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Artificial Intelligence, Data and Competition – Note by Austria

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More documents related to this discussion can be found at www.oecd.org/competition/artificial-intelligence-data-and-competition.htm

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1. Preliminary remarks

1. The purpose of this paper is to provide some preliminary views on selected aspects relevant to the discussion on 'Artificial Intelligence, data and competition'. In particular, this paper examines the increasing impact artificial intelligence ('AI') deployed by large, well-resourced companies from a competition point of view.

2. The rapid development of AI creates both opportunities and challenges for the competitive dynamics of the market. It is assumed that the major technology companies have all identified (or are in the process of identifying) and developing the areas where they see commercial opportunities. Potential competitive challenges of generative AI include barriers to entry, concerns about market concentration, abuse of market power, discriminatory practices, access to key data and algorithms, impact on interoperability and standards, and entry points into value chains.

3. Ensuring fair competition - similar concerns have also been discussed in the context of the Digital Markets Act (DMA) in relation to gatekeepers' Core Platform Services (CPS) - requires proactive monitoring and, where necessary, adaptable (ex-ante) regulatory approaches.[1]

2. Introduction

4. AI, including machine learning and related technologies, is transforming businesses across a wide range of industries.[2] Its ability to analyse large amounts of data, automate tasks and provide valuable insights can deliver significant benefits to large organisations. However, these benefits also raise competition concerns about the potential for AI to distort market forces and jeopardise fair competition.[3]

3. Challenges and findings

3.1. Data and integration

5. The key strengths of AI relate to its ability to process vast amounts of customer data, recognise patterns and (even) make business decisions.[4] In particular, Big Tech companies already have access to and/or have collected large amounts of data, giving them - more or less - a head start. It is likely that these large companies have already begun to

[1] See the AFCA submission on Virtual Worlds and Generative AI attached as Annex 1.

[2] Georgieva, AI Will Transform the Global Economy. Let's Make Sure It Benefits Humanity, IMF Blog, 14.01.2024, https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity.

[3] See footnote 2.

[4] Nahari/Bertsimas, External Data and AI Are Making Each Other More Valuable, Harvard Business Review, 26.02.024, https://hbr.org/2024/02/external-data-and-ai-are-making-each-other-more-valuable.

integrate advanced AI systems into their operations. Implementing these powerful AI technologies often requires significant investment. This could be considered as a significant barrier to entry for other companies.

3.2. Risk of market concentration

6. The AI-driven advantages of large companies, empowered by their data collection and financial resources, pose the risk of increasing market concentration. There is also the risk of abuse conduct in relation to generative AI, including limiting interoperability and controlling access to key data or algorithms.[5] This indicates that those sectors that rely heavily on generative AI could be particularly vulnerable.

3.3. Previous findings

- *Dominance of Big Tech in AI patent applications*: A small group of Big Tech companies are considered to be responsible for a disproportionate share of AI-related patents.[6] This indicates a high concentration and potential barriers to entry for smaller companies.[7]
- *Growing activity in AI*: The number of mergers and acquisitions between AI start-ups and established technology companies appears to have increased significantly.[8] This accelerates consolidation and may reduce competition over time.
- *Declining number of new entrants in technology-intensive markets*: In certain sectors where AI plays an important role, the number of successful new entrants has declined, suggesting that smaller companies may find it increasingly difficult to compete.

3.4. Tipping and the call for a more proactive approach

7. There is considerable potential for high first mover advantages, i.e. advantages for companies that are the first to introduce products to customers and/or the public. As a result, there could be also a higher risk of tipping (in the sense of monopolisation) and a high potential for lock-in effects with few opportunities for substitution.[9] It is therefore essential to address AI-related competition concerns at an early stage. In addition, it is crucial to assess the current competition law framework to ensure fair competition in the context of increasingly sophisticated AI technologies.

8. Moreover, in the coming years, it will be more important than ever to adapt investigative methods to both the increasing volumes of data and the new opportunities created by AI. For successful enforcement, it will be crucial to analyse the behaviour of

[5] See footnote 1.

[6] Fried, Exclusive: IBM tops list of AI-related patent applications, 05.02.2024, https://www.axios.com/2024/02/05/patent-applications-generative-ai-ibm-list.

[7] Federal Trade Commission, Generative AI Raises Competition Concerns, 29.06.2023, https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/06/generative-ai-raises-competition-concerns.

[8] John, Know 10 exciting mergers and acquisitions in the AI industry in 2022-23, 11.05.2023, https://wire19.com/ai-companies-mergers/.

[9] See footnote 1.

companies (both market participants and 'AI customers') and develop their own strategies and toolsets accordingly.

4. Conclusion

9. The impact of AI on competitive dynamics is a complex and rapidly evolving area. The AFCA highlights the urgent need to bridge the growing gap between large companies with enormous AI capabilities and smaller market players. Proactive enforcement, careful assessment of the regulatory framework, and consideration of both the potential and the risks of AI are critical to ensuring fair competition.

5. Recommendations

10. The following recommendations seek to address various aspects of AI not only from a competition perspective, but more generally from a (competition) policy perspective:

- ***International cooperation***: increased cooperation between competition authorities in different countries to share best practices and address cross-border issues related to AI.
- ***Guidelines and standards***: Develop clear guidelines or standards to promote transparency, accountability and non-discriminatory use of AI in the commercial environment.
- ***Maintain fair and open competition***: Ensure a level playing field for all market participants.

Annex 1

Competition in Virtual Worlds and Generative AI

Contribution by the Austrian Federal Competition Authority (*Bundeswettbewerbsbehörde*)

I. Introduction

As a national competition authority tasked with upholding and supporting fair and effective competition, the Austrian Federal Competition Authority ('**AFCA'**) is pleased to contribute to the European Commission's ('**EC'**) consultation on virtual worlds and generative AI. Addressing these new technologies and the potential effects on competition at an early stage - jointly with the EC - is not only of importance for the AFCA as a competition enforcer, but for Austria as a whole.

