



Effective Enforceability of EU Competition Law Under AI Development Scenarios

a Framework for Anticipatory Governance

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ABSTRACT

This paper examines whether competition law enforcement can remain effective under different AI development scenarios over the coming years. Economic and political power has become increasingly concentrated into a few AI companies, such as Big Tech. The growth of generative AI could further reinforce this concentration of power in Big Tech. The market power of these companies, and increasingly their involvement in AI, is a major focus for regulators such as the European Commission. Recent EU antitrust fines on Google alone run in the billions. The dynamism of technology markets such as AI can make it difficult for regulators to take effective action. If AI continues to develop rapidly over the coming years, propelled by the proliferation of generative AI, this ability to effectively enforce antitrust law may be further challenged. To help ensure regulators remain effective, EU competition law has been bolstered by a new tech-tailored, ex ante competition regime. These are likely to be critical tools to shape the market power of Big Tech but are largely untested. Exploring how these regulatory tools can be most effective in governing future AI development is a timely question for regulators, lawyers, companies, and citizens. This paper examines this question by considering the ‘effective enforceability’ of EU competition law and the Digital Markets Act under different AI development scenarios. By ‘effective enforceability’ of EU competition law we mean how well it achieves its policy objectives. We consider four factors: jurisdictional scope, potential loopholes, effectiveness of detection, and ability to remedy/sanction breaches. However, there is significant uncertainty as to how AI will develop in the coming years. Considering this, we propose an analytical framework based on five variables: key inputs, speed of development, AI capability, number of actors, and the nature/relationship of actors. In some of these scenarios, we argue EU competition law would struggle to address the power of the largest AI companies; but in many other scenarios it remains a powerful tool. This is a critical juncture for competition regulators. They stand at the dawn of emerging challenges presented by generative AI. With this paper, we hope to contribute to anticipatory

governance at this important intersection of legal governance and technology.

Effective and future-proof competition law enforcement is crucial to ensuring this potentially transformative technology has widely distributed benefits, rather than concentrating power in a few hands.

CCS CONCEPTS

• **Computing methodologies** Artificial intelligence;; • **Social and professional topics** Computing / technology policy; Commerce policy; Antitrust and competition.;

KEYWORDS

Antitrust, competition law, anticipatory governance, AI development scenarios

ACM Reference Format:

Shin-Shin Hua and Haydn Belfield. 2023. Effective Enforceability of EU Competition Law Under AI Development Scenarios: a Framework for Anticipatory Governance. In *AAAI/ACM Conference on AI, Ethics, and Society (AI/ES '23)*, August 08–10, 2023, Montréal, QC, Canada. ACM, New York, NY, USA, 10 pages. <https://doi.org/10.1145/3600211.3604694>

1 INTRODUCTION

Competition law (also known as antitrust) is a key tool to govern concentration of economic power to ensure the market functions competitively for the benefit of consumers and citizens. However, competition law enforcement may be profoundly challenged by progress in developing artificial intelligence (AI) and the proliferation of generative AI systems [1], [2]. The most prominent generative AI system, ChatGPT, shows how their spread can be rapid and their potential impact could be immense. An ongoing challenge is how regulators best keep up with these developments.

The scope of this paper focuses on the European Union (EU) competition regime and how that regime may apply to different AI development and deployment scenarios. We start by providing a brief overview of EU competition law principles and why it is likely to be enforceable against entities that are most likely to develop AI in future. In the substantive part of the paper, we consider the extent to which competition law is enforceable across (2) different AI development and deployment scenarios. We define ‘AI’ as digital systems that can performing tasks commonly thought to require intelligence, with these tasks typically learned via data and/or experience. ‘AI systems’ refer to a software process (with the characteristics of AI mentioned above), running on physical

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AI/ES '23, August 08–10, 2023, Montréal, QC, Canada
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ACM ISBN 979-8-4007-0231-0/23/08.
<https://doi.org/10.1145/3600211.3604694>

hardware, under the direction of humans operating in some institutional context [3, pp. 4 and 62]. Generative AI is a category of AI system that uses machine learning that generates a wide range of output (images, text, audio) based on data it was trained on. Their USP is their adaptability to a wide range of tasks.

We seek to contribute to the literature in three main ways. First, this paper focuses on the ‘effective enforceability’ of competition law to future AI development and deployment under different scenarios. Competition law is likely to be an important instrument (and perhaps the most important regulatory tool) in shaping the behaviour of ‘AI actors’: those that develop and deploy AI systems. However, effective enforceability is already challenging, and may become harder: in certain AI development scenarios – it may be harder for regulators to detect and sanction breaches. While we use EU competition law as our focus (looking at abuse of dominance, merger control, state aid and anti-competitive agreements), EU competition law has jurisdiction over foreign companies that are active in the EU, such as US Big Tech (indeed these companies have been the focus on EU competition law enforcement in recent years). Also, most of our analysis can apply to US antitrust [4]. Moreover, we envisage that our findings around the enforceability of competition law can also be extrapolated to the question of enforceability of law and regulation more broadly.

