Competition in cloud and IT services in Australia

Prepared for

Amazon Web Services Australia Pty Ltd

Level 37, 2-26 Park Street, Sydney NSW 2000

Prepared by

Charles River Associates (Mikaël Hervé, Sebastian Panthöfer, and team)

8 Finsbury Circus London EC2M 7EA

Date: 09/10/2024

CRA Charles River Associates

Disclaimer

Charles River Associates and its authors make no representation or warranty as to the accuracy or completeness of the material contained in this document and shall have, and accept, no liability for any statements, opinions, information or matters (expressed or implied) arising out of, contained in or derived from this document or any omissions from this document, or any other written or oral communication transmitted or made available to any other party in relation to the subject matter of this document.

TABLE OF CONTENTS

1. SUMMARY

1. For the purposes of the Australian Competition & Consumer Commission ("ACCC") Digital Platform Services Inquiry Issues Paper from 25 July 2024,[1] Amazon Web Services Australia Pty Ltd instructed us to provide an economic view on potential or emerging competition and small business issues in relation to cloud services[2] in Australia.

2. Based on empirical evidence from market intelligence providers, customer surveys, and publicly available information, we find that:

- Industry outcomes are all positive and indicative of healthy competition between IT providers to provide customers with solutions that meet their needs. We observe a constant stream of innovation from IT providers (including on-premises, hybrid, and cloud providers), and that customers benefit from many choices, high-quality services, and low prices. Consistent with these positive outcomes, surveys show that customer satisfaction is high.
- Companies in need of IT solutions choose from a wide array of services, providers, and delivery methods. Cloud services provide companies with an alternative option for solving their IT needs, in addition to traditional on-premises solutions. This is welfare improving, as more options allow companies to find a better match for their specific IT needs. In practice, many companies use multiple providers to meet their IT needs, such as adopting a hybrid solution with a mix of cloud and on-premises providers and/or a multi-cloud solution that involves multiple cloud providers.
- Despite some degree of differentiation, on-premises and cloud services generally address the same core underlying IT needs (compute, storage, database services, etc.) and, as such, can be substitutable for many workloads and use cases. At present, cloud services account for 15% of overall IT spending and the majority of workloads are still on-premises. Empirical evidence shows that when customers switch away from a cloud provider, a significant proportion switch to an on-premises provider. These findings show that on-premises must be considered in any competitive assessment to reflect the degree of competitive pressure they exert on cloud services.
- Focusing on the provision of cloud services only, the industry is unconcentrated in Australia and concentration has been decreasing further over the past years.
- There is significant entry and expansion in cloud services. Small cloud providers grow and succeed alongside large ones. Scale does not appear to be a driver of growth. To the contrary, small cloud providers have been growing as fast or faster than large cloud providers in recent years.

1 ACCC (2024), Digital Platform Services Inquiry – March 2025 – Final Report: Issues Paper (https://www.accc.gov.au/system/files/dpsi-10-final-report-issues-paper.pdf).

2 We use the term cloud services to refer to the stack of services offered on the cloud, including, among many other, storage, compute, and relational database services.

- The observed entry and expansion in cloud services can be explained by a combination of factors that reduce barriers to entry and expansion. These are: high demand growth, supply-side substitutability, availability of financing, leasing and co-location of datacentres, and customers typically using multiple providers or "multi-homing".[3]
- Generative AI will influence the competitive dynamics in the coming years. At this point, it is too early to conclude what the impact will be. However, generative AI is expected to create further entry and expansion opportunities for all types of IT providers (whether on-premises, hybrid, or in the cloud) and drive continued innovation in IT services.
- Competition will likely remain fierce. Core IT services (compute, storage, database services, etc.) are not characterised by features associated with a high likelihood of "tipping", *i.e.*, the possibility that only one relevant provider remains and dominates the market. In particular, core IT services are not characterised by strong network effects, empirical evidence of entry and growth of smaller cloud providers indicates there are no insurmountable scale advantages, and customers typically use multiple IT providers (multi-home).

3. Regarding the *potential* competition concerns referenced in the Issues Paper,[4] we note the following:

- *Multi-clouding and switching*: Potential barriers to multi-clouding and switching are not detectable empirically. Most companies use multiple IT providers, including multiple cloud providers and/or multiple on-premises providers. Surveys also indicate that, at most, only a quarter of companies use a single IT provider and that less than 10% of companies using cloud services use a single IT provider. These empirical patterns are a strong indication against insurmountable barriers to multi-clouding. Equally, surveys show that customer satisfaction is high, and high customer satisfaction is frequently named as a reason why cloud customers do not want to switch to another provider or IT solution. There is no plausible competition concern if customers can switch but do not want to switch because they are satisfied with their current provider.
- *Concentration*: Concentration is not detectable empirically in Australia. Starting from a low degree of concentration, concentration in cloud services in Australia has decreased further over the period 2017 to 2023 according to IDC data.

4. Last, we note that the benefits of cloud services are generally valuable to customers of all sizes. Small and medium-sized businesses ("SMBs"), including start-ups, particularly benefit from the instant scalability, pay-as-you-go pricing, and access to up-to-date hardware and software solutions that cloud services offer.[5]

5. The remainder of this report is organised as follows: Section 2 offers some background on cloud services and customer choice of IT solutions; Section 3 sets out the observed industry outcomes in Australia; Section 4 provides an overview of the competitive dynamics

3 Multi-homing refers to the use of multiple providers at the same time. In this case, IT providers can include cloud providers, on-premises providers, or hybrid cloud/on-premises providers.

4 ACCC (2024), Digital Platform Services Inquiry – March 2025 – Final Report: Issues Paper, p. 13.

5 As the ACCC's Issues Paper invites comments on potential small business issues, this report also assesses cloud services from the vantage points of SMBs.

observed in Australia; Section 5 discusses the economic reasons why competition is likely to remain intense in the future.

2. BACKGROUND ON CLOUD SERVICES AND CUSTOMER CHOICE OF IT SOLUTIONS

2.1. History of cloud services

6. Cloud services are a relatively recent form of technology, providing on-demand delivery of IT services over a network. Before cloud services became available, companies' primary option (referred to as an on-premises solution) was to obtain their own hardware and software, keep it in their offices or specialised facilities, and train employees to operate it. Cloud services allow companies to use IT services and resources provided by cloud providers over the Internet in addition to, or as a replacement for, their own IT infrastructure.

7. Cloud services offer an on-demand, pay-as-you-go solution where customers only pay for the IT services and resources they use. Cloud services provide customers with instant scalability, as the level of compute and storage can be scaled up and down as needed, and they reduce the human and financial resources that would be required to build and maintain on-premises IT infrastructure.

8. However, the underlying IT needs that are solved by on-premises and cloud solutions are similar and each includes running compute instances, storing data, transferring data, and managing databases. The main difference between on-premises and cloud solutions is in the delivery method.

9. The first commercial public cloud offering was AWS's Elastic Compute Cloud, which was launched in 2006.[6] The term public cloud means that the respective cloud services are open to all interested parties and the underlying computing resources (CPU, storage, etc.) are shared between all parties who use the public cloud offering. In contrast, private cloud solutions are off-site compute resources (in a dedicated or "co-located" datacentre) that are dedicated to a single party. Hereafter, we refer to public cloud services as cloud services and, where relevant, distinguish them from private cloud services.

10. Since 2006, cloud offerings have grown in many ways. To name just a few, more cloud providers have entered the industry, more cloud infrastructure has been built,[7] and more types of cloud services are being offered. At the same time, traditional on-premises providers have improved and expanded their services, including offering their own cloud or hybrid on-premises/cloud solutions (see further Section 3.1).

2.2. Companies in need of IT solutions can choose from a wide array of services, providers, and delivery methods

11. The availability of cloud services has given companies a large set of options to solve their IT needs. Companies in Australia and worldwide can choose from:[8]

- **on-premises solutions** hosted at a company's location, which may be managed in-house or by an on-premises provider, such as IBM, Dell, and HPE;

6 https://cybermagazine.com/cloud-security/history-cloud-computing

7 For example, in 2012 AWS opened its first datacentre in Australia (https://aws.amazon.com/about-aws/whats-new/2012/11/12/announcing-the-aws-asia-pacific-sydney-region/).