Virtual Worlds: a new frontier

Virtual worlds represent a rapidly growing area in which individuals (children and adults alike), companies and communities interact in digitally simulated environments. Depending on the dimensions of the immersive world, completely new areas of experience may emerge, enabling new forms of marketing and exchange. Market participants are increasingly embracing these virtual ecosystems, viewing them as new areas for economic activities and innovative services. However, the emergence of virtual worlds also raises significant questions regarding the dynamics of competition, consumer protection, privacy and data protection as well as maintaining a level playing field for companies of different sizes and types.

However, we will subsequently focus our contribution on the questions raised in the Call for Contribution on generative AI as this raises, in our view, the biggest questions for competition enforcers nowadays. Certain aspects of our contribution may irrespectively also be relevant for virtual worlds, given that these virtual worlds often concern the integration of different generative AI models for producing sound, 3D modelling of objects, etc.

Generative AI: changing possibilities

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Generative AI technology emerged with a bang a little over a year ago following the introduction of ChatGPT4 to the general public, enabling everybody to generate, adapt and respond to content in virtual environments. This transformative power holds enormous potential to enhance virtual experiences and revolutionize various sectors with far-reaching implications for competition, innovation and consumer welfare. The competitive principles that generative AI should take into account are also currently under discussion in other jurisdictions, e.g. in the United Kingdom with the Competition & Markets Authority's initial report on AI Foundation Models published in September 2023.[1]

Potential challenges of generative AI for competition include barriers to market entry, concerns related to market concentration, abuse of market power, discriminatory practices, access to important data and algorithms, impact on interoperability and standards, and entry points into value chains. Ensuring fair competition - similar concerns have also been discussed in the context of the Digital Markets Act (DMA) vis-à-vis the gatekeepers' core platform services (CPS) - requires proactive monitoring and, if necessary, adaptable (ex-ante) regulatory approaches. The AFCA welcomes an ambitious stance by the EC and further initiatives, such as nurturing the development of European data spaces.

As a national competition authority, we recognize the importance of a constructive forward-looking dialogue focused on competition concerns in the field of generative AI. Generative AI favours depending on the model a concentrated market. However, the downstream market - i.e., translating the technology into different business models - might contain countless innovators of various size. Those innovators could be large multinational companies with negotiation power, but also smaller ones, such as SME tech undertakings acting on a national or even regional level. It is certain that some disrupted and potentially tipped downstream markets are small. Thus, focusing on competition concerns on the downstream market and on issues like interoperability might be a priority for national competition agencies.

Subsequently, we focus on those questions, which we believe are primarily important for a competition enforcer.

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[1] See https://assets.publishing.service.gov.uk/media/650449e86771b90014fdab4c/Full_Non-Confidential_Report_PDFA.pdf (last accessed on 26/02/2024).

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II. Contribution to the questions on generative AI

Primarily, generative AI models are characterized by the fact that they are able to generate new data based on a large learning set of training data, distinguishing them from classic classification-based models (which identify and classify existing). Generative AI models learn the underlying patterns and structures of the training data, which are subsequently used to flexibly create new data sets. Generative AI models are therefore able to produce creative new outputs, e.g. in the areas of music, images and texts.

1) *What are the main components (i.e., inputs) necessary to build, train, deploy and distribute generative AI systems? Please explain the importance of these components.*

   From the AFCA's perspective, there are four main elements for generative AI:

   - Data
   - Technical know-how (human resources)
   - Computing power
   - Financial resources

(Large training sets of) data: Data is the basic prerequisite for generative AI models and its role in the generative AI value chain can be separated into three stages (see also figure 1):[2]

- *Foundation models*: Made by training a machine learning algorithm (called pre-training in this context) using huge datasets to produce a model that can be refined and used in many downstream applications.
- *Fine-tuned models*: Foundation models that are refined through additional training on a narrower set of use case specific data.
- *Grounded models*: Access to additional data sources, allowing the model access to information (e.g. real-time news) beyond the pre-training and fine-tuning data.

[2] HUNT, S., JIAN, W., MAWAR, A., and TABLANTE, B. (2023): YOU ARE WHAT YOU EAT: NURTURING DATA MARKETS TO SUSTAIN HEALTHY GENERATIVE AI INNOVATION in REGULATING GENERATIVE ARTIFICIAL INTELLIGENCE, TechREG Chronicle, Volume 1, September 2023, page 24.

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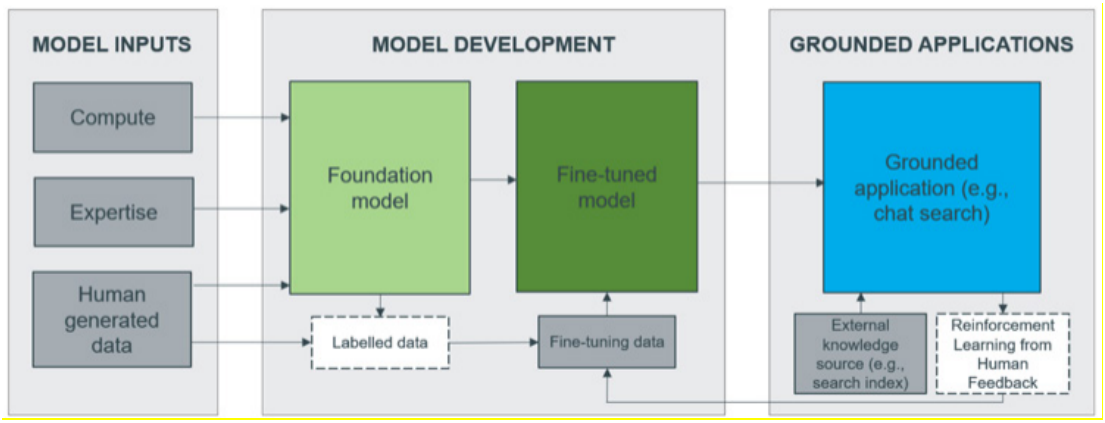
Figure 1: Value chain of generative AI applications



Source: TechREG Chronicle.