Second, we outline different scenarios for analysing AI development and deployment in future, based on a number of technical and strategic variables. In previous literature, scenario-mapping has focused on a more limited set of variables relating to technical model or number of developers [5, p. 170]. We envisage this will offer a nuanced framework of analysis for anticipatory governance more broadly.

Third, we intend our legal analysis of the implications of the effective enforceability of competition law to be useful for ‘AI governance’: the broad field that attempts to ensure systems are developed and deployed ethically, safely, securely and with broadly distributed benefits – in a word, ‘responsibly’ [6], [7]. Both the synergies and tensions between AI governance and competition law are potentially significant, yet currently underexplored [8], [9]. This memo builds on work at this intersection [10], [11]. We hope that this will be useful to both fields, and indeed encourage collaboration across these fields.

By identifying the areas where competition law enforcement may be less effective, we hope to contribute to anticipatory governance and help make competition law more ‘future-proof’. This is essential to ensure that enforcement can keep up with complex and fast-moving technologies such as generative AI. Effective competition law enforcement, now and in future, is crucial to ensuring the benefits of this transformative technology are widely distributed.

2 FRAMEWORK OF LEGAL ANALYSIS

2.1 ‘Effective enforceability’ of Competition Law

‘Effective enforceability’ is a term that we introduce to refer to how effective competition law is in achieving its objectives. In relation to EU competition law, that objective as set out in the Treaty on the Functioning of the European Union (TFEU) is to prevent restrictions on and distortions of competition in the internal market [12]. The four main areas of competition law that may apply across

our AI scenarios include abuse of dominance, merger regulation, collusion/cartel, and state aid.

Effective enforceability can depend on a wide variety of factors. For present purposes, we will focus on the following: (1) whether the conduct in question falls within the jurisdictional scope of competition law and is not protected by sovereign immunity rules, for example; (2) if the law is written and applied by the courts in a way that is in line with the legislators’ intentions. An example of where the law is not aligned with legislator’s intentions is where behaviour that a legislator would have intended to be a breach slips ‘through the net’ due to the presence of a lacuna, ambiguity or loophole in the rules [13], [14], or laws that fail to keep up with market developments and therefore end up being too lax/too strict in light of changes [15], [16]; (3) regulators have the independence and the resources and expertise to effectively detect and bring a case against the breach (this may involve monitoring behaviour and assessing the market power of companies) [17, pp. 34–47], [18, p. 10]; and (4) competition law can effectively remedy and sanction the breach in a way that addresses the harm. In other words, whether competition law can restore competition in the market and change behaviour, both by punishing the company that breached the rules, and deterring others from unlawful behaviour [18].

2.2 Development Scenarios

The trajectory that AI development and deployment will take in the coming years is highly uncertain. Generative AI seems to have transformed the AI landscape in just a few months and its full impact is still difficult to predict. There is little agreement about the key input into AI development, the future speed of development, what levels of capability we will reach, the number and nature of the key ‘AI actors’ or the geopolitical environment they will operate in.

Nevertheless, we can draw from techniques which have been well-developed since the 1970s in futures, long-range technological forecasting, and scenario-planning and -mapping [5], [19], [20], [21, pp. 443–464], [22]. We can capture our uncertainty on particular dimensions in a set of variables. Each of these variables can have several possible values and lie on a spectrum. When we assign values to each of these variables, we can describe particular scenarios for future AI development.

Our five variables are grouped into technical variables, which relate to the technical features of the AI systems and non-technical variables, which relate to factors beyond the AI systems themselves: the number of developers, who those actors are and the geopolitical context they operate within

We expand upon each of these variables below. For each variable, we first describe the spectrum, and second consider the ‘effective enforceability’ of competition law across its spectrum. Our analysis depends on simplified hypothetical scenarios, where the variables change but everything else is kept constant. Of course this does not reflect complex market realities and competition analysis is very fact-specific and will depend on the particular legal and economic context in each particular case. Therefore, our analysis is necessarily based on a number of assumptions, but nevertheless draws out some informative high-level themes and ‘direction of travel’. They are

Table 1: Effective enforceability of competition law across five variables

Type	Variable	Less Enforceable	More Enforceable
Technical	Key inputs	Talent and Data	Compute
Technical	Speed of development	Fast progress	Incremental progress
Technical	Capability	Higher capability	Lower capability Non-Technical
Non-Technical	Number of actors	More actors	Fewer actors
Non-Technical	Nature and relationship	States and ‘shielding scenarios’	Private actors and ‘weaponising scenarios’

not and should not be treated as detailed forecasts. In summary, our findings are as follows:

3 JURISDICTIONAL REACH AND ENFORCEMENT POWERS OF THE EU COMPETITION REGIME

EU competition law is a powerful tool today in shaping market behaviour, particularly in the technology sector. In a world being transformed by AI, EU competition law is also likely to be a powerful tool. There are several reasons for this.