8 See Amazon's submission to the ACCC from 18 September 2024, p. 17.

- **off-site datacentres** dedicated to a specific company;
- **off-site "co-located" datacentres** shared by multiple companies, such as those provided by Equinix, Macquarie Telecom Group, and Digital Realty;
- **cloud services** like AWS, Microsoft Azure, Google Cloud Platform, Oracle Cloud, Vault Cloud, SlicedTech, IONOS, Akamai Connected Cloud, Vultr, and OVHcloud;
- **software services** provided by companies such as Oracle, Salesforce, Adobe, Microsoft, Atlassian, SAP, Workday, Databricks, and thousands more; and
- **IT resellers** that provide a "system" or "managed service", such as Accenture, HCL, Cognizant, Deloitte, and Capgemini.

12. Companies can also combine different solutions and/or providers. For example, companies may choose a **hybrid on-prem/cloud solution** (combining on-premises and cloud services) or a **multi-cloud solution** (multiple cloud providers, potentially in combination with on-premises providers).

13. When assessing their IT needs, companies typically define their objectives for a specific workload, or a set of workloads, and look at providers that can meet those objectives. Companies do not face a single, binary choice between cloud and on-premises for all their workloads. Instead, companies can choose their preferred providers and delivery methods on a workload-by-workload basis.[9]

3. INDUSTRY OUTCOMES IN AUSTRALIA ARE INDICATIVE OF HEALTHY COMPETITION BENEFITTING CUSTOMERS

3.1. Cloud services are driven by constant innovation and have triggered innovation in on-premises and hybrid services

14. Empirical evidence confirms that the IT services industry is highly innovative and that all IT providers (including on-premises, hybrid, and cloud providers) invest in innovation and respond to innovation of rivals. This is an indicator of a well-functioning industry with healthy dynamic competition where providers need to work hard to compete for customers by providing high-quality and innovative services. Competition concerns typically arise in different circumstances, when there is a lack of investment and innovation, which does not apply to cloud and IT services.

15. For example, AWS constantly releases new services and updates existing ones. Between 2011 and 2023, AWS launched more than 21,000 new services and features, as shown in Figure 1. For instance, the number of Elastic Compute Cloud ("EC2") instances has constantly increased to over 800 as of today, up from 300 in July 2020.[10] AWS has also introduced significant enhancements to other popular services, including but not limited to Simple Storage Solution ("S3") and Relational Database Service ("RDS").[11] These

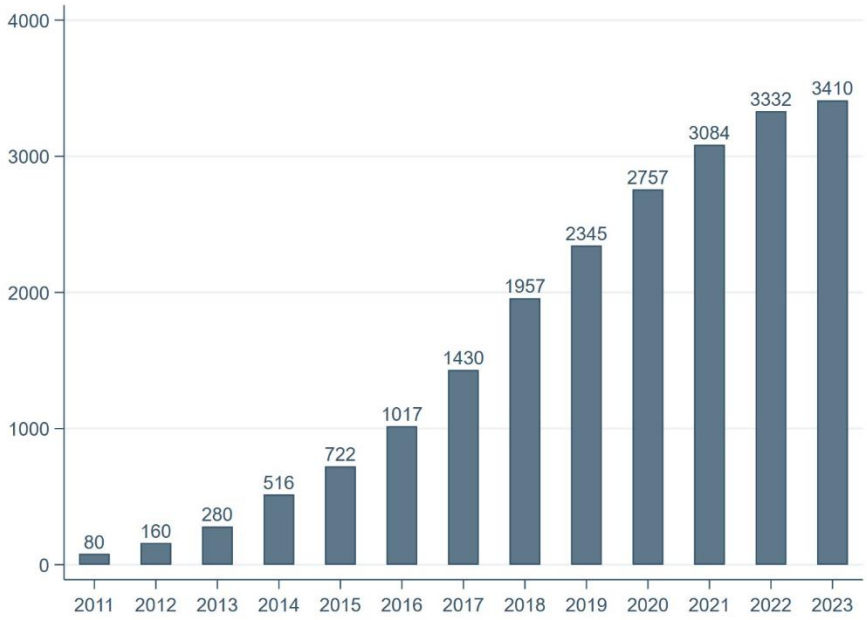
9 This does not preclude the possibility that some companies prefer to have all their workloads in the cloud or on-premises.

10 https://web.archive.org/web/20200731012337/https:/aws.amazon.com/ec2/.

11 For example, in 2023 AWS launched S3 Express One Zone (https://aws.amazon.com/blogs/aws/new-amazon-s3-express-one-zone-high-performance-storage-class/), Aurora PostgreSQL zero-ETL integration with Amazon Redshift (https://aws.amazon.com/about-aws/whats-new/2023/11/amazon-aurora-postgresql-zero-etl-integration-redshift-public-preview/), and Amazon RDS for Db2 (https://aws.amazon.com/about-aws/whats-new/2023/11/amazon-rds-db2/), among many other new services and updates.

innovations have provided AWS's customers with more and higher quality options to solve their IT needs.

Figure 1: Number of new services and features released by AWS, 2011-2023



Source: CRA based on information provided by AWS.

16. Innovation is not limited to AWS. All cloud providers have innovated and expanded their service offerings over time. For example, Google has announced 20 new or enhanced products at its Google Cloud Next conference in 2023;[12] Microsoft regularly announces new products and enhancements on Azure;[13] Oracle completely overhauled its cloud offering in 2016;[14] and OVHcloud is developing new services to respond to the needs of clients in the public sector and in healthcare.[15] As a Gartner study from 2021 found: "All of the vendors [*i.e.*, cloud providers] in this year's analysis have enhanced their offerings during the past year, reaching the stage where most meet general cloud computing requirements".[16]

17. The innovation and expansion fostered by cloud providers in turn has induced traditional on-premises providers to become more innovative to retain existing and/or win (back) new and old customers. By now, many on-premises providers embrace cloud services and offer

12 https://www.crn.com/news/cloud/google-cloud-next-2023-the-20-biggest-product-launches
13 https://azure.microsoft.com/en-us/blog/content-type/announcements/
14 https://www.forbes.com/sites/moorinsights/2024/02/13/oracle-cloud-has-achieved-momentum-through-differentiation/
15 https://corporate.ovhcloud.com/sites/default/files/2024-01/2024-01-17-ovhcloud-shaping-the-future-veng-vdef.pdf
16 https://emt.gartnerweb.com/ngw/globalassets/en/doc/documents/736013-critical-capabilities-for-cloud-infrastructure-and-platform-services.pdf)

hybrid and/or pure cloud solutions.[17] Many on-premises providers are also actively working on improving their service offerings with a view towards AI customers.[18]

3.2. Customers benefit from innovation and lower prices

18. Innovation in IT services (including cloud, hybrid, and on-premises services) provides evident benefits to customers, who have access to greater quantity and quality of choices to meet their IT needs.