Larger and more flexible training sets of data lead to better and more reliable AI models (whether classifying or generative). The most important aspects include the quality of the data, its origin, intellectual property rights and data protection, timeliness, uniqueness, etc. For the development and training of generative AI models, data must therefore be available in high technical quality and reliability. Getting such data sets may also be a significant cost factor, if there is the need to procure or supplement the data externally. This will also be discussed in more detail in Question 7.

Technical expertise (human resources): Technical expertise for the development of AI models concerns all stages of the value chain and will generally require knowledge of data clearing, programming skills, mathematical knowledge, knowledge of neural networks and deep learning or evaluation and error analysis. Different types of skills and qualification are required, ranging from AI developers and data scientists to application programmers. For many of those areas, there is a considerable shortage of experts not only in Austria, but more general in Europe.

Computing power: Extremely high and powerful computing capacities are also an essential input for the development of generative AI models. These capacities are not only required in the various steps of creating AI models but also in training AI models to recognize patterns. Equally, they are relevant in the creation of synthetic data, in simulations and optimizations of the model as well as in the processing of human language. Generally, such computing capacities are provided by platforms (networks), scientific institutions, data centres or by purchasing cloud capacities. The easier it is to scale the computing capacities according to the given requirements, the lower the market entry barrier and the easier it will be for smaller companies to enter the development of generative AI or individual components (data acquisition, algorithm development, training, etc.). In this regard, the development of edge nodes, the broader roll-out of data

centres and the fact that more and more internal company services are also handled via cloud services have contributed to lowering barriers to market entry.

Financial resources: Several of the aforementioned aspects (data / technical expertise / computing power) require considerable financial resources. A lack of (sufficient) financial resources may therefore have negative effects on data collection or data cleansing, the training of generative AI models as well as the ongoing improvement and provision of computing power and thereby on the quality of the generative AI model itself.

We appreciate the numerous initiatives undertaken by the EC to reduce the above-mentioned barriers to entry, reaching from data initiatives (creating high value datasets, the creation of European data spaces, the data related regulations - like the Open Data Directive or the Data Act) to AI innovation packages particularly dedicated to support AI start-ups and SME with access to supercomputer power (AI Factories) and financial support. All these initiatives together with a coordinative and supportive infrastructure by the AI office, will help to reduce entry barriers and will thus contribute to the overall aim that (generative) AI markets should be fair and contestable. [3]

2) *What are the main barriers to entry and expansion for the provision, distribution or integration of generative AI systems and/or components, including AI models? Please indicate to which components they relate.*

Given our answer to Question 1, the AFCA believes that there is still a considerable risk that (very) large undertakings with sufficient (financial and data) resources will have a clear advantage in developing generative AI models. This, in turn, provides the risk of gatekeeping. Therefore, there is the need for high-quality public (non-proprietary) data sets, the development of data awareness and data culture in order to provide also smaller undertakings with the opportunity to be active in the development of generative AI or individual components thereof.

In addition, the possibility of access to high computing power will be essential. Furthermore, structural markets are needed allowing open and closed models to compete. Only in those situations where undertakings hold 'gatekeeper positions', for example, due to the specific market structure some form of regulatory intervention may be required to support or restore competition. A positive competitive outcome would ideally enable a large number of developers to develop competing open and closed

[3] https://digital-strategy.ec.europa.eu/en/news/commission-launches-ai-innovation-package-support-artificial-intelligence-startups-and-smes (last accessed on 26/02/2024).

generative AI models in parallel. The barriers to market entry should be low and access to the resources listed in Question 1 should exist or be supported.

Currently, the competitive situation is characterized by a juxtaposition of open and integrated/closed models, whereby in many areas large technology undertakings (BigTech) have a strong (and in some cases integrated) structure across several levels of the value chain.

There is a considerable potential for high first mover advantages, i.e. advantages for undertakings that are the first to introduce corresponding products to the customers and/or the public. These companies will be able to enter faster into 'improvement loops' for optimizing and adapting generative AI, thereby gaining a competitive advantage. Regularly, there is a high potential for up-scaling, which is characterized by a broad and heterogeneous customer structure enabling to generate high-quality data sets, and to contribute to the rapid improvement and fine-tuning of AI models or AI-based applications on basis of high-grade data sets. Such up-scaling opportunities have not only led to a technology capital market that was (and probably still is) geared towards start-ups of a certain size being acquired by large technology undertakings, but also led to digital-ecosystems being created by connecting services or sharing the user base (economies of scope and scale) of an already widespread service. This in turn has contributed significantly to the consolidation of market power. As a result, there is also a higher tipping risk (risk of monopoly formation) and a high potential for lock-in effects with few options for substitution. With regard to a possible regulatory approach, please refer to the AFCA's answers to Questions 11 and 12.

