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Competition in the Provision of Cloud Computing Services – Note by Spain

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1. Introduction

1. The digitalization of the economy has led to the appearance of new markets and the transformation of traditional ones. In this context, the cloud computing services market has seen rapid expansion, driven by both established businesses migrating their computing needs to the cloud and a new wave of start-ups that operate entirely in the cloud.
2. Due to this rapid growth and its importance in the digital transformation process, the cloud services market has become the focus of several market studies and analyses, with the aim to better understand the market's competitive structure.
3. The Spanish National Markets and Competition Commission (CNMC) is actively involved in this initiative, conducting a study on the cloud services market with the aim of promoting competition. The study examines various structural, regulatory, and other factors that could influence the market's efficiency and competitiveness. Based on its findings, the CNMC intends to propose recommendations aimed at fostering a competitive environment, driving innovation, and ensuring a more efficient allocation of resources.
4. The aim of this contribution by the CNMC for the OECD Competition Committee is to address the topic of the Roundtable on "Competition in Cloud Computing Services". For this purpose, the following pages will proceed as follows: firstly, a definition of the cloud services market will be provided, highlighting its main characteristics. Secondly, the main challenges to competition in the cloud services market identified in the literature will be underlined. Finally, the key findings of the public consultation carried out by the CNMC as part of its cloud services market study will be presented.

2. The cloud services market

5. Although various definitions of cloud computing can be found in the literature, the most widely accepted is the one established by the National Institute of Standards and Technology (NIST): "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".
6. In this sense, cloud services are generally categorized into three main models:
 - Infrastructure as a Service (IaaS): This is the most basic layer, where the provider offers storage, processing, or networking services for running software. In this model, the infrastructure is managed by the cloud service provider.
 - Platform as a Service (PaaS): This layer goes beyond the capabilities of IaaS by allowing consumers to develop their own applications using tools and frameworks provided by the cloud service provider.
 - Software as a Service (SaaS): This is the most comprehensive layer, where the consumer is provided with fully developed applications that run on the cloud.
7. While cloud services in the IaaS layer tend to be more similar, there is a higher level of differentiation in the PaaS and SaaS layers, particularly in terms of innovation, sector specialization, and unique features.

8. What is more, three main ways of deploying cloud services are generally defined:
- Private cloud, in which the infrastructure is exclusively dedicated to a single user.
 - Public cloud, in which different users share the same infrastructure associated with cloud services.
 - Hybrid cloud, which is a combination of the above.
9. From the demand perspective, two types of cloud services end-users are identified:
- 'Native users,' referring to companies that have built all their systems and applications directly in the cloud from the beginning (typically start-ups or newly established businesses)
 - Users who originally hosted their systems on-premise, and have made the decision to move their workloads to the cloud
10. Regarding the regulation that applies to the cloud services market, although Spain lacks its own national regulation, it is worth highlighting the European regulation on digital markets, composed by:
- The Digital Services Act, effective from February 2024. Its main goal is to enhance the safety and reliability of online platforms and search engines, focusing on preventing illegal activities and combating misinformation.
 - Digital Markets Act, applicable from May 2023. This regulation sets out a series of prohibitions and general obligations for major digital service providers, known as "gatekeepers," who control access to key digital markets. Even though no "gatekeeper" has been designated for the cloud services market to date, there is an ongoing debate that revolves around the potential need to amend this regulation to allow the inclusion of cloud services.
 - The European Data Strategy, composed by the Data Act and the Governance Data Act, has the aim of allowing data to flow freely within the EU and across sectors for the benefit of businesses, researchers and public administrations.

3. Main challenges for competition in the cloud services market

11. Having exposed the main elements of the cloud services market, it is necessary to analyze the challenges to competition that may arise in this market. The literature that analyzes this issue highlights the existence of different barriers to competition, which are summarized in the following lines.

12. Firstly, it is worth highlighting a series of **characteristics intrinsic to the cloud services market**, which may limit the entry and expansion of new providers:

- High fixed costs, related to the investment required to deploy the infrastructure and the technology needed to provide these services. These fixed costs entail economies of scale, which foster high market concentration.
- Existence of economies of scope in the joint provision of several cloud services, which lead to the existence of large providers that are conglomerates.
- Network effects, so that the value of the cloud service to a user increases as the number of other users increases.

- Shortage of skilled workers with cloud technology knowledge. However, the demand for these professionals is increasing rapidly, intensifying competition for talent and driving up recruitment and retention costs.

13. Secondly, there are technical and cost constraints to switching providers, also known as **lock-in effects**. Very few companies switch cloud service providers once they have made their choice. This can be detrimental in that it can allow the main providers to increase their prices or lower their quality to their locked-in customers without losing them. What is more, these lock-in effects can also make it difficult for new entrants to compete in the market due to the difficulty of attracting locked-in firms. All these problems could also discourage innovation. Lack of user mobility could be a consequence of, among other factors:

- **Lack of interoperability and technical barriers:** the difficulty or impossibility of transferring data or software between cloud service providers limits the possibility of switching providers or using multiple providers (multicloud).
- **Closed ecosystems and vertical integration:** technical complexity, learning costs, and interoperability issues that can arise from using services from different providers encourage the decision to purchase cloud services from a single provider capable of offering solutions across multiple cloud layers.
- **Costs and operational difficulties in switching processes:** when switching from one cloud provider to another, there are several costs that can be encountered. There are direct costs linked to the migration of data, called egress fees, as well as other indirect costs, such as possible delays, service interruptions or other incidents.
- **The existence of different interfaces and technical differentiation:** different technical skills are needed to work with each of the clouds, which forces customers to acquire specific skills for each platform they wish to use.
- **Information problems and transparency limitations:** it can be complex to gather information on the costs, conditions and problems of migrating to another cloud, as well as to obtain information on the actual service conditions and prices of a new cloud service.