19. Further, competition has driven providers to become more efficient and decrease prices to the benefit of customers.[19] For example, as of September 2023, AWS has reduced its prices 134 times since it launched in 2006. Focusing on 2016-2024, as shown in Figure 2, AWS has implemented significant price decreases for many popular services, including EC2 (including in 2017, 2020, 2022, and 2024), S3 (including in 2016, 2021, and 2024), and RDS (including in 2017 and 2020). AWS also introduced a "Free Tier" in 2010, which has since expanded in scope and usage limits, now providing free usage for more than 100 AWS services up to specified limits.[20]

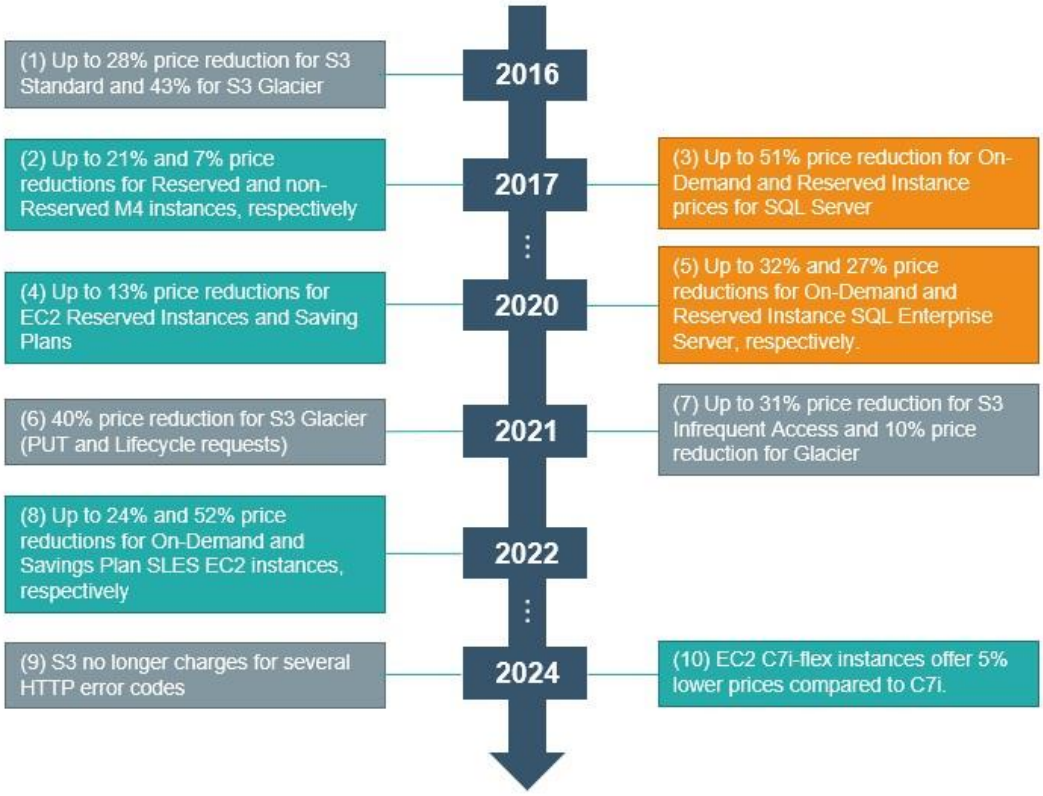
17 Examples include, but are not limited to, Dell (https://www.dell.com/en-uk/dt/cloud/dell-technologies-cloud.htm), IBM (https://www.ibm.com/cloud), and HPE (https://www.hpe.com/us/en/greenlake.html).

18 https://www.techtarget.com/searchstorage/opinion/On-prem-storage-infrastructure-evolves-to-keep-pace-with-AI
https://www.hpe.com/us/en/newsroom/press-release/2024/06/hewlett-packard-enterprise-and-nvidia-announce-nvidia-ai-computing-by-hpe-to-accelerate-generative-ai-industrial-revolution.html
https://www.dell.com/en-uk/lp/dell-technologies-expands-dell-ai-factory-with-nvidia-to-turbocharge-ai-adoption
https://www.ibm.com/ai-infrastructure

19 https://docs.aws.amazon.com/wellarchitected/latest/cost-optimization-pillar/cost_cloud_financial_management_scheduled.html

20 https://aws.amazon.com/free/?all-free-tier.sort-by=item.additionalFields.SortRank&all-free-tier.sort-order=asc&awsf.Free%20Tier%20Types=*all&awsf.Free%20Tier%20Categories=*all

Figure 2: Examples of recent AWS price decreases for EC2, S3, and RDS, 2016-2024



Sources: (1) https://aws.amazon.com/blogs/aws/aws-storage-update-s3-glacier-price-reductions/, (2) https://aws.amazon.com/blogs/aws/ec2-price-reductions-reserved-instances-m4-instances/, (3) https://aws.amazon.com/blogs/aws/aws-price-reduction-sql-server-standard-edition-on-ec2/, (4) https://aws.amazon.com/blogs/aws/ec2-price-reduction-for-ec2-instance-saving-plans-and-standard-reserved-instances/, (5) https://aws.amazon.com/blogs/database/amazon-rds-for-sql-server-reduces-prices-on-enterprise-edition-in-the-multi-az-configuration/, (6) https://aws.amazon.com/blogs/aws/amazon-s3-glacier-price-reduction/, (7) https://aws.amazon.com/blogs/storage/s3-storage-class-price-reductions/, (8) https://aws.amazon.com/about-aws/whats-new/2022/06/price-reductions-amazon-ec2-instances-suse-linux-enterprise-server-sles-os/, (9) https://aws.amazon.com/about-aws/whats-new/2024/05/amazon-s3-no-charge-http-error-codes/, (10) https://aws.amazon.com/about-aws/whats-new/2024/07/amazon-ec2-c7i-flex-instances-sydney-tokyo-regions/.

3.3. Cloud services benefit customers of all sizes, including SMBs

20. The introduction of cloud services has given companies in need of IT solutions more options and more choice for running their workloads. This is beneficial from an economic standpoint, as more options allow companies with IT needs to find a better match for their respective workloads and use cases.

21. The benefits of cloud services are generally valuable to customers of all sizes. Startups and other SMBs especially benefit from the scalability that cloud services provide, given that these businesses start off with a low scale and face considerable uncertainty about the eventual scale that they can reach. SMBs also benefit from the fact that cloud services offer pay-as-you-go pricing, which can bring cost savings compared to an on-premises solution using their own IT infrastructure. Furthermore, cloud services offer SMBs access to the same up-to-date hardware and software solutions that larger companies have access to, which helps level the playing field and allows SMBs to compete more effectively. Finally, SMBs also benefit from various promotions tailored to smaller customers. For example,

AWS offers the "Free Tier", which provides free usage of more than 100 AWS services up to specified limits.[21]

22. Several studies have attempted to estimate the economic benefits of cloud services. For example:

- A **2024 study from John Bai and Wang Jin** studies the causal impact of cloud adoption on productivity gains for a large sample of US public firms between 2010 and 2019.[22] The study finds that firms that have adopted cloud services had 2.3 to 6.9 percent higher revenue growth than firms that have not adopted cloud services.
- A **2023 study from Jin Chuqing, Sida Peng, and Peichung Wang** estimates the welfare benefits of cloud services using customer-product-month level data from a major cloud provider covering the period November 2015 to June 2018.[23] The study finds a 216% return on investment of cloud services. The return on investment is higher for smaller customers, consistent with the hypothesis that SMBs especially benefit from cloud services.
- A **2023 study from Accenture**, commissioned by AWS, estimates the macroeconomic impact of cloud adoption by micro, small, and medium enterprises.[24] The study finds that cloud adoption is associated with annual productivity benefits for micro, small, and medium enterprises of up to $161bn by 2030 across 12 major economies (including Australia).[25]

23. While the economic value of cloud services can hardly be summarised in a single number, the above examples show that cloud services provide significant benefits to many companies. Conversely, in some instances or for specific workloads, customers might reach the conclusion that on-premises solutions are better suited. At the most basic level, cloud services provide companies with more options and choice to solve their IT needs and increase competition in the IT services industry.

3.4. Customers combine different IT services and providers to their advantage

24. Surveys indicate that approximately three out of four global companies using cloud services adopt a hybrid solution, meaning they use both on-premises and cloud providers.[26] A similar or even higher share of companies worldwide multi-cloud, *i.e.*, use multiple cloud providers: out of the companies using cloud services, this share is 92%.[27]

25. Consistent with the above, surveys also indicate that only a minority of companies single home, *i.e.*, use only one IT provider. The share of companies using only on-premises

21 https://aws.amazon.com/free/

22 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4082436

23 https://chuqingjin.github.io/files/cloud_inertia_ChuqingJin.pdf

24 https://pages.awscloud.com/rs/112-TZM-766/images/Accenture-AWS-report-2023-Realizing-a-cloud-enabled-economy.pdf.