Barriers to market entry

Data and data availability are also of key importance. Initially, this topic is related to copy rights (e.g., the proceedings initiated by the Italian competition authority or the New York Times against ChatGPT), which may arise during data collection or training of an AI model. Some of the data is obtained from generally accessible (but still legally protected) public collections (e.g., from the internet), some data is purchased from third parties and originates from the provision of in-house services. In particular, access to the latter gives large digital service providers a significant competitive advantage.[4] The extent to which synthetic (i.e., artificially produced, e.g. with *Generative Adversarial Networks*) data may

[4] Insofar as public data (e.g., data scraping) is exhausted for the development of models, data that is not yet accessible but potentially accessible from the public sector, from private collections or from ongoing interaction becomes more important, especially for the fine tuning of models.

have a negative impact on the quality of generative AI models is still under discussion.[5] The fact is, however, that access to (new) data sets is a key driver for the creation and ongoing improvement (fine-tuning) of generative AI models. Undertakings that collect and process data from the use of their own applications/services etc. have therefore a clear advantage. Although having clear advantages from a competition perspective, they must ensure that data collection does not become an end in itself (misuse) and is always related to the provision of the actual service. Otherwise, there is a risk that excessive data collection may also violate competition law.[6]

The *Digital Markets Act*, the *Data Governance Act* and the *Data Act* contain a number of provisions relating to the procurement of and access to data. At this stage, it is not yet entirely clear to what extent these provisions will support a strong competitive environment, but it appears likely that large technology undertakings with over 100s of millions of users and corresponding data sets will have a clear competitive advantage, also in the creation of generative AI models. It may also by necessary to allow access to raw data, enabling also smaller undertakings to create higher levels of value creation (aggregation/structuring/data analysis and AI).

3) *What are the main drivers of competition (i.e., the elements that make a company a successful player) for the provision, distribution or integration of generative AI systems and/or components, including AI models?*

Initially, drivers of competition are entrepreneurial interests in a technology perceived to be particularly relevant for the future either in the improvement or integration of existing business models or in the development of new business areas. External growth by acquiring undertakings can also be observed, similarly as this had been observed in classic platform markets. Main drivers of competition are also the national or supranational (industrial) policies that are expected to provide competitive advantages to the economy and the society with the use/support of generative AI. Both can have an impact on the entire value chain of provision, distribution and integration.

As mentioned above, large undertakings may be interested in developing generative AI if generative AI (integration) can support their applications and/or business model. For example, OpenAI Five is an AI model that was developed for playing the video game Dota 2, and Mozilla has developed Deep Speech, an AI model for automatic speech recognition (speech to text). Undertakings with a strong position in various services may therefore have an incentive to develop generative AI for their respective applications (search

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5 Cf. CMA, *AI Foundation Models: Initial Report,* para. 3.19 et seq und 32 et seq.

6 CJEU 04.07.2023, C-252/21 - *Meta* vs *Bundeskartellamt.*

engine, social networks, etc.). The large number of platform services that already use generative AI (e.g., OpenAI Chat GPT in Bing - with corresponding capital participation from Microsoft or Microsoft 365 Copilot or Snapchat, which also relies on a ChatGPT-supported companion) shows, that generative AI models are often seen as the basis for the further development/integration of existing services.

The more integrated an undertaking is in terms of computing capacity, data availability, skilled personnel and capital, the more likely it is that all stages of the value chain of a generative AI model will be integrated into one and the same undertaking. However, individual services may also be developed separately requiring some form of harmonized interfaces and structures. Data could be purchased in individual cases as public or proprietary data, computing power can be purchased via data centres or cloud capacities, components of generative AI models or entire AI models can also be purchased, whereby the integration depends on the type of business model in question.

4) *Which competition issues will likely emerge for the provision, distribution or integration of generative AI systems and/or components, including AI models? Please indicate to which components they relate.*

In each stage (see Figure 1), data is a crucial production input; meaning that underdevelopment of data markets could hinder competition. Drivers of competition and competition concerns are two ways of looking at the same picture. The following issues are in particular of importance:[7]

- Insufficient supply is already a limiting factor in model development and data scarcity is expected to worsen as models massively expand in size.[8] Two factors exacerbate this issue. First and foremost, most generative AI models rely heavily on data scraped from the web, but data providers as it stands have limited incentives to make more data freely available online. The current growth rate of this data is too low to sustain large language model development. Second, it is difficult to form data markets for AI because data providers are often not aware whether their data (if any) is being used to train AI models or not, thereby facing challenges in assessing its value. This lack of transparency adds friction in the negotiations between major generative AI companies and data providers.

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[7] HUNT, S., JIAN, W., MAWAR, A., and TABLANTE, B. (2023): YOU ARE WHAT YOU EAT: NURTURING DATA MARKETS TO SUSTAIN HEALTHY GENERATIVE AI INNOVATION in REGULATING GENERATIVE ARTIFICIAL INTELLIGENCE, TechREG Chronicle, Volume 1, September 2023, page 24-25.

[8] Villalobos, P., Sevilla, J., Heim, L., Besiroglu, T., Hobbhahn M., and Ho, A. (2022): Will we run out of data? An analysis of the limits of scaling datasets in Machine Learning. arXiv preprint arXiv:2211.04325.

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- Smaller AI companies might lack resources or business connections to negotiate content deals with large data providers, limiting entry into the sector. Superior access to data could give some players a significant advantage. Moreover, when generative AI products directly improve from the data created by user interaction, there can be direct network effects.

There is also a knowledge gap between content creators and foundation model firms. If firms do not know if their content is being used or not, data value is even harder to estimate. Ultimately, this lack of visibility could lead to the following:[9]

- Content creators could increase or create barriers to sharing their data, e.g. by strict copyright protections or restrictive licensing agreements and/or charging access fees. Such reactions may reduce access to web content for consumers.
- Content owners may become reluctant to release new high-quality data. Insufficient information to price data could lead to valuable content being mispriced and inefficient use of content. This could lead to undersupply of content, thereby influencing the size and representativeness of AI training data.