Competition law has wide jurisdictional reach and applies to any company that has an effect within the EU, regardless of whether it is incorporated in the EU or not [23]. The European Commission (or EC, the EU-wide regulator that enforces and EU competition law) is institutionally strong, influential and well-resourced, and often seen as a world-leader in influencing competition law globally [24]. Its strong procedural and investigative powers allow it to effectively detect and evidence an infringement, as well as to impose fines and remedies to change behaviour and market structures.

Competition law also has a long history of being used for political or industrial strategy purposes. For example, in the EU, the clearest political influence on competition policy is single market integration, which is one of the aims in the TFEU. Competition law plays an essential part in breaking down internal barriers to trade within the EU and ensuring the freedom of movement of goods, services, workers and capital [25, Para. 7]. Given its prominent role in pursuing the objectives of the EU, the Commission holds significant influence within the overall EU apparatus and has real ‘teeth’ in enforcing competition law [26].

Importantly for looking at governance of AI companies, in November 2022 the EU passed the Digital Markets Act (DMA), an *ex ante* regulatory regime for markets dominated by large digital platforms that act as gatekeepers. The regime represents a far-reaching expansion of the EC’s regulatory power in digital markets, and will significantly increase regulatory scrutiny of large gatekeeper platforms (i.e. Big Tech) from a competition perspective. The DMA seeks to drive contestability and fairness in markets and does not have an explicit focus on AI. However, given Big Tech are also the key AI companies today and for the foreseeable future, the DMA has important implications for AI governance [27, p. 7]. The DMA will potentially strengthen the effective enforceability of competition law vis-a-vis any AI company due to a broader scope of prohibited conduct and grounds for regulatory intervention, more effective monitoring and detection of breach, and quicker and wider range of sanctions.

4 TECHNICAL VARIABLES

For each variable we (1) describe the spectrum and (2) analyse how the effective enforceability of competition law might vary for different values across that spectrum.

4.1 Key inputs into AI development

Three key inputs drive advances in AI: algorithmic innovation, computational resources (hardware or ‘compute’), and data [28], [29]. A company with talented experts can develop better algorithms, it can use superior compute to run a bigger model or train a model for longer, and it can use more data to train a model more effectively. This is a spectrum - these three inputs are all important, and complementary. We note that in real life, the amount of these key inputs that a company has is not the only determinant of success. Other critical factors may include, for example, good organisational management leading to wise or efficient deployment of resources or cultural fit and business practices [30], [31]. Other factors can constrain *deployment*, such as pre-existing ‘internet of things’ infrastructure. However, in common with other analyses, we present a simplified model based around these three inputs for the purposes of this present analysis.

All three are important, yet we can conceive of *one* of these inputs being the most constrained and therefore a bottleneck. We can envisage this as three percentages which have to sum to 100%. For example, innovation and talent could be constraining progress by 10% each while compute is 80% of the constraint, in which case compute would be the bottleneck. In such an example, many companies could be limited at the production possibility frontier by the supply and/or cost of compute, and progress in the state-of-the-art would be disproportionately attributable to running larger experiments. At the extreme, one of these inputs could be constraining development 100% - and so the others would be 0%. This can also be envisaged as the ratios of measurements of input constraint, such as: 80:10:10.

The key input driving AI advancements could be relevant as part of the assessment of market power. An assessment of market power is particularly pertinent in an abuse of dominance or merger control scenario, where market power is a key factor. A company that has unique access to a key input may be deemed to have market power as a result [32], [33]. In competition law, market power or dominance is the ability for an undertaking to ‘behave independently’ of market pressure from competitors and consumers, which is detrimental to consumer welfare [34, Para. 10]. If a company is deemed to have market power and to abuse that market power under Article 102, a regulator may seek to address that through

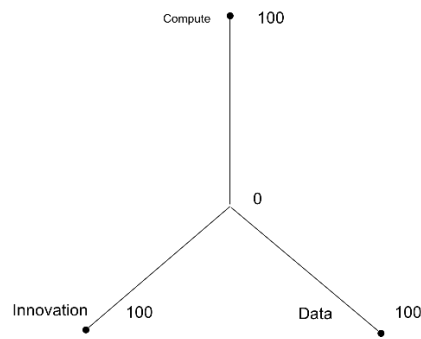


Figure 1: Spectrum showing extent to which each major input is a constraint on AI development (in % or ratio)

finances and an order to bring the infringing conduct to an end [35, Art. 7(1)]. Competition law remedies may also include access remedies, sharing that key input e.g. through granting competitors use of that key input; or structural remedies, structurally separating parts of the business that hold that key input so that the separated part of the business acts as a separate company, an independent market participant in competition with the incumbent [36].