25 The results are scaled by the GDP share of MSMEs in the respective countries.

26 73% according to Flexera (2024, global survey, https://info.flexera.com/CM-REPORT-State-of-the-Cloud) and 82% according to Cisco (2022, global survey, https://www.cisco.com/c/dam/en/us/solutions/collateral/hybrid-cloud/2022-trends-report-cte.pdf). While there are no separate figures available for Australia, there is no evidence that would suggest that the hybrid on-premises/cloud rates in Australia are materially different from the global averages reported in the Flexera and Cisco surveys.

27 Cisco (2022, global survey, https://www.cisco.com/c/dam/en/us/solutions/collateral/hybrid-cloud/2022-trends-report-cte.pdf).

services *or* only one cloud provider (an upper bound for the share of companies that single home) ranges between 22% and 26% across the US, Germany, and the UK.[28] Only 12-14% of companies use a single cloud provider (a lower bound for the share of companies that single home).[29]

26. This not only shows that companies assess their IT needs on a workload-by-workload basis and make decisions accordingly, but also that multiple IT providers, including cloud and on-premises providers, compete for and win workloads.

3.5. Customer satisfaction is high

27. Consistent with customers getting access to high-quality services at affordable prices, surveys show that customer satisfaction is high. As shown in Table 1, the vast majority of customers worldwide appear to be satisfied with their cloud providers and/or the services they offer.[30]

Table 1: Surveys show that customer satisfaction is high

Survey	Finding(s)	Source
Wasabi (2024)	**90%** of organisations are satisfied or completely satisfied with their object storage service(s).	https://wasabi.com/blog/industry/2024-cloud-storage-index
Forrester (2024)	**90%** of decision-makers report that their organisation's cloud infrastructure strategy has helped achieve overall business goals or is expected to do so within the next 12 months.	https://www.datocms-assets.com/2885/1719373669-hashicorp-tlp.pdf
Atlassian (2021)	**95%** of new Atlassian customers choose cloud over server or datacentre, and **90%** of those switching from on-premises to cloud recommend making the switch.	https://www.atlassian.com/blog/platform/customer-survey-infographic
SPR (2021)	**63%** of decision-makers whose organizations used public or hybrid cloud deployments said they were extremely satisfied with how their cloud provider supported them throughout the pandemic.	https://spr.com/spr-cloud-report/
Accenture (2020)	**93%** of executives were satisfied or very satisfied with cloud results achieved.	https://www.accenture.com/content/dam/accenture/final/accenture-com/document/Accenture-Cloud-Well-Underway.pdf

Source: CRA based on sources provided above.

Note: All surveys are global, except SPR which is focused on US decision-makers.

28. Customer satisfaction with their current cloud provider is frequently named as the most common or one of the most common reasons why cloud customers do not want to switch

28 Cockroach Labs (2024, survey in US+UK+DE, https://www.cockroachlabs.com/guides/thank-you?pdf=/pdf/the-state-of-multi-cloud.pdf). This share is an upper bound because it includes companies that use only on-premises services, irrespective of whether they use one or multiple on-premises providers.

29 *Ibid*.

30 A survey of public cloud users and decision makers in Australia, conducted by BCG in 2019, found that *(i) "nearly all industry verticals are aware of the benefits of the public cloud when it comes to unlocking efficiencies across the value chain, and have harnessed it to some degree" and (ii) "Australian companies value both productivity and the way in which the public cloud fosters more efficient team collaboration, so that they can do more with the resources they have."* (https://www.bcg.com/publications/2019/economic-impact-public-cloud-apac/australia). While this survey did not quantify customer satisfaction, the results point towards customers being satisfied that their IT needs are being met by a cloud solution.

to another provider or IT solution.[31] If customers *can* switch but *do not want* to switch because they are satisfied with their current provider, this cannot constitute a competition concern.

4. OVERVIEW OF COMPETITION AND COMPETITIVE DYNAMICS IN AUSTRALIA

4.1. Cloud services are unconcentrated and concentration has been decreasing

29. For this report, we have not sought to define relevant markets in an antitrust sense. To undertake that exercise would require us to obtain data regarding cloud, hybrid, on-premises, and other substitutable services, which is beyond the scope of this report.[32]

30. For the purposes of assessing concentration in the provision of cloud services in Australia, we relied on IDC's Worldwide Semiannual Public Cloud Services Tracker,[33] and IDC's definition of (public) cloud services.[34] The IDC data includes comprehensive provider-level data covering (public) cloud services in Australia.[35] A significant limitation in using IDC's definition and data is that on-premises, hybrid, and private cloud services are excluded. If on-premises and private cloud services were to be accounted for, this would lead to substantially lower shares of supply for cloud providers such as AWS.

31. The Herfindahl-Hirschman concentration index ("HHI") indicates that cloud services in Australia, as defined by IDC, are unconcentrated. As shown in Figure 3, the HHI fluctuates around 500. This is well below the 1,500 threshold that generally indicates an industry with a moderate degree of concentration, and even further below the 2,500 threshold that generally indicates an industry with a high degree of concentration. It is also well below the 2,000 threshold applied by the ACCC as an initial screening tool in the context of evaluating horizontal mergers.[36]

31 See, for example, DigitalOcean's report on startups and small-to-medium-businesses, p. 12 (https://anchor.digitalocean.com/rs/113-DTN-266/images/DigitalOcean-Currents_Dec-2022.pdf); Public First Survey, Q36 (2023, UK survey, https://www.publicfirst.co.uk/files/CCIA_Survey.xlsx). While this set of findings is not specific to Australia, we are not aware of any evidence that would suggest that cloud customers in Australia are less satisfied than cloud customers in the rest of the world.

32 Also, while we analyse competition in Australia below, this is without prejudice to the geographic definition of the relevant markets, which is also beyond the scope of this report.

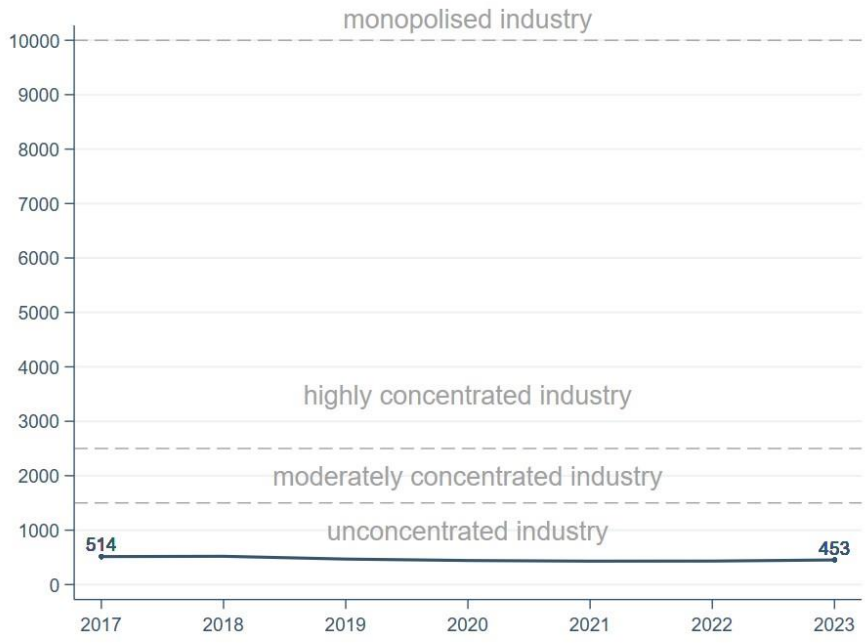
33 https://www.idc.com/getdoc.jsp?containerId=IDC_P29737

34 This definition includes Infrastructure as a Service ("IaaS"), Platform as a Service ("PaaS"), Software as a Service – System Infrastructure Software ("SaaS – SIS"), and Software as a Service – Applications ("SaaS – Applications"). See https://www.idc.com/getdoc.jsp?containerId=prUS52343224.