Consequently, concerns relate to data scarcity, data transparency, network effects and unequal access to data, each of which can profoundly affect competitive dynamics. Making information at least partially available to some parties through transparency requirements, as the EU is proposing with the AI Act, is an important step. Other possibilities to nurture data markets could include monitoring for harmful exclusionary vertical agreements or requirements on data sharing.

Competition dynamics also shape the growth path of innovations. Learning from the past, most innovations take a long time to be widely adopted.[10] Hence, the impact on other markets will be - typical to a general-purpose technology such as generative AI - in waves of innovation. Thereby, AI will lead to incremental and disruptive innovation throughout the economy as more use cases are identified and AI itself improves. The main economic drivers from each wave might differ in importance, but a main aspect will be to which

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[9] HUNT, S., JIAN, W., MAWAR, A., and TABLANTE, B. (2023): YOU ARE WHAT YOU EAT: NURTURING DATA MARKETS TO SUSTAIN HEALTHY GENERATIVE AI INNOVATION in REGULATING GENERATIVE ARTIFICIAL INTELLIGENCE, TechREG Chronicle, Volume 1, September 2023, page 32.

[10] Earlier versions of AI technologies were already incorporated in diverse areas, such as healthcare, call centres, search engines, and e-commerce.

extent the creators of the foundational models provide relatively low-cost open access to their platforms.[11]

While the market for generative AI has economic features, which favour a rather concentrated market, the downstream impact - which translates the technology into different business models - might contain countless innovators of various size. Those innovators could be large companies with negotiation power acting on a global level. However, innovators could also be SMEs acting on a much smaller scale, let it be national or even regional. The competition implications on narrow downstream market, consisting of SME tech companies are very important when looking on competition concerns as a national competition agency.

The lack of information about data used for training also affects downstream markets for AI applications. Downstream, data transparency may facilitate the development of consumer safety standards and increase attention on potential consumer protection issues. Transparency requirements could also make at least some information available to regulators, content creators, other interested third parties, and researchers. It may help these parties bring to light potential consumer safety problems.[12]

In particular, the application on the downstream market might disrupt many competitive markets. Based on the familiar economic feature of implementing information technology in companies - high fixed cost and a relatively low marginal cost, this could lead to a tipping of many smaller markets.

Thus, key competition issues are:

- High barriers to market entry, e.g., financial resources, (large) data sets, computing power, lock-in effects, too few open models or models with only limited openness...)
- Potential for high first mover advantages
- High network effects and a corresponding tipping risk
- Dependence on the AI models of large companies in value creation
- Leveraging of market power

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[11] DAVID S. EVANS, D. S. (2023): SOME ECONOMIC ASPECTS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES AND THEIR EXPECTED SOCIAL VALUE in REGULATING GENERATIVE ARTIFICIAL INTELLIGENCE, TechREG Chronicle, Volume 1, September 2023, page 12.

[12] HUNT, S., JIAN, W., MAWAR, A., and TABLANTE, B. (2023): YOU ARE WHAT YOU EAT: NURTURING DATA MARKETS TO SUSTAIN HEALTHY GENERATIVE AI INNOVATION in REGULATING GENERATIVE ARTIFICIAL INTELLIGENCE, TechREG Chronicle, Volume 1, September 2023, page 32.

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- Foreclosure
- Bundling and tying
- Generative models can lead to a decline in innovative strength because companies invest less in their own developments. This could also have a detrimental effect on competitive diversity, for example due to reduced opportunities for differentiation.

Categorizing these competition issues - which are similar to those of traditional platforms (cf. the DMA, in particular provisions Art 5 and 6 DMA) - as outlined in this question:

- Provision *of generative AI models*: As stated above, the aforementioned barriers to entry are of relevance in this context. More accessible (public) data leads to more developed financial markets with risk capital, more open (existing) generative AI models, the easier it is to challenge the computing capacities necessary for scaling. Most importantly, high first mover advantages will be particularly relevant in the early stages of creating generative AI and, if necessary, the subsequent further development. These factors may be less relevant, if (large) data sets, codes and/or interfaces are widely available, i.e., enabling that third parties may also use systems or subcomponents. This would have a positive effect on the downstream stages of distribution and integration.
- However, l*ock-in effects* can also arise in case of integration of generative AI models in other services or an existing portfolio of services. Undertakings that base their services on generative AI models from large providers may become dependent on generative AI (and its development) in the control or design of their products. This can have a negative impact on competition and innovative strength. The more open a generative AI model is, the lower the probability of a lock-in at this level. Other key factors for lock-in effects may also be the time at which a generative AI is available for distribution and use. If generative AI is integrated into services (such as social networks, conversations, etc.) through virtual or augmented reality, for example, the lock-in effects are likely to be correspondingly higher. Therefore, lock-in effects are also strongly related to the time of market entry and adoption. Conversely, high lock-in effects make it more difficult for new providers to bring their possibly even better products to a company.
- *Foreclosure*: Relevant tools might be chips, computational capacity provided by (competing) cloud services provider etc.
- *Leveraging of market power*: From the AFCA's point of view, the transfer of market power can be relevant in distribution, but also in the context of integration. This raises questions of access, suitable interfaces, system compatibility or the possibility of transferring the existing customer base or the advantages of high data volumes

to new services and markets in the specific form of generative AI in a service offering. Further aspects are addressed below.

5) *How will generative AI systems and/or components, including AI models likely be monetised, and which components will likely capture most of this monetization?*

The monetization of generative AI systems will initially depend on the type of model. Open models can be financed via license fees for the entire model or for individual components. Alternatively, monetization may also be influenced depending on the area the generative AI model is used in. Besides, also licensing options, indirect financing (via advertising), via shareholdings, etc. are an option. Finally, developing a generic AI model to such an extent that it can be taken over by another undertaking may also qualify as a form of financing/monetization.