The effective enforceability of competition law may depend on the type of key input that is the bottleneck: data, algorithmic innovations or compute. For example, if the key input is *data*, it may be challenging to assess the market power that flows from that data. As noted, this is particularly important in a merger or abuse of dominance analysis. Under competition law, data has been assessed as a source of market power in the *Microsoft/LinkedIn* merger for example [37]. And under the DMA, one of the criteria for determining whether a platform is a ‘gatekeeper’ is whether it has ‘data driven advantages’ [27, Art. 3(8)(c) and (d)]. However, it may be more challenging to assess the market power from data compared to compute because it is not purely a quantitative exercise i.e. ‘the more data, the more market power’. The market power that a company can derive from data will also depend on factors such as how recent the data is, the uniqueness of the data, the quality of the data, what the permitted uses of the data are (e.g. what are the scope of consents), whether it can be used to generate more synthetic data, etc. It is therefore an imprecise and highly complex exercise that may present two difficulties. First, in assessing the correct threshold for e.g. finding dominance – in other words how much is too much data? Second, in monitoring or detecting a breach – how can a regulator show that the data a company holds is enough to cross the threshold for dominance?

In addition, where a key input is the bottleneck that confers market power to a company, a competition regulator may order an access remedy in a merger or abuse of dominance context. An access remedy typically involves granting direct or indirect competitors access to an essential technology or infrastructure, or ensuring the interoperability of the access seeker’s products or services with the key services, products and platforms of the defendant undertaking [38]. Access remedies are also one of the key components of the DMA, for example [27, Art. 6(10)]. However, effective enforceability may be challenged by difficulties with remedies granting data access to competitors, that are widely discussed today, such as tensions

with data protection law [33]. Competition law itself may also be an obstacle, if the data contains commercially sensitive information. Competition law frowns on sharing such information between competitors.

If the key input is algorithmic innovations developed by talented staff, similar challenges to effective enforceability arise. This is because the amount of ‘talent’ that a company has is difficult to measure in terms of market power – rather, you would look at the product of that talent e.g. large and sustained market share, perhaps due to the superior algorithms that one’s pool of computer engineers were able to design. It is therefore difficult to define the scope of the law – in other words, what would be the threshold of talent above which you have market power?

The availability of remedies may also be more limited. For example, a regulator may wish to address the dominance of a company by ordering a divestment in a merger scenario, which could either create or strengthen a competitor to the incumbent. Talent is more difficult to transfer from one entity to another via competition law remedies, relative to data or compute [36, Para. 55]. Indeed, competition law recognises that there is a talent ‘flight risk’ of divestment of parts of a business and takes that into account when assessing the appropriateness of a remedy. Where talent is the key input, therefore, competition law may be a less effective tool to increase competition relative to data and compute [30].

In comparison with data and talent, *compute* could be the bottleneck, and success in AI markets could rely on access to a large amount of computing power. We see this in the cloud compute capacity of Big Tech, and the ‘compute partnerships’ struck between OpenAI and Microsoft, and Anthropic and Google Cloud. If compute is the bottleneck, then effective enforceability of competition law may be higher, as it is likely to be easier to regulate relative to data or talent [3], [39]. This is because compute is more easily measured and quantified, and the amount of compute that is necessary to train a certain type of AI system is more easily defined relative to, for example, how much talent is required to design such a system [40]–[42]. Market power may be easier to measure. As a remedy, compute may also be more easily ‘transferred’ or distributed compared to talent or data: e.g., a remedy could require divesting particular data centres. By comparison, as discussed above, the transfer of talent often leads to a flight risk, and the transfer of data carries obstacles such as data privacy rules that may limit the sharing of information. This could make structural remedies easier in either a merger or abuse of dominance context. It may also be easier to order an access remedy involving compute relative to data and talent, though there have been no cases of this so far.

4.2 Speed of development

This variable refers to the speed of AI development, measured in terms of the length of time between an arbitrary set of benchmarks. For example, progress on chess-playing in the late twentieth century was slow, with progress occurring over decades [43, pp. 604–609]. However, progress in large language models over the last two years can be measured in months – with not just the state-of-the-art being rapidly replaced, but entire benchmarks having to be replaced with harder ones [44]. AI could be developed rapidly or through more

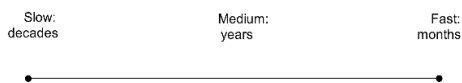


Figure 2: Speed of development spectrum

incremental, sequential and piecemeal development, or anywhere on the spectrum between these two extremes [45]. Speed could also vary throughout the development process: it could be slow in low capability systems and faster in higher capability systems; could have occasional shocks with large and long plateaus in between; or could slow in higher capability systems as bottlenecks or diminishing returns are encountered.