35 We have not independently verified IDC's methodology, including the attribution of cloud services revenues to individual providers.

36 ACCC (2017), *Merger Guidelines*, p. 35 (https://www.accc.gov.au/system/files/Merger%20guidelines%20-%20Final.PDF)

Figure 3: IDC data show that cloud services are unconcentrated



Source: CRA analysis of Australian data from IDC Worldwide Semiannual Public Cloud Services Tracker, 2022H1, 2023H1, and 2023H2.

32. Further, and perhaps more importantly in a dynamic industry, there is no indication that cloud services in Australia are becoming more concentrated. In fact, the HHI has decreased over the period 2017 to 2023 (from 514 in 2017 to 453 in 2023). Analysing competition from a dynamic point of view, it is also important to consider whether smaller cloud providers can grow and expand. As shown in Section 4.3, smaller cloud providers have gained scale and have seen substantial growth, consistent with effective dynamic competition.

4.2. On-premises and hybrid services should be considered in a competitive assessment

33. Companies with IT needs look for IT providers that can provide a solution for a specific workload or a set of workloads. On-premises, hybrid, and cloud services generally address the same underlying IT needs (compute, storage, database services, etc.) and as such can be substitutable for many workloads and use cases. In practice, companies will aim to strike a balance across different factors and choose the option that best suits the specific requirements of each of their workloads, where cloud services may be preferred for some workloads and on-premises or hybrid services may be preferred for other workloads. This means that on-premises, hybrid, and cloud services can all be relevant solutions for companies to choose from.

34. Empirically, there are multiple ways to assess the degree of substitutability between cloud and on-premises services. For example, the degree of substitutability between the two solutions is evidenced by the fact that a material share (~30%) of cloud customers

worldwide choose on-premises services when switching providers.[37] Consequently, cloud providers must compete with on-premises and hybrid providers: cloud providers aim to convince companies to bring (new or existing) workloads to the cloud, while on-premises and hybrid providers aim to convince companies to utilise their services. This implies that cloud providers must also compete to retain the workloads of existing cloud customers.[38]

35. Even though cloud services have experienced significant growth rates in recent years, in 2023 they still accounted for less than 15% of overall IT spending according to Gartner.[39] Focusing on enterprise workloads, Goldman Sachs' CIO survey estimates that only 30% of enterprise workloads have been moved to public cloud as of 2024.[40] Even when focusing on companies who have adopted cloud services, the share of workloads that are in public cloud, rather than on-premises or in private clouds, is only slightly higher than 50% and has remained relatively stable between 2020 and 2024, as shown in Figure 4 based on survey data from Flexera. While we are unable to analyse these estimates in more detail as we do not have access the underlying data, these studies all point to a similar conclusion: hybrid solutions that combine on-premises and cloud services are widespread, even for companies that have adopted cloud services for some of their workloads. Further, considering the observed trends, on-premises services are likely to remain a relevant competitive constraint for the foreseeable future.

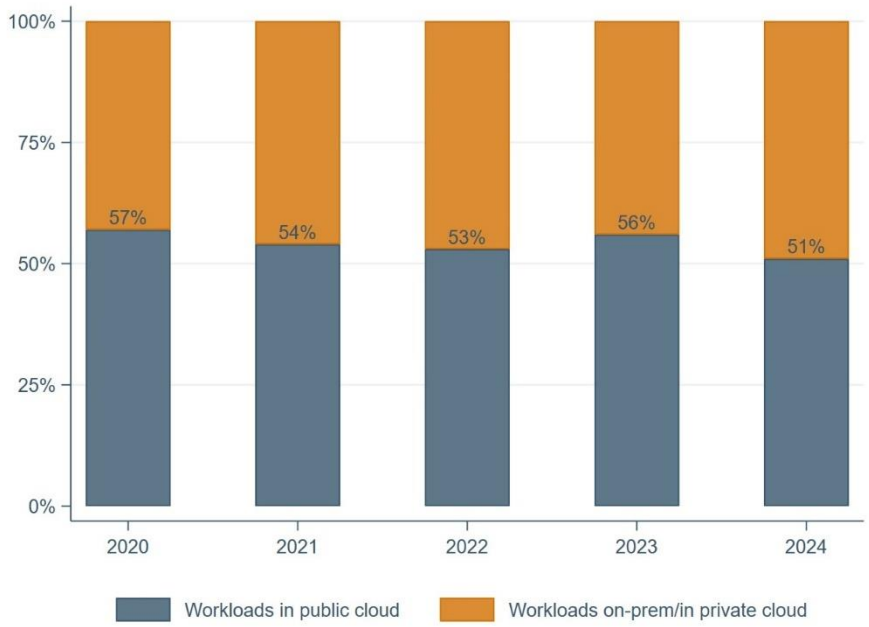
37 According to Public First's survey, Q31, the diversion ratio to on-premises (*i.e.*, the percentage of cloud customers who switch to on-premises out of all cloud customers who have switched) is 29% (2023, UK survey, https://www.publicfirst.co.uk/files/CCIA_Survey.xlsx). We are not aware of any reason that would suggest that the on-premises diversion ratio in Australia is materially different from that in the UK.
For companies that have made the decision to move workloads away from large cloud providers such as AWS, Microsoft, Google, IBM, and Alibaba, the diversion ratio to on-premises is even higher. According to 451 Research, 65% of these companies choose an on-premises solution (2021, global survey, https://www.spglobal.com/marketintelligence/en/documents/cloud-repatriation-what-it-is-what-it.pdf).

38 Note that for on-premises services to exert a significant competitive constraint on cloud services, it is sufficient that a significant share of companies view on-premises and cloud services as substitutable. This does not preclude the possibility that cloud or on-premises services may be better suited for certain workloads or for certain companies.

39 https://www.gartner.com/en/newsroom/press-releases/01-17-2024-gartner-forecasts-worldwide-it-spending-to-grow-six-point-eight-percent-in-2024, https://www.gartner.com/en/newsroom/press-releases/11-13-2023-gartner-forecasts-worldwide-public-cloud-end-user-spending-to-reach-679-billion-in-20240.

40 https://www.goldmansachs.com/insights/articles/cloud-revenues-poised-to-reach-2-trillion-by-2030-amid-ai-rollout

Figure 4: Flexera finds that just over half of cloud customers' workloads are in a public cloud, showing that hybrid solutions are frequently adopted by companies that use cloud services



Source: CRA based on Flexera State of the Cloud Reports (2020-2024, global survey, https://info.flexera.com/CM-REPORT-State-of-the-Cloud)

36. In sum, the evidence shows that on-premises services are a viable alternative for many workloads and use cases and account for a significant share of revenues and workloads. Accordingly, any competitive assessment in relation to cloud services should take account of the competitive constraint that on-premises services exert on cloud services.

4.3. There is significant entry and expansion in cloud services

37. The growing demand for cloud services has led to entry and expansion of multiple cloud providers both worldwide and in Australia specifically. To name just a few recent examples of investments in cloud infrastructure in Australia:

- In **2022**, Wasabi Technologies (a cloud provider focused on providing cloud storage) started operations in Australia, and DigitalOcean (a cloud provider focused on SMBs) opened its first datacentre in Australia.[41]
- In **2023**, Microsoft unveiled its plan to invest $3.2bn in cloud and AI infrastructure in Australia, establishing nine new datacentres in the process;[42] and SolarWinds (a Software-as-a-Service provider) opened its first datacentre in Australia.[43]

41 https://wasabi.com/company/newsroom/press-releases/wasabi-technologies-opens-storage-region-in-sydney
42 https://www.datacenterknowledge.com/hyperscalers/microsoft-to-establish-nine-new-data-centers-in-australia
43 https://www.datacenterplanet.com/data-center/solarwinds-opens-new-data-center-in-australia/

- In **2024**, French cloud provider OVHcloud opened its third datacentre in Australia,[44] only a few years after the opening of its second Australian datacentre;[45] AWS announced that it would build two new data centres – one south-west of Sydney and the other outside of Melbourne;[46] and Attura (an Australian cloud provider focusing on "IaaS", "PaaS", and "AI-as-a-Service") announced the expansion of its sovereign cloud capacity with a new deployment in a datacentre just outside of Sydney.[47]

38. Cloud infrastructure investments in Australia have gone hand in hand with entry of new cloud providers and increasing cloud revenues. As shown in Table 2, the number of cloud providers in Australia has grown from 482 in 2017 to 692 in 2023, an increase of 44%.[48] Over the same period, Australian cloud revenues have quadrupled, from $3.1bn in 2017 to $12.5bn in 2023.[49]

Table 2: Cloud revenue and the number of cloud providers is increasing in Australia

Year	Number of cloud providers	Net increase in number of cloud providers	Cloud revenue ($mn)
2017	482	-	3,136
2018	567	85	4,232
2019	625	58	5,088
2020	644	19	6,287
2021	668	24	8,167
2022	684	16	10,153
2023	692	8	12,515

Source: CRA analysis of Australian data from IDC Worldwide Semiannual Public Cloud Services Tracker, 2022H1, 2023H1, and 2023H2.