The monetization of closed models (for the term, see the answer to Question 6) depends on the developing company itself. It can, for example, consist of gaining competitive advantages in one's own product range (at app level) and thus monetizing directly via the end customer side, but it can just as well consist of access and marketing (licensing) of individual components (e.g., via APIs). This, in turn, can be structured in different ways and provide for conditions or restrictions, include a lump sum or be structured according to intensity of use. Closed models also entail higher risks of price abuses if they become widespread and dependencies arise.

6) *Do open-source generative AI systems and/or components, including AI models compete effectively with proprietary AI generative systems and/or components? Please elaborate on your answer.*

Depending on the degree of openness, open-source generative AI models/systems offer the following typical characteristics:

- Accessibility
- transparency
- Adaptability
- Acceptance

Ideally, open-source extends to the software code, i.e., the algorithm, structure and parameters of the model itself are accessible. Generally, open systems are not subject to any copyright restrictions in terms of use, redistribution or changes. Besides, open systems also allow the developer community to access and improve (e.g., fix errors, add

new functions/components) the respective AI model and might lead to broader commercial use.

De facto there are a large number of open-source models that are restricted in various aspects, especially in terms of commercialization and/or licensing, and are often only open-source to the extent that a trained basic model is available. Disadvantages of open-source models often relate to lack of quality, insufficient optimization (which can lead to lower performance) or incompatibilities (e.g., between different versions).[13]

In contrast, closed models offer less transparency and information about the characteristics of the model. Use is generally restricted and optimized for a specific purpose and access for third parties is often only possible via controlled interfaces. Innovation based on a closed model is therefore more controlled and restricted. Closed models are often developed by large platforms and are based on sensitive and/or personal data that is at risk of misuse. Closed AI systems can be better adapted for specific purposes, offer better protection of intellectual property (no free riders) and may also be associated with greater security or integrity.[14]

At present, open and closed AI models appear to be widespread and competing with each other. From a competitive perspective, in particular open generative AI models should be available in order to facilitate innovation and reduce market entry barriers. Open models seem particularly interesting for Europe, which has no corresponding (integrated) gatekeepers in the digital sector. The public sector could also play a steering role here in the areas of European Data Spaces and the generative AI models based on them (or to be created) in favour of open systems, various business models and more competition.

7) What is the role of data and what are its relevant characteristics for the provision of generative AI systems and/or components, including AI models?

The usability of data (and its characteristics) is a crucial prerequisite for the development of generative AI. Unlike other commodities, data does not perish with use but often contributes to the creation of new data and insights. For this reason, an open data policy within the boundaries set by the GDPR and copyright laws is commendable. The European

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[13] The FTC in its technology blog from June 29th 2023 also mentions the strategy of open first and closed later, that is based on lock-in effects. https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/06/generative-ai-raises-competition-concerns

[14] For fundamental considerations between open and closed models, please refer. CMA/Autorité de la Concurrence: The economics of open and closed systems. 12/2014. https://assets.publishing.service.gov.uk/media/5a75c284e5274a545822e01a/The_economics_of_open_and_closed_systems.pdf

data policy within the framework of the Digital Decade until 2030 takes these peculiarities into account while fully preserving the high standards of European data protection.

As mentioned, the creation of a generative AI model requires very large data sets to train the model and recognize relevant patterns and rules. The diversity of data may also contribute to the improvement of the model's quality. In general, the quality of generic AI results will depend on the quality of data input. Relevant dimensions of quality include completeness (e.g., of attributes), accuracy (no errors, description of reality), relevance (for the purpose), uniqueness (e.g., no duplication of data), timeliness (e.g., risk of misinterpretation, recognizing current trends), consistency (within a dataset, outliers, etc.), description Interaction data, especially those arising from the interaction of humans or machines with AI systems (searches, clicks, likes, etc.), can be particularly significant. Their importance lies mainly in the training phase, where they aid in identifying patterns and structures based on recognizable preferences, needs, usage intensities, etc.

Regarding data availability, relevant European initiatives should be noted (see also the answer to Question 1). This includes the European Data Strategy from 2020, [15]relevant acts of the European Union (such as the Open Data Directive, Data Governance Act (DGA), the Data Act or the High Value Dataset that has to be implemented by Member States by June, 9th, 2024) and the intention to create ten European data spaces and accompanying data support centres. The AFCA considers it crucial to make public sector data available for the development of AI and value creation, as envisioned by the DGA. The joint initiative to create European data spaces in various areas (e.g., health, public administration, energy, finance, mobility, green deal) with varying degrees of influence from the public sector also offers the national opportunity to contribute public sector data and collaborate on the development of generative AI models and their acceptance in the public domain. Moreover, this could help reduce a significant cost factor – data acquisition and data quality – for the development of generative AI. The AFCA, as a competition authority advocating for open markets and the removal of access barriers, also welcomes the competitive impulses expected from the availability of non-personal data through the Data Act.