Competition law, and regulatory enforcement more generally, will likely be weaker the faster the speed of development. A key question is whether there is ‘equality of arms’ between the regulator and the private AI actor. When there is that equality of arms, competition law is more likely to be enforceable because the four factors that allow for effective regulatory enforcement are more likely to be met. However, this is a less likely outcome, as the private sector is generally ahead in terms of technological capability and know-how, due to differences in salaries and skills [46]. Regulators may be less able to understand the technological specifics that give rise to market power or breaches. So, for this variable we refer to the speed of development of private actors and assume that the state and regulators lag behind.

Enforceability may be more difficult in a rapid scenario for five reasons. First, new technologies may breach the law in novel ways that should be caught by existing rules but instead fall through the cracks or give rise to loopholes/lacunae in the law. Legislative changes or court jurisprudence help to evolve the substantive law to keep up, but these also take time and may be significantly outpaced by the market.

Second, in a more procedural sense, it may be harder to detect and monitor competition law breaches, because the market is moving so fast that regulators may struggle to make sense of what the developments are, and how they might be breaching competition law in potentially novel ways [47]–[49]. For example, new forms of market power may emerge that competition law struggles to characterise as market power, echoing similar discussions today with regard to how such terms have been redefined by the rise of digital platforms and data [15].

Third, the regulator may struggle to bring a case quickly enough to address the harm – a case can take a number of years, and the regulator may decide it is not worth it because the market will have moved on by that time anyway.

Fourth (and relatedly), a fine several years down the line may not be enough to restore competition because e.g. competitors have already been forced to exit the market. Alternatively, the perpetrator firm may have already made windfall profits over several years to make the conduct worthwhile. The slowness of sanctions and remedies may be an issue across mergers and antitrust enforcement. Antitrust cases can take many years to conclude and appeals extend that further [50]. A famous example is *Google Shopping*, an Article 102 case, which took over seven years to reach an EC decision, a further 4 years to reach an appeal decision in the General Court,

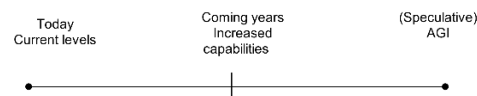


Figure 3: Spectrum of AI capabilities available to an AI actor

and is currently pending appeal to the European Court of Justice [51].

Fifth, rapid development and deployment could also lead to the AI actor enjoying a monopoly-inducing effect, because it pulls ahead whilst others are further behind both technologically and financially. This could increase regulatory capture concerns, reducing the effective enforceability of competition law further.

These are already challenges that competition regulators face today in regulating the tech sector, which is complex and fast-moving. How to address these challenges is a topic that competition regulators all over the world are currently grappling with and is a key driver behind introducing the new *ex ante* regulatory regime for tech platforms.

In a more incremental scenario, these problems are still likely to exist – after all, they are present in technology markets today. However, they should be present to a lesser extent. The more incremental pace of change means that the rules and regulators are less likely to fall behind, and enforcement is more likely to be sufficiently swift to address the harm. In short, the more rapid the AI development and deployment, the greater the risks to effective competition law enforcement.

4.3 Capability levels of AI systems

Another variable is capability – what are the AI capabilities available to AI companies? By ‘capability’ we refer here to the state of technological capabilities: the tasks and ‘work’ that can be accomplished by an AI system or collection of systems [52], [53]. Capability is a broad spectrum. Currently, AI systems outperform humans in some narrow tasks. This range may increase over the coming years, if capabilities continue to improve. At the top end is the speculative possibility of artificial general intelligence (AGI): AI systems that outperform humans at most economically valuable work [54], [55]. We do not discuss this possibility, but use it instead to mark one extreme of the spectrum.

All else being equal, competition law enforcement is more likely to be effective when the AI capabilities available to AI companies are lower. In today’s world, regulatory authorities are broadly able to govern the behaviour of private actors, save the usual concerns around regulatory capture and regulatory effectiveness [56]–[58]. But if the AI capabilities available to companies improve, there would likely be more scope for private actors to use them to evade competition law. Let us take a hypothetical where one private actor has developed and deployed more advanced AI systems than others including especially the competition regulator.

First, that actor may use AI systems which behave in new ways that are not yet condemned under competition law but should be, because that conduct is in fact anti-competitive [14]. The actor may hold market power or abuse that market power in a way that is sufficiently complex that it is not easily measurable or recognised by the law’s prevailing analytical toolkit. For example, regulators

have struggled to characterise the harm to consumers when the service (such as search or social media) is free to the user. This might be particularly applicable in a merger or abuse of dominance scenario, such that a merger review does not find a significant impediment to competition because there is sufficient remaining competition in the market, or does not find that the actor has a dominant position for the purposes of Article 102. Two AI actors using their novel AI systems in novel ways could fall within a jurisdictional lacuna, either outside of merger review in the first place, or receiving clearance but nevertheless being harmful to competition (e.g. because of legal loopholes). Alternatively, the conduct of the AI system may technically be acting in breach of the law but does so in a way that is concealed or difficult to monitor, such that the regulator cannot detect the breach [59], [60]. This may be the case for some kinds of algorithmic collusion. More speculatively, the AI actor may be able to evade investigation or detection by using its AI capabilities to conceal its conduct from detection e.g., using large language models to produce many false documents which conceal its participation in a cartel.