Note: Net increase in number of cloud providers is the difference between the number of entries and exits.

39. The growing demand for cloud services has benefitted cloud providers of all sizes. Smaller cloud providers have been able to win customers and gain scale alongside the larger ones. The Australian IDC data also shows that, at the level of individual cloud providers, scale does not appear to be a driver of growth. If anything, there is a negative association between cloud provider size and cloud provider growth, as shown in Figure 5. Even mid-sized cloud providers appear to grow faster than the largest cloud providers.

44 https://corporate.ovhcloud.com/asia/newsroom/new-datacentre-sydney/

45 https://www.datacenterdynamics.com/en/news/ovhcloud-increases-data-center-footprint-australia-singapore/

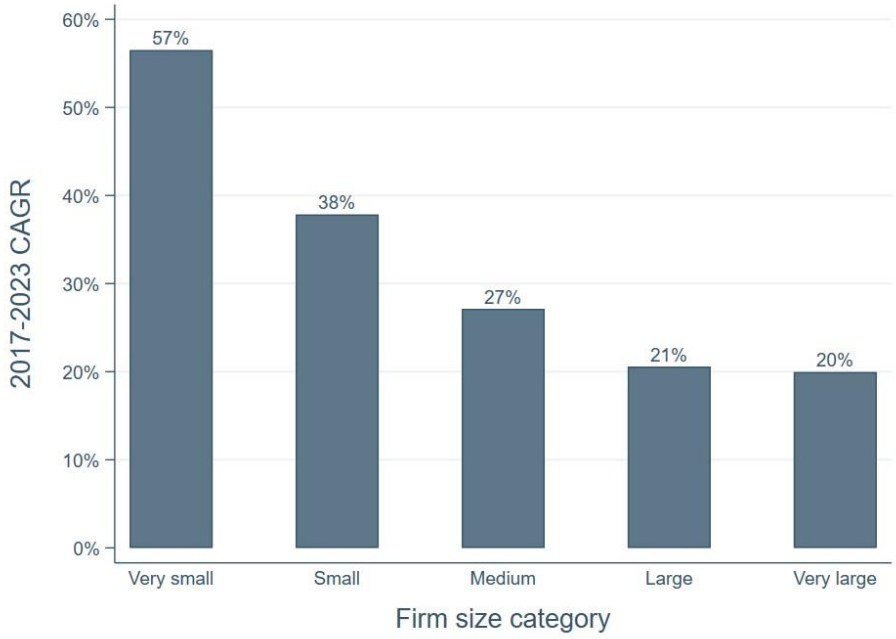
46 https://www.theurbandeveloper.com/articles/amazon-plans-more-data-centres-in-sydney-and-melbourne

47 https://direct.datacenterdynamics.com/en/news/atturra-expands-aussie-sovereign-cloud-with-deployment-in-nextdc-sydney-data-center/

48 This count includes cloud providers from all categories of cloud services as defined by data provider IDC, namely Infrastructure as a Service ("IaaS"), Platform as a Service ("PaaS"), Software as a Service – System Infrastructure Software ("SaaS – SIS"), and Software as a Service – Applications ("SaaS – Applications").

49 All dollar values in this report refer to US dollars.

Figure 5: IDC data show that smaller cloud providers are growing at faster rates than larger cloud providers



Source: CRA analysis of Australian data from IDC Worldwide Semiannual Public Cloud Services Tracker, 2022H1, 2023H1, and 2023H2.

Note: Figure 5 shows the relationship between size and 2017-2023 compound annual growth rate ("CAGR") for cloud providers in Australia. We focus on cloud providers which are present in the IDC data throughout the period 2017-2023 and categorise cloud providers by size according to their 2017 revenues: "very small" includes cloud providers below the 25th percentile by revenue, "small" between the 25th and 50th percentiles, "medium" between the 50th and 75th percentiles, "large" between the 75th and 95th percentiles, and "very large" above the 95th percentile. We group cloud providers by size in terms of 2017 revenues rather than 2023 revenues because using cloud providers' revenues in 2023 would lead to endogeneity, given that cloud providers that end up with higher revenues in 2023 are more likely to have grown faster over the period 2017-2023.

40. The fact that large cloud providers are not growing faster than small cloud providers (if anything, the reverse is true) shows that (i) small cloud providers are not being foreclosed but instead are able to grow, (ii) there are no insurmountable barriers to entry, and (iii) there is no indication of winner-takes-all dynamics or "tipping".

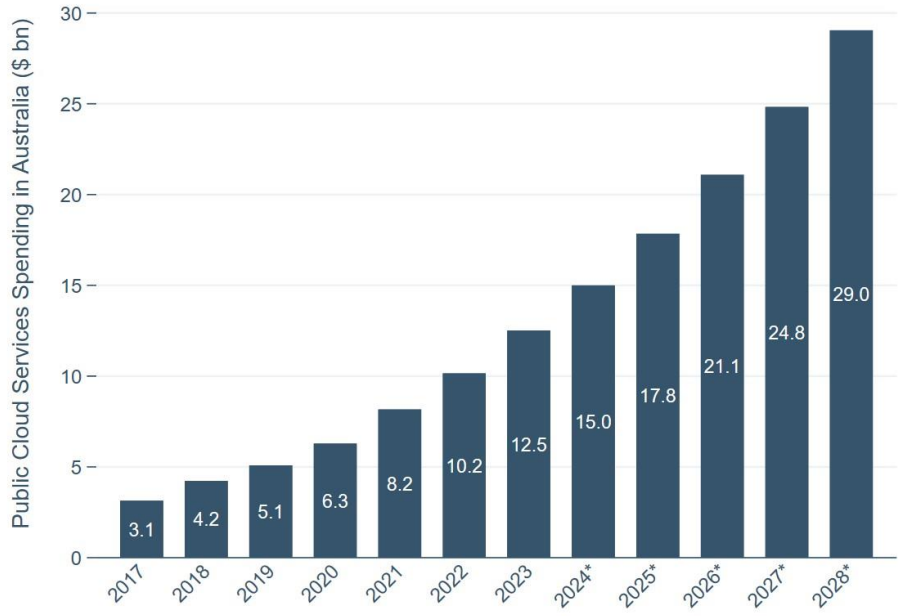
4.4. Several industry features reduce barriers to entry and expansion in cloud services

41. The entry and expansion of cloud providers that we have discussed in the previous section is explained and facilitated by a combination of industry features that reduce barriers to entry and expansion in cloud services.

Growing demand for cloud services opens up opportunities for entry and expansion

42. As shown in Figure 6, IDC data show that spending on cloud services in Australia quadrupled from $3.1bn in 2017 to $12.5 billion in 2023. The growth is expected to continue, with IDC predicting that cloud spending in Australia will reach $29.0bn in 2028.

Figure 6: IDC data show that cloud spending in Australia is increasing over time (2017-2028)



Source: CRA analysis of Australian data from IDC Worldwide Semiannual Public Cloud Services Tracker, 2022H1, 2023H1, and 2023H2.