8) *What is the role of interoperability in the provision of generative AI systems and/or components, including AI models? Is the lack of interoperability between components a risk to effective competition?*

[15] COM(2020) 66 final; SWD(2024) 21 final (Commission staff Working Document on common European Data paces)

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The answer to this question should be preceded by the acknowledgment that interoperability can, in principle, contribute to effective competition. However, it may also be associated with potential disadvantages in terms of innovations and quality. [16] The economic benefits linked to interoperability primarily stem from network effects, contestability of market power, and the reduction of market entry barriers. These are crucial aspects necessary for breaking down dominant market positions. Recently, interoperability has been introduced, for instance, through Art 7 DMA for Non-Internet Interoperable Communication Services (NI-ICS) provided by gatekeepers. Besides, certain interoperability obligations to facilitate switching between different computing services (originally cloud services) are also envisaged within the framework of the Data Act (concept of functional equivalence).[17]

In the following, interoperability is to be understood as the capability of components or systems to exchange data with each other or interact in some other form. Interoperability in this sense is not necessarily bilateral, unlike the interoperability outlined in Art 7 DMA. It may also involve unilateral access, where one side merely provides or receives information. From the perspective of the AFCA, the concept of interoperability in the context of generative AI systems involves the following aspects:

- *Interoperability at the data level*: This pertains to the integration and harmonization of data from different sources to achieve meaningful results. One way to ensure or support interoperability is through the use of standardized data formats, such as CSV or JSON.
- *Interoperability at the level of AI models*: Generative AI models should potentially be able to provide their functionality in various systems. This is particularly relevant, for example, as a requirement for virtual worlds. From the AFCA's perspective, similar advantages apply at the level of system components as interoperability enables the outsourcing, allocation or integration of individual components, contributing to specialization and the reduction of market entry barriers.
- *Interfaces (APIs):* If these interfaces are standardized, they can facilitate faster and more cost-effective development by assembling different components from various development environments. To support interoperability, unified frameworks such as TensorFlow or Keras can be utilized.

  From the perspective of the AFCA, open systems are particularly advantageous for economies with predominantly small and medium-sized structures (without large digital tech corporations) and should potentially be supported through

[16] Op.cit.ref.1

[17] REGULATION (EU) 2023/2854 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Section 6.

various policy approaches. According to the AFCA, backing open systems implies supporting interoperability in order to facilitate collaborative development, cooperation, and the use of open generative models.

9) *Do the vertically integrated companies, which provide several components along the value chain of generative AI systems (including user facing applications and plug-ins), enjoy an advantage compared to other companies? Please elaborate on your answer.*

From the perspective of the AFCA, such advantages do indeed exist. Control over the value-added level not only provides the opportunity for flexible monetization, but integration also offers advantages in terms of optimizing and advancing models when there is a corresponding user base at the application level or through integrated add-ons/plugins. This can be used for the differentiation of AI models or for improvement. Feedback data, looped back through integration from application areas to the generative model, enhances the model's quality and makes it adaptable to the current circumstances and developments. This is a crucial factor that other companies lacking a corresponding customer base or ecosystem of services may not have. It should be noted that gatekeepers are restricted in the use of data by Art 5 (2) DMA.

Integrated companies may also need to make balancing decisions between time-to-market on one hand and the definition or assurance of individual interchangeable components on the other. In cases where interoperability needs to be "rebuilt" after the development of a generative AI model, coordination and openness become more challenging. Often, interfaces, protocols, and definitions will need to align with the possibilities provided by a market-leading integrated model.

10) *What is the rationale of the investments and/or acquisitions of large companies in small providers of generative AI systems and/or components, including AI models? How will they affect competition?*

The incentives for large companies to invest in or acquire small companies in the field of generative AI systems may vary; potential reasons include:

- *Acquisition of innovators/innovations or know-how*: when dealing with specialized companies that are not on the verge of an immediate market breakthrough, acquiring complete control over the company may in many cases be the preferred option. In situations where a smaller specialized company has its own resources for further development and may be on the brink of a market breakthrough, larger companies may only be able to acquire relevant stakes. Therefore, acquisitions that

facilitate the desired transfer of know-how or the integration of individual components into self-provided applications (e.g., Microsoft – Chat GPT, Google - Anthropic), can achieve other goals as well.

- *Accelerating development*: If a smaller, specialized company possesses relevant know-how, the internal provision of which would incur high development costs or take a longer time, external acquisition may be the preferred solution.
- *Lessening of competition*: In discussions in the context of the obligation under the DMA to notify any acquisition by gatekeepers to the European Commission, the argument of acquiring potential future competitors and thus the loss of competition has been central. This argument also seems plausible in the given context.
- *Gaining access to new markets*: Finally, the acquisition or securing of significant influence over a small company in the field of generative AI models may also be determined by the intention to gain access to new markets, explore new target groups, or improve ties with existing customer groups.

11) Do you expect the emergence of generative AI systems and/or components, including AI models to trigger the need to adapt EU legal antitrust concepts?

There is a considerable likelihood that generative AI systems and/or components emerge which might be difficult to capture with current EU (and national) legal antitrust concepts. *Stucker/Ezrachi* discussed this already in 2017 in their scenarios/categories called *Predictable Agent* and *Digital Eye*.[18] While there are already challenges for competition enforcement in the *Predicable Agent* scenario, those challenges increase and might be difficult to address by competition enforcers in *Digital Eye* scenarios. In the latter scenario, competitors unilaterally create and use AI to achieve a given target, such as profit maximization. The AI itself, through self-learning and experiment, independently determines the optimal strategy/behaviour to optimize profits which may also result in some form of collusion. While the lack of safeguards in the respective AI model against illegal behaviour (e.g., price fixing) may still be addressed by current EU (and national) legal antitrust concepts, the possible detachment between actions of the AI and its human designers and operators may still lead to situations which may potentially not be caught by current competition rules.[19]

In addition, it should be noted that the AI Act, in addition to the general obligations that apply to AI overall and for the individual risk levels of AI (and therefore also for generative

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18 *Stucker/Ezrachi*, Artificial Intelligence & Collusion: When Computers Inhibit Competition (2017), UTK Law Faculty Publications, 1775 et seqq.

19 See inter alia *Stucker/Ezrachi*, Artificial Intelligence & Collusion: When Computers Inhibit Competition (2017), UTK Law Faculty Publications, 1789 et seqq.