Second, Big Tech are already amongst the richest companies in the world, and developing and deploying AI systems may generate yet more profits and power. If that wealth is generated in a less perceptible way, for example very quickly, or in a distributed manner across many markets, it could be harder to detect or lead to regulatory capture, therefore reducing the ability or willingness of regulators to bring a case [6, p. 9], [61, pp. 39–40]. Furthermore, the AI actor may be so well-resourced that any fines have less of a deterrent effect or ability to change its behaviour, though fines can be up to 10% of global turnover [62]. At the most extreme, a custodial sentence is possible (though rarely used) for breach of competition law, for example under UK cartel law for the most serious infringements. However, it could be difficult to attribute criminal liability to a human for decisions shaped by AI systems. Another deterrent effect for competition law enforcement is not the sanctions themselves, but the time and effort spent defending the investigations, and reputational harm. Well-resourced actors may be more willing and able to absorb that time, effort and reputational harm.

On the other hand, AI actors that develop and deploy AI systems with potentially significant market power or societal impact could attract substantial public attention, ‘backlash’ and focus. This could then shift the relative amount of scrutiny that competition regulatory authorities feel they should, can, or are called upon to exert over these companies.

5 NON-TECHNICAL VARIABLES

In addition to technical variables, different sociopolitical variables can also characterize different scenarios for the development and deployment of AI, with different effects on the effective enforceability of competition law.

5.1 Number of Actors

The extreme endpoints of this spectrum are monopolistic or multipolar. At the monopolistic or unipolar extreme, a single actor is the clear leading developer or deployer of AI. At the contrasting extreme, there may be a multipolar AI situation, with multiple (ten

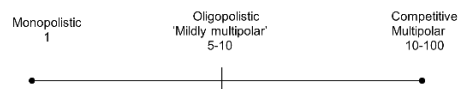


Figure 4: The spectrum of number of actors developing and deploying AI

to a hundred) actors developing and deploying AI with comparable levels of capability. In between, we could consider a ‘mildly multipolar’ or oligopolistic scenario, with a more defined group of around five to ten actors.

There are several factors that may shape whether we develop towards the monopolistic or multipolar ends of the spectrum. Some commentators have argued that AI generally tends towards natural monopolies because of first-mover advantage including the ability to capture resources like data, hardware and talent; positive reputational effects; creating switching costs for consumers; and network effects [6, p. 9]. This could be reinforced by the tendency for ‘winner-takes-all’ in AI markets [63], [64, pp. 10–46], so that only one actor (or only a few) will develop AI. However, we do not make a claim as to where on the spectrum is most likely, except to note that current developments in generative AI seem likely to reinforce the market power of Big Tech rather than opening up competition more widely.

Note that we will use the terms ‘monopolist’, ‘oligopolist’ or ‘competitor’ to refer to an actor developing or deploying AI. This is neutral on the nature of that actor, that is whether it is a company or state. The considerations we analyse are relevant no matter the nature of the AI actor, which we turn to in the next section.

Effective enforceability may be higher in a monopolistic scenario relative to a multipolar scenario. In short, a multipolar scenario is likely to result in a more competitive market (to the extent that the AI actors are active on the same market), relative to a monopolist scenario where the monopolist actor likely faces little or no effective competition in the markets in which it is active. Antitrust authorities should find it easier to detect and establish that the monopolist has market power for the purposes of bringing a successful antitrust claim. Acquisitions by that monopolist may also be subject to more stringent merger control assessment compared to a multipolar scenario. This is because it is more likely to trigger the jurisdictional thresholds that allow the European Commission to review the merger in the first place, given the thresholds take into account the sizes of both buyer and target. Further, the potential lack of competition in the market compared to a multipolar scenario may make it more likely that a merger is prohibited because it is found to be anti-competitive, or only cleared subject to remedies [36, Paras 4–5], [65, Art. Article 2(3)]. The test is whether the merger can be expected significantly to impede effective competition, in particular through the creation or enhancement of a dominant position [65, Art. Article 2(3)].