Note: Forecasts are denoted with *.

43. The growing demand for cloud services has several implications that reduce barriers to entry and expansion:[50]

- First, there is a large opportunity for cloud providers to attract new workloads, which typically involve lower switching costs (inherent to IT services) than workloads that have already been placed with an IT provider.
- Second, large untapped demand for cloud services means that cloud providers have an incentive to remain competitive, not only to win business from each other, but also to position cloud services as preferable to on-premises and hybrid alternatives. Cloud providers must convince companies that are still relying on on-premises solutions to try out cloud services. Once companies try out cloud services and are convinced of cloud's value proposition, companies may expand their cloud usage, *e.g.*, by transitioning additional workloads to the cloud. In economics, this is known as dynamic demand, where higher demand today results in higher sales today and in the future.[51]
- Third, growth means there is a higher chance of recouping investments, which in turn encourages further entry and expansion.[52]

50 Gans, J., Hervé, M., Masri, M. (2023), *Economic analysis of proposed regulations of cloud services in Europe*, European Competition Journal, 19(3), p. 537.

51 See, for example, Moresi, S. (2021), *Market definition in industries with dynamic demand*, Competition Law & Policy Debate 6(3-4), pp. 58-66.

52 See, for example, Hause, J. C, Du Rietz, G. (1984), *Entry, Industry Growth, and the Microdynamics of Industry Supply*, Journal of Political Economy, 92(4), pp. 733–757.

Supply-side substitutability facilitates entry from adjacent industries

44. Entry is facilitated by supply-side substitutability, *i.e.*, the possibility that companies from adjacent industries can adapt their product offering and enter at a relatively low cost in comparison to companies that start from scratch.[53]

45. Cloud services are characterised by supply-side substitutability, as evidenced by the long list of companies from adjacent industries that have started providing cloud and/or hybrid services. Examples include:

- **Traditional IT hardware companies** such as Dell, IBM, and HPE;
- **Telecoms companies** such as Telstra, AT&T, Deutsche Telekom, Verizon, and Huawei;
- **Datacentre operators** such as IO and DigitalRealty;
- **Fujitsu**, a specialist in consumer and industrial electronics;
- **SAP**, a leader in enterprise resource planning software; and
- **NVIDIA**, a GPU maker.

46. There can also be entry by companies that backward integrate their IT services. For example, food retailer **Lidl** has set up its own cloud for internal use and subsequently started offering cloud services to others.[54]

Availability of financing enables investments in cloud infrastructure

47. Costs of entry, such as necessary investments into IT infrastructure, do not represent a barrier or deterrent to entry if potential entrants have access to capital markets and financing opportunities.

48. In the case of the cloud industry, empirical evidence shows that small and large cloud providers alike have access to capital markets and financing opportunities. There have been numerous funding and investment rounds for cloud providers of all sizes. Examples include cloud services startups, such as Skytap,[55] Voltage Park,[56] Lambda Labs,[57] and CoreWeave,[58] as well as more established cloud providers, such as Alibaba[59] and OVH Cloud.[60]

Leasing and co-location of datacentres lower real estate investment costs

49. Leasing and co-location of datacentres are capital efficient strategies for smaller cloud providers, allowing them to incur significantly lower upfront capital costs for real estate, while preserving the possibility of scaling capacity as the business grows. According to

53 See, for example, the European Commission's Horizontal Merger Guidelines (2004), para 72: "*Entry is particularly likely if suppliers in other markets already possess production facilities that could be used to enter the market in question, thus reducing the sunk costs of entry.*"

54 https://www.irishtimes.com/business/2024/08/23/how-lidl-accidentally-took-on-the-big-guns-of-cloud-computing/

55 https://www.geekwire.com/2023/seattle-cloud-company-skytap-lands-18m/

56 https://www.reuters.com/technology/crypto-billionaires-nonprofit-buys-500-million-ai-data-center-chips-2023-10-30/

57 https://lambdalabs.com/blog/lambda-raises-320m-to-build-a-gpu-cloud-for-ai

58 https://finance.yahoo.com/news/coreweave-secures-1-1-billion-160000654.html

59 https://www.ft.com/content/978687d4-f9cf-4990-94b6-8d4f21c5e94b

60 https://www.reuters.com/technology/frances-ovhcloud-gets-200-mln-euro-eib-loan-european-investments-2022-11-25/

estimates by the Uptime Institute, co-location of datacentres can be 19% to 64% more cost-effective than building a dedicated datacentre, depending on the specific requirements.[61] As a result, leasing and co-location lower barriers to entry and expansion.

Multi-homing allows entrants to focus on key areas

50. As discussed in Section 3.4, a large share of cloud customers multi-home, *i.e.*, use multiple IT providers (multiple cloud, hybrid, and/or on-premises providers) to fulfil their IT needs. This implies that entrants do not necessarily need to cover the whole range of services that companies may demand. Rather, entrants can compete by providing high-quality, innovative services in one or several key areas. Companies who have demand for these services can then mix and match with the services offered by other providers to achieve the optimal solution from their perspective for the specific workload(s) they need to run.

51. By focusing on one or several key areas, entrants can save resources and potentially achieve greater results in terms of the quality and innovativeness of these services. This means lower barriers to entry and expansion, consistent with the empirical findings set out in Section 4.3. In turn, established IT providers are incentivised to innovate in the respective areas where new cloud providers enter with innovative products.

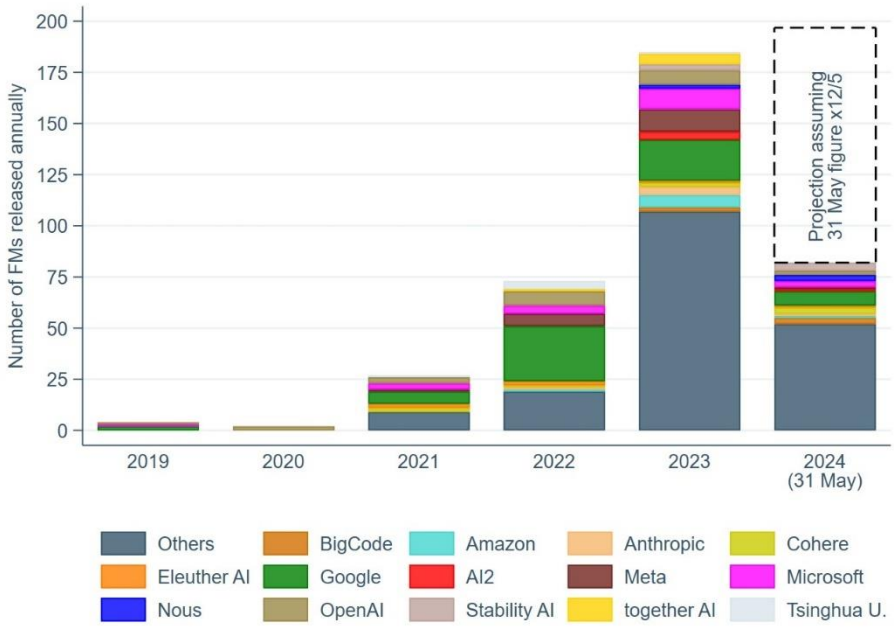
4.5. Potential impact of AI on competitive dynamics

52. Generative AI, *i.e.*, artificial intelligence capable of generating text, images, videos, and other data using generative models, is expected to leave a mark on all aspects of human life, including many industries. One of the first industries where generative AI has already had a significant impact is the IT services industry, which is now faced with new workloads for building, training, fine-tuning, deploying, and applying generative AI solutions.

53. It is too early to predict how generative AI will shape the competitive dynamics of the IT services industry, as generative AI is still a nascent and rapidly developing technology. Foundation models ("FMs"), which are the workhorse of generative AI, are constantly evolving, with more FMs becoming available, offering greater capabilities, and being provided by a wider range of developers. As shown in Figure 7, many new FMs are being released each year, and the number of new FMs released annually keeps increasing. As a result, the number of available FMs has been increasing exponentially. The same applies to the size of some leading FMs (as measured by the number of trainable parameters) and the number of FM developers.