AI systems), also provides specific regulations for generative AI. Accordingly, it must be ensured that the system is designed and developed to inform individuals interacting that they are engaging with an AI system. Additionally, generative AI models must be trained to provide adequate protection against the creation of content that contradicts European law. Furthermore, a sufficiently detailed proof must be provided that the training data also comply with intellectual property rights standards and provisions.

In the draft final version of the AI-Act, Art 59 AI Act (Draft; 21.01.2024), on the designation of national competent authorities and single point of contacts states *inter alia*:

(1) *National competent authorities shall be established or designated by each Member State for the purpose of ensuring the application and implementation of this Regulation. National competent authorities shall be organised so as to safeguard the objectivity and impartiality of their activities and tasks*.

(2) *Each Member State shall designate a national supervisory authority among the national competent authorities. The national supervisory authority shall act as notifying authority and market surveillance authority unless a Member State has organisational and administrative reasons to designate more than one authority.*

Subsequently, in Art 63 AI Act (Draft) - Market surveillance and control of AI systems in the Union market states in paragraph (2) that the national supervisory authority shall report to the European Commission on a regular basis the outcomes of relevant market surveillance activities. The national supervisory authority shall report, without delay, to the European Commission and relevant national competition authorities any information identified in the course of market surveillance activities that may be of potential interest for the application of Union law on competition rules.

Since the AFCA has already several years of experiences with AI in data forensics and vast experience in the analysis of markets, it regards itself as a very well suited candidate to become the national supervisory authority for AI. However this is a political decision that needs to be taken in the months to come. However, in any case it is important that the AFCA - as national competition authority - receives any and all information that may have an impact on competition and has a strong institutional voice. It is only on this basis that the numerous challenges to competition stemming from AI can be adequately addressed.

As for a fundamental reform of competition law, a last major initiative was made with the idea of creating a new competition tool by the European Commission in the initial

consultation, which later materialized into the DSA and DMA. The options for the development of competition law presented there still have relevance and have been partly implemented in individual jurisdictions through national regulations (such as in Germany with the 10th and 11th GWB amendments). However, for the current issue of generative AI systems, we cannot identify a direct contribution from these previously discussed approaches. In its current assessment, the AFCA assumes that the DMA, as an ex-ante regulation, has its justification alongside traditional competition law and can make a corresponding contribution to some of the competition-related issues under discussion here.

This is due to the following considerations: The DMA is an open system concerning the services it includes, addressing Core Platform Services (CPS) of digital gatekeepers with European significance and strong network or tipping effects that make market positions difficult to contest. In principle, the provision of generative AI models could meet these requirements. Indeed, a significant part of those gatekeepers already holds a special position in the currently defined CPS, playing a driving role in the development of generative AI models. Generally, they possess a considerable amount and diversity of data from providing their services to customers, which is already being used for commercializing or improving their products/services and allows for ongoing adaptation of the models to new circumstances. These are major tech companies such as Alphabet, Amazon, Apple, ByteDance, Meta, Microsoft, which have both the expertise and the capital, computing capacity, and corresponding capacities in development. [20] In fact, these companies are heavily involved in the development of generative AI models and virtual worlds (through investments or proprietary developments). For instance, Google has developed several models, including the DeepDream model for images or the WaveNet model that generates speech.

However, at present, this does not necessarily mean that generative AI models are subject to regulation or should be regulated. The fact is, wherever generative models are deployed within existing CPS, they are subject to regulation under the provisions of Art 5, 6 DMA. Thus, it wouldn't be the generative AI models themselves subjected to regulation, but rather the applications for which they are used.

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[20] For instance, the CMA also states in their document "AI Foundation Models Review: Short Version," in section 1.18, the following: "Several FM developers, such as Microsoft, Amazon and Google, own key infrastructure for producing for producing and distributing FMs such as data centres, servers and repositories. Those firms also have a presence in a range of user-facing markets where FM technology can be integrated, from online shopping, search, through the supply of software, so they have links across several parts of the value chain."

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In principle, from the perspective of the AFCA, it is also conceivable to include generative AI models per se – such as image or language models – in the list of Core Platform Services according to Art 2 (2) DMA.

12) *Do you expect the emergence of generative AI systems to trigger the need to adapt EU antitrust investigation tools and practices?*

As outlined in the response to Question 11, the instruments for enforcing competition law objectives and rules must be adapted to the specific circumstances. Challenges for the enforcement of competition law may include the fact that AI models are capable of recognizing patterns and could contribute to better market coordination. Companies might use this technology to collude, create fake reviews or content to discredit competitors or mislead consumers, thereby affecting fair competition. To better address these developments, competition law enforcement will also need to explore new approaches based on technologies such as machine learning, digital signatures as well as the development of generative AI, to monitor the use of generative AI models, prevent abuse, and detect manipulations.

Given the potential for generative AI models to be used for anticompetitive behaviour or to impact fair competition, AI models should also ensure compliance with certain competition rules. The UK Competition and Markets Authority (CMA) has proposed the following guiding principles (which are also endorsed by the AFCA):

- *Responsibility*: Developers and providers of generative AI models are responsible for the results provided to consumers.
- *Access*: Permanent access to key data without unnecessary restrictions that would affect the efficiency and effectiveness of third-party use of the system.
- *Diversity*: Sustainable diversity of business models, both open and closed.
- *Choice*: Sufficient choice for companies to decide how generative AI models can be used.
- *Flexibility*: Flexibility to switch between multiple generative AI models and/or use multiple models simultaneously as needed.
- *Fair Treatment*: No anticompetitive behaviour, including anticompetitive self-preference, tying, or bundling.
- *Transparency*: Consumers and companies must be informed about the risks and limitations of generated content to make informed decisions.