However, one potential outcome of a monopolistic scenario is that AI will lead to concentration of wealth and power in the hands of the actor that develops it [6], [61, pp. 9 & 39–40]. If there is only one monopolist substantial control of AI, the implications for enforceability are similar to the previous section (Capability). In summary, a monopolist may have (1) the AI capability to act in a way

Table 2: Six scenarios for Private and State AI Actors and their Relationship

Scenario	Actor Type	Relationship
1	Private & Private	Cooperative
2	Private & Private	Competitive
3	State & State	Cooperative
4	State & State	Competitive
5	State & Private	Cooperative
6	State & Private	Competitive

to evade detection, or behave in new and novel ways that are not yet condemned under competition law (but should be, because they are in fact anti-competitive), or benefit from loopholes; (2) financial resources to implement extreme regulatory capture, allowing the monopolist to act more autonomously from any law; and/or (3) the financial resources to ‘absorb’ any financial sanctions, so fines have less of a deterrent effect or ability to change its behaviour.

5.2 Nature and relationship of actors

This section will consider the nature and relationship of actors developing and deploying AI, and how it affects effective enforceability. The *nature* of the actors is important. Both private actors (such as companies) and states (i.e. governments and militaries) are developing and deploying AI. An actor that is a state or linked to a state may not be subject to EU competition law if it can rely on various defences based on its sovereign status. These defences could mean the AI actor falls outside the jurisdiction of EU competition law, so that EU competition law would not apply to that AI actor. Note, however, that the lines between state and company could blur, as we discuss below. The *relationship* between a state AI actor and private AI actor is important to the question of (1) whether competition law enforcement is possible i.e. capability to enforce whether competition law enforcement is likely i.e. incentive to enforce. There are a number of permutations, but we will focus on a few that have interesting implications for competition law enforcement.

In the table below, we note six scenarios. They vary depending on whether the actor(s) are companies/private actors or states, and whether the relationship between the actors is competitive or cooperative. Where a relationship is cooperative, two actors work together to achieve a common objective, which in turn serves their mutual self-interest. In a cooperative relationship, the stronger one party is, the stronger the other party is. Where a relationship is competitive, it is a zero-sum game such that one party’s gain is equivalent to another’s loss, and the weaker one party is the stronger the other is.

In the first two scenarios (1 and 2), we have two private AI actors in a cooperative and competitive relationship respectively. Competition law will potentially be applicable to these private AI actors from a jurisdictional perspective as long as they affect competition in the EU (subject to other variables such as speed and capability being equal). This is because each actor is likely to constitute an ‘undertaking’, defined by the EC as an entity carrying

out an economic activity: it offers goods or services, it bears risk and there is the potential to make profit.

The third and fourth scenarios (3 and 4) have two state actors in a cooperative and competitive relationship respectively. The important difference between scenarios 1 & 2 and scenarios 3 & 4 is that it may be more difficult to enforce competition law against a state actor because of a lack of jurisdiction. A state may seek to rely on the ‘state act doctrine’ under public international law, which refers to the international law principle that a foreign court should not opine on the international activities of sovereign foreign states. However, acts that are commercial in nature do not benefit from state immunity, and a practical difficulty arises in distinguishing clearly between situations where a foreign State is involved in commercial activities and where it is acting in its sovereign capability [66].

In scenario 3, the two state actors are in a cooperative relationship. In this scenario the geopolitical context is relatively stable, and there is more likely to be respect for international institutions and international law. Therefore, while competition law would likely continue to be effectively enforceable alongside international law and the two are not mutually exclusive, in practice international law would likely be the more appropriate tool to bring about a desired outcome between the two state actors. This is because competition law is not easily applied to state actors because of state immunity rules, as explained above.

On the other hand, scenario 4 involves two state actors in a competitive relationship. This represents a more fraught geopolitical situation, where there could be a breakdown in respect for the international legal order. In this scenario, competition law may be a useful alternative tool to international law, despite jurisdictional challenges, because it has stronger enforcement power (for example, large financial sanctions) compared to international law. International law is generally more difficult to enforce because the lack of a central enforcement agency means that international law depends on soft power and diplomatic pressure rather than concrete sanctions [67]. Competition law may be ‘weaponised’ (see below), for example, to take action against private actors that support states. However, where the geopolitical situation becomes very antagonistic, even the ability of states to enforce competition law may break down, despite its relative resilience. In an antagonistic scenario, states may prefer to take an economic hit for the sake of protecting high stakes political or security interests. States may also turn to more direct and radical action such as imposing export controls, such as those the US announced in October 2022. These new controls ban the exports of high-end semiconductors and semiconductor manufacturing technologies to China. The restrictions prevent leading US AI chip designers such as NVIDIA and AMD from selling their high-end chips for AI and supercomputing in China. Not only do the prohibitions cover exports from American firms (most notably NVIDIA and AMD), but also apply to any company worldwide that uses US semiconductor technology, which covers most of the world’s leading chipmakers. However, such drastic action carries high potential risks of retaliation.. This costly ‘bill of decoupling’ [68] suggests that such escalation is more likely to be a last resort. Before that stage, states may prefer more nuanced and less incendiary actions such as competition law enforcement

that retain the ‘business as usual’ framework of the international legal order.