61 https://365datacenters.com/data-center-colocation-build-vs-buy/

Figure 7: Many new FMs are being realised each year and the number of new FMs released annually keeps increasing



Source: Stanford Center for Research on FMs (https://crfm.stanford.edu/ecosystem-graphs/index.html?mode=table).

Note: We added 6 FMs from Amazon (Titan Text Express, Titan Text Lite, Titan Text Embeddings, Titan Multimodal Embeddings, Titan Image Generator, and Alexa TM 20B), which were missing in the Stanford data. The dotted bar in 2024 indicates 2.4 (=12/5) times the end of May value.

54. Even though the long-term impact of generative AI cannot be predicted at this point, a few observations can be made at this early stage:

- **Generative AI workloads can be addressed by cloud, on-premises, and on-devices solutions.** While both on-premises and cloud solutions can run generative AI workloads on their own, some industry experts predict the future of AI deployment is likely to be a hybrid model, combining both on-premises and cloud solutions.[62] FMs are also increasingly being designed and developed specifically for use on mobile devices.[63] Examples include Apple Foundation Models[64], Google's Gemini Nano[65], and Samsung Gauss.[66]

62 https://medium.com/nerd-for-tech/the-next-big-thing-on-premise-ai-7ab216504eec
63 https://www.cnet.com/tech/mobile/on-device-ai-is-a-whole-new-way-of-experiencing-artificial-intelligence/
64 https://donmoon.medium.com/on-device-ai-apple-intelligence-533c4c6ed7d6
65 https://deepmind.google/technologies/gemini/nano/
66 https://developer.samsung.com/sdp/news/en/2023/11/28/samsung-developer-november-newsletter-samsung-electronics-reveals-the-samsung-gauss-generative-ai-model-and-other-latest-news

- **Generative AI is creating entry and expansion opportunities for all types of IT providers, whether they operate on-premises, in a hybrid setting, or in the cloud.** The growth of generative AI represents a demand surge for IT services, which usually goes hand in hand with opportunities for entry and expansion, as already discussed in Section 4.4. In response to the new opportunities provided by the rise of generative AI, a number of specialised cloud providers offering compute capacity for AI developers have already entered or expanded.[67] Oracle is a good example of an IT provider that has expanded its compute capacity for AI workloads, leveraging its recent datacentres that are optimised for the development of FMs.[68] Further, as mentioned in Section 3.1, traditional on-premises providers such as Dell, IBM, and HPE are also tailoring their service offerings to compete for AI customers. These investment decisions indicate intense dynamic competition on AI compute workloads. They also confirm that the increase in compute demand due to AI creates additional opportunities on the supply side for IT providers to invest and expand, further lowering barriers to entry and expansion.
- **Generative AI will drive continued innovation in IT services.** AI developers exert significant pressure on IT providers to innovate and keep pace with the latest generative AI services offered by other providers. In this context, on-premises providers and cloud providers alike must innovate in new product areas, differentiate their offerings based on quality and feature improvements, and enable interoperability between their own services and third-party services to meet demands from AI customers – or, as one industry expert put it: *"nearly every IT infrastructure and storage provider is looking to better serve enterprises for AI workloads."*[69]

5. COMPETITION IS LIKELY TO REMAIN INTENSE

55. The evolution of cloud services in Australia (see Section 4.3), and more generally the evolution of IT services over the last few decades, suggests that small and large IT providers can compete for and win workloads, and that different types of IT solutions will coexist. There is no indication that the provision of IT services is going to: (i) become less competitive over time, or (ii) that there will be large-scale consolidation. On the contrary, we see in Australia that small cloud providers have been able to grow faster than some of the large cloud providers, and that companies use various IT services and switch between those services.

56. Furthermore, core IT services like compute, storage, and database services do not have features that make them prone to "tipping", *i.e.*, shifting from a market with many providers to a market with only one provider that dominates the market.[70] The reasons why are as follows:

67 Examples include CoreWeave, FluidStack, Lambda Labs, Atturra, and Gcore.

68 https://www.wsj.com/tech/ai/oracles-missteps-in-cloud-computing-are-paying-dividends-in-ai-71f98980

69 https://www.techtarget.com/searchstorage/opinion/On-prem-storage-infrastructure-evolves-to-keep-pace-with-AI

70 See, for example, Ö Bedre-Defolie and R Nitsche, 'When Do Markets Tip? An Overview and Some Insights for Policy' (2020) 11(10) Journal of European Competition Law & Practice 610–22; Stigler Committee on Digital Platforms, Final Report, (2019).

- First and most importantly, core IT services are not characterised by strong **network effects**. There are no direct network effects because core IT services do not become more valuable to one customer because another customer is using them. This is different from social media, for example, where users directly benefit from their friends or family using the same service. There appear to be no meaningful indirect network effects either. Indirect network effects could arise with respect to the link between cloud customers – acting as buyers – on the one side and ISVs – acting as sellers – on the other side, with the cloud provider acting as a platform in between cloud customers and ISVs. However, ISVs typically offer their services on multiple cloud providers,[71] which implies that ISVs are generally not a differentiating factor when choosing between cloud providers. Moreover, there is no evidence to suggest that ISVs play an important role in customer choice of cloud providers, which would also be a prerequisite for indirect network effects to materialise. Taken together, this suggests that network effects are non-existent or too small to shape competition in any meaningful way.
- Second, insurmountable **"scale advantages"**, irrespective of whether they arise from network effects or more conventional economies of scale or any other factor, are not supported empirically. If there were scale advantages preventing small cloud providers from competing, we would expect to find that small cloud providers are unable to grow. However, the Australian IDC data reveals exactly the opposite: small cloud providers have been able to enter and expand and have been growing as fast or faster than large cloud providers (see Section 4.3).
- Last, most cloud customers **multi-home**, *i.e.*, use multiple providers at the same time. As discussed in Section 3.4, the empirical evidence suggests that three out of for cloud customers use a hybrid on-prem/cloud solution and a similar or even higher share of cloud customers use a multi-cloud solution. Only a minority of companies (at most 22-26%) single-home, i.e., use only one IT services provider, and an even smaller share (12-14%) uses a single cloud provider.[72] There is also no indication that the rate of multi-homing is going to decline in the future. On the contrary, innovations in cloud services, such as Containers and Kubernetes,[73] have made it easier for companies to use multiple providers. The fact that most cloud customers multi-home makes it easier for different IT providers (including cloud, hybrid, and on-premises providers) to coexist and compete for workloads. All else equal, this reduces the likelihood of tipping.

57. In summary, the empirically observed evolution of cloud services is consistent with effective dynamic competition. Further, a conceptual analysis of the relevant features of cloud services suggests that competition will not slow down and that large-scale consolidation or tipping is unlikely. Accordingly, competition is likely to remain intense.

---

71 For example, Crowdstrike, one of the larger ISVs, offers its cybersecurity platform Falcon on cloud providers such as AWS, Microsoft, Google, and Oracle, as well as on-premises, on Dell devices. According to IDC's 2023 CloudShare survey, only 17.2% of ISVs deploy applications exclusively on one cloud (https://www.idc.com/getdoc.jsp?containerId=US51465123).

72 Cockroach Labs (2024, survey in US+UK+DE, https://www.cockroachlabs.com/guides/thank-you?pdf=/pdf/the-state-of-multi-cloud.pdf). The 22-26% share is an upper bound because it includes companies that use only on-premises services, irrespective of whether they use one or multiple on-premises providers.

73 Containers are packages of application code together with dependencies (*e.g.*, specific versions of programming language runtimes and libraries required to run software services). They facilitate the sharing of CPU, memory, storage, and network resources at the operating systems level and allow for applications to be abstracted from the environment in which they actually run.
Kubernetes is an open-source container orchestration system. It assembles one or more computers, either virtual machines or bare metal, into a cluster which can run workloads in containers.