-ai/.

a lasting basis. However, a cloud provider can have a material competitive influence over a GenAI provider even in the absence of control, as the *Bundeskartellamt* noted in its assessment of the partnership between Microsoft and OpenAI under the German merger control law. The EUMR essential requirement that there should be a change in control might thus prevent the assessment of partnerships that might not have control but nevertheless have a competitive influence.

Depending on the nature and duration of a partnership, this influence might have a lasting impact on market structure and on competition. Partnerships with cloud providers have an impact on the development of GenAI, considering the multi-billion and multi-year investments involved in several partnerships. Moreover, some partnerships might enable hyperscalers to reinforce their dominance in existing markets, or to expand or enter new related markets without acquiring a firm or hiring people to build GenAI solutions.

Partnerships could also trigger potential anticompetitive risks, such as tying. This might require interoperability requirements to prevent those risks from occurring in the first place. Against this background, the Commission should amend the definition of concentration under the EUMR if it wants to review these partnerships *ex-ante* to assess for concentration when there is a material competitive influence, as under the German merger control law. However, such a change is unlikely in the short and medium term as it would require changing the EUMR. Such a change would also require an assessment of the impact of the change of the definition on merger control as a whole, in particular because it might lead to the review of a higher number of concentrations. Taking into account the low number of potential anticompetitive partnerships, compared to the potential higher number of potential non-problematic concentrations, the change might not be cost-effective. It would increase administrative costs for the Commission and legal costs for the parties in all economic sectors, in order to review only a few problematic partnerships. The Commission should thus use currently in place antitrust laws and regulations to tackle potential anticompetitive risks arising from the partnerships.

Second, there are potential interoperability issues when switching to other cloud providers that competition laws or regulations might not tackle. Indeed, there are no interoperability requirements under competition laws. A competition authority can impose an interoperability requirement only in exceptional circumstances, such as when a dominant firm refuses to give access to an essential facility, as in the *Microsoft WMP* case[35].

Moreover, while the DMA does not address interoperability issues in the cloud sector, the Data Act would address them, but the definition and scope of the interoperability requirements are unclear in the Data Act. The Commission should specify interoperability requirements in implementing acts (Article 35 Data Act). Provided that interoperability of GenAI solutions is technically feasible, and must thus be interoperable, an assessment of the proposed standards should consider the impact on competition and innovation. Standardisation might make some cloud and GenAI solutions more homogenous, whereas the differentiation of cloud and GenAI solutions drives the current state of

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[35] T-201/04 *Microsoft v Commission*, ECLI:EU:T:2007:289, 17 September 2007, paras. 331 to 335.

competition in the cloud and GenAI sectors. Standardisation would thus lead to less innovation in these sectors. If required, standards should concern only a set of basic functionalities defined by industry players, to preserve innovation in terms of additional functionalities.

5.2 Monitoring developments

Market and regulatory developments in the cloud and GenAI sectors are moving fast. Cloud providers and GenAI providers frequently release innovative solutions in relation to new products and services, or solutions that cut the costs of training, running and deploying GenAI solutions. There are many partnerships between cloud providers and GenAI providers and cloud providers also frequently implement various GenAI-related strategies and business models. Furthermore, there are ongoing regulatory developments at national, regional and global levels to regulate cloud computing and GenAI. These market and regulatory developments are likely to impact competition either because they might change the market structure or because of of potential competition risks, such as those outlined in this paper.

Against this background, the Commission should monitor developments in cloud and GenAI through market studies and should take on board developments in other jurisdictions, as the UK Competition and Markets Authority does with its study on AI foundation models (CMA, 2023). To the extent that it is possible, the Commission should involve its international counterparts in joint market studies, to consider market and regulatory developments at the global level.

Some competition risks might have a lasting impact on competition. Some of the practices discussed in this paper might make it more difficult for alternative cloud providers to attract customers because they lack the required computing resources or because of customer lock-in arising from some strategies, such as tying. As customer use of GenAI is likely to soar in the short and medium terms, competition risks will likely materialise imminently. Accordingly, the Commission should intervene quickly to tackle imminent competition risks by using fast procedural tools, such as interim measures.

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