In the fifth scenario (5), the private actor and state are in a cooperative relationship. A cooperative scenario may tend to arise where somehow the two have mutual or aligned interests. It may be more likely to occur between a home AI actor and a domestic private actor – but it is still possible that a cooperative relationship arises with a private actor in an aligned foreign state.

In a cooperative scenario between a home state and domestic private actor, the state may seek to ‘shield’ the private actor from foreign states trying to ‘weaponise’ competition law to weaken that domestic private actor. In that scenario, we could see the home state AI actor using certain retaliatory actions such as blocking legislation to protect the domestic AI actor from foreign competition law enforcement [69]. In that case, cross-border competition law cases may not be effectively enforceable.

In a cooperative scenario with a home state and a domestic private actor, it seems possible that the state could subsume the private actor. This may be implemented through nationalisation, which refers to the process of transforming private assets into public assets by bringing them under the public ownership of a national government or state. Another possibility is that whilst not being completely nationalised, the AI companies have strong links to their state government, such as Huawei and ZTE’s purported links to the Chinese government [70], [71]. In scenarios where the private actor is either formally nationalised or de facto subsumed by the state i.e. it is effectively state-controlled, it may be difficult to apply competition law given sovereign defences may apply. If the private actor is formally nationalised, it should more straightforwardly benefit from ‘state act doctrine’ and argue that it is acting in the exercise of public authority power, rather than acting in a commercial capability (although it can be very difficult to distinguish the two). If a private actor is de facto subsumed but not formally nationalised, it may be more difficult to argue that it is not acting in a commercial capability. However, the private actor may be able to rely on the state compulsion doctrine i.e. that a company was compelled to act in a certain way by a state. In this scenario, the private actor may be immune from EU competition law [72]. In short though, there are several ways that a private actor could be shielded from EU competition law, as long as it has the cooperation of its home state.

Finally, in scenario 6 we have one private actor and a state in a *competitive* relationship. A competitive scenario could emerge where the state feels threatened by the power, behaviour, or systemic effects of the private actor, and/or where a domestic private actor is resisting a cooperative relationship or nationalisation. A competitive relationship may be more likely to arise if the two actors are a state and a private actor in a foreign state. One might assume that a state is more likely to be in a cooperative relationship with a domestic private actor. However, this is not always the case: see for example Chinese government’s crackdown on some of its most successful tech companies on Ant Group, Alibaba and Didi using competition law and a number of other legal grounds.

In a competitive relationship between a private actor and a state, the state may wish to weaken the private actor, and competition law may be one tool to do so. Competition law may be ‘weaponised’ against the private actor either by a home state or a foreign state.

We use the term ‘weaponisation’ of competition law in this paper to refer to the application of competition law that are driven by policies that lie outside the classic objectives of competition law to protect the process of competition and maximise consumer welfare. In addition, weaponising of competition law may be particularly relevant in cases where there is a foreign state who does not have substantial AI capacity and who thus seeks to gain access to the technology of a foreign private AI actor who may be active in its territory, or to weaken it in favour of its home-grown AI companies. Competition law may be a particularly useful tool in this scenario because simply expropriating the assets is likely to create a significant diplomatic dispute, and likely to be far less favourable than bringing a claim under a somewhat legitimate guise.

An adversarial home state may even wish to partner with an aligned foreign state to control or weaken its own domestic private actor. In these scenarios, states may band together to counter the strength of the private actor(s). Competition law may be one way to do this: for example, see the ‘copycat’ antitrust action against Big Tech from the US and EU [73], [74].

6 CONCLUSION: A FRAMEWORK FOR LEGAL ANALYSIS AND ANTICIPATORY GOVERNANCE

The future of AI development and deployment over the coming years is highly uncertain. There are several dimensions of uncertainty, both technical and socio-political. Across these different possible future scenarios, it is unclear to what extent competition law (and other kinds of legal and governance tools) will be effectively enforceable. But as recent developments in generative AI demonstrate, it is crucial that regulators look forward to future scenarios in order to put anticipatory governance structures in place that can adapt and remain effective under a range of scenarios.

In this paper, we have attempted to reduce that uncertainty. We laid out five variables upon which future scenarios can be placed: key inputs, speed, capability, number of actors, and nature and relationship of actors. We examined how different values along these variables could affect the effective enforceability of the four main types of competition law (abuse of dominance, merger regulation, cartels and state aid), through the challenges they might pose to competition law enforcement through jurisdiction, exploiting loopholes, avoiding detection and being difficult to remedy. We encourage more work to be done to ensure competition law can remain future-proof across various a range of potential AI development scenarios.

ACKNOWLEDGMENTS

The authors would like to thank Claire Harris and colleagues from LCFI and CSER for helpful comments, and workshop organisers from the Legal Priorities Project.

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