14. What is more, in this market it is common to find **offers to attract new customers** that are potentially structured to reinforce the lock-in effects defined. These entry offers may benefit users at the time of the initial purchase, but in the long term may also harm users and the level of competition.

15. Another barrier that could be found is the **discriminatory use of the group's own products** for competitive advantage. Large operators may gain advantages by offering other products, services or database management systems. These advantages could, in some cases, excessively or unjustifiably restrict competition, in particular in the case of large players and practices of: (i) bundling (discounts for using cloud and even non-cloud services from the same provider), (ii) introducing legal or technical obligations to use the software on the same provider's cloud and (iii) increasing costs to other cloud providers (for example, with increased software licensing requirements or more frequent updates).

16. Finally, **users' historical relations** with cloud providers are an important factor in their choice of a provider, which could reinforce the barriers described above.

4. Results of the CNMC's public consultation

17. As part of the study on the cloud services market, the CNMC carried out a public consultation in 2024, in order to gather information on the cloud market and the existing issues from the point of view of different stakeholders. The results of the public consultation confirm the preliminary diagnosis of the existence of challenges to competition in the cloud sector.

18. One of the questions posed to stakeholders was to expose the key drivers for the future growth of cloud services, among which digital transformation and business digitization, progress in the development of artificial intelligence, the strengthening of data security and cost optimization were highlighted.

19. Also, the responses to the public consultation show that the main elements that consumers take into account when choosing between providers are technical quality and availability of technical service, data security and historical relationships with the provider. Although the price of the service was frequently mentioned, it was not positioned as one of the dominant factors in the decision-making process.

20. Finally, the CNMC asked about the barriers and challenges to competition in this sector. In this sense, stakeholders underlined that the principal **entry barriers** to the cloud services market are the large costs of investments in infrastructure (higher for data center and IaaS providers) and in R&D (higher for PaaS and SaaS); (ii) shortage of qualified labor force and (iii) regulatory barriers, particularly concerning personal data legislation or the cybersecurity standards of different countries.

21. The answers also put the focus on the existence of **barriers to switching cloud providers and multicloud**, among which:

- **Interoperability issues**, affecting both the integration of applications across different cloud layers, as well as communication between applications within the same cloud layer.
- **Restrictions related to cloud providers' commercial policies**, such as discounts and bonuses in exchange for spending or commitment terms, with the loss of discounts or penalties for early termination of the contract.
- **Restrictions on the use of licenses** imposed by the provider.
- **Providers' failure to provide necessary information** to ensure applications interoperability.
- **High costs of migration** or maintaining a multicloud environment with multiple pricing schemes, cost control systems, and potential cybersecurity issues.
- Interoperability problems, for which many stakeholders are in favor of adopting **interoperability standards**. However, the answers also underline the existence of risks linked to this homogenization. Notably, the introduction of standards could lead to a negative impact on innovation, with lower incentives to innovate or the obsolescence of the adopted standard. In this sense, the main market operators appear to be divided on this matter, as some are in favor of standards, while others believe that there are no interoperability issues.
- **Lack of transparency** and unilateral changes in contractual terms, such as insufficient notice to reprogram applications, interruptions of the service, as well as the discontinuation of support services. Some responses have referred to the difficulty of predicting service costs, as they are based on usage metrics of IT

systems, which cannot be anticipated by users and require specialized cost management tools or outsourcing. It was also mentioned that the service catalogs of the cloud providers do not always provide information about which services are interconnected, making it difficult for users to anticipate which services they will need to purchase to meet a specific need.

22. Finally, it is worth mentioning that the public consultation also received responses that highlight the importance of monitoring other markets related to cloud services. In this sense, the **Artificial Intelligence** sector is underlined, as the growing use of AI and data analytics is driving the demand for cloud services that offer scalable processing and storage capabilities.

23. All in all, the public consultation has provided a broad perspective on the potential competitive challenges in the cloud services market in Spain, based on the views of different stakeholders, and serves as a foundation for the CNMC's market study.

5. Conclusion

24. In conclusion, given its rapid growth and relevance in the digital transformation process, the cloud services market has emerged as a central subject of numerous market studies and analyses. In this literature, several challenges to competition are usually underlined, such as high entry and expansion costs, difficulties in switching providers, and challenges related to multicloud.

25. The CNMC's ongoing market study aims to further explore these issues, identifying areas where market efficiency and competition can be improved. Based on its findings, the CNMC aims to deliver recommendations that will enhance competition, stimulate innovation, and optimize the allocation of resources.

26. The results of the public consultation confirm the preliminary diagnosis of the existence of challenges to competition in the cloud sector and lays valuable groundwork for the CNMC's market study.