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**Data interoperability and portability in the DMA:
Competition booster or lame duck?**

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Data interoperability and portability in the DMA: Competition booster or lame duck?

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Abstract: The European Digital Markets Act (DMA) is a regulatory framework designed to address competition concerns in digital markets by imposing specific prohibitions and obligations on the core platform services of so-called gatekeepers. As the DMA is the first regulation of its kind worldwide, regulative uncertainties in its application need to be identified and addressed for its future review by policymakers. This is particularly true for the DMA measures on data interoperability and portability. This paper examines key economic concepts and, thus, the reasoning behind the DMA's interoperability and portability rules, assessing their theoretical impact on competition in digital markets. It shows that (i) the horizontal interoperability measures for number-independent interpersonal communication services are not necessarily economically justified and their current design might even lead to less competition; (ii) the effects of vertical interoperability instruments seem to be more pro-competitive for hardware, namely near field communication, while the outcome for software remains difficult to predict due to their high degree of generalization; and (iii) data portability can contribute to more competition, but its impact remains highly dependent on the effectiveness of the interoperability regime. This paper concludes that the data interoperability, especially in its vertical form, and portability rules in the DMA have the potential to improve competition in digital markets. However, policymakers need to address the identified design flaws to enhance its effectiveness and efficiency. This includes establishing common standards for functionalities and data access conditions, as well as a clarifying the relationship between these measures and existing intellectual property, data protection, and trade secret rules.

Keywords: antitrust, big tech, competition policy, digital economy, digital ecosystems, Digital Markets Act (DMA), gatekeepers, GAFAM, interoperability, platforms, sector-specific regulation, portability

JEL Classification: K21, L40, L50, L86

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1. Introduction

In recent years, the regulation of digital markets has become a focal point for policymakers worldwide, reflecting the growing influence of dominant platforms and their impact on competition and, consequently, on society. In the European Union (EU), this concern has been addressed by policymakers through the Digital Markets Act (DMA). This regulatory framework is designed to increase competition on digital markets by imposing certain prohibitions and obligations on so called gatekeepers – companies that provide predefined core platform services while holding considerable market power.

The DMA is considered pivotal in reshaping the landscape of digital governance – not only in the EU member states but also as a global role model. However, amidst the groundbreaking nature of the DMA, there is concern about overregulation, which could inadvertently stifle innovation and impede markets dynamics. Additionally, it cannot be ruled out that political motives, such as protecting European digital companies against competition from primarily American tech companies, played a major role in designing these rules.

Although the DMA will be enforced from March 2024 onwards, it will take regulators time to fully apply it. This process might be further complicated by court appeals and private lawsuits expected in the months and years to come. As the DMA is also the first regulation of its kind, the lack of practical experience with its obligations leaves room for regulatory uncertainties. This is particularly true for the economic effects of its data interoperability and portability rules. Notably, this bears significance not only in the realms of pure digital markets. Learning from these measures, especially from resulting data standards, can influence other market designs, such as in the healthcare sector, emergency and disaster protection, or the energy industry.

In this regard, this paper seeks to assess the potential effects of the DMA's data interoperability and portability obligations on competition by answering the research questions to what extent these rules are economically justified and how they impact competition in digital markets. By doing so, it sheds light on the question if they increase competition in digital markets or, on the contrary, lead to market inefficiencies and stifle innovation.

This paper is organized as follows. Section 2 defines the terms data interoperability and portability and presents the respective DMA obligations for core platform services of gatekeepers. Section 3 discusses the underlying economic theory and assesses the outlined rules

as well as their potential outcome on competition in digital markets. For that, it also highlights major future challenges for the regulation's implementation. The paper concludes in Section 4.

2. Data interoperability and portability in the DMA

In the following section, the terms data interoperability and portability are defined. Subsequently, the respective prohibitions and obligations for gatekeepers' core platform services are described and contextualized within European regulators' previous experience. Note that the concepts of data portability and interoperability within the DMA can be perceived as complementary. Both are based on the idea of preventing further market tipping by ensuring competition and innovation in secondary markets (Kerber, 2019). They are closely linked to each other and mutually dependent, as they require common standards for formatting and transmitting data. The DMA leaves room for interpretation but also shows the need for a clear distinction between various degrees and compositions of data interoperability and portability.

2.1 Rules on data interoperability

Data interoperability has been a central building block of communication networks. However, it has played only a subordinate role for the development of platform markets, resulting in greater centralisation instead of more competition (Stigler Committee on Digital Platforms, 2019). Policymakers have acknowledged this problem and are increasingly advocating towards more interoperability. Ahead of the DMA adoption, the European Commission (EC) published an expert report by Crémer et al. (2019) which defines two different types of interoperability.¹ First, protocol interoperability is the ability of two services or products to technically interconnect. Second, full protocol interoperability makes substitute services, such as messaging systems, interoperable. Both require continuous and (potentially) real-time access to personal or machine user data via application programming interfaces (APIs).²

Based on this, the EC defines interoperability in the DMA (Regulation (EU) 2022/1925) as the “ability to exchange information and mutually use the information which has been exchanged through interfaces and other solutions, so that all elements of hardware or software work with other hardware and software and with users in all the ways they are intended to function” (WP

¹ Additionally, the British Competition and Markets Authority (CMA) defines content interoperability as a related concept which enables users to share content across platforms without switching services (Competition & Markets Authority, 2020). This can include cross-posting on a social media platform, where content from one platform appears simultaneously on a different one (Tirole, 2023).

² This can be achieved by standardisation or by contract (Borgogno & Colangelo, 2019; Gal & Rubinfeld, 2019).

242 Rev.01, rec. 29). The DMA thus differentiates between horizontal and vertical interoperability. The former refers to products and services at the same stage of the value chain, and the latter to different stages (Bourreau et al., 2022; Farrell & Simcoe, 2012; Kerber & Schweitzer, 2017; Monopoly Commission (Monopolkommission), 2021; Riley, 2020). Horizontal interoperability enables users to communicate via different networks. The respective products and services are often substitutes competing directly against each other (Bourreau et al., 2022). In contrast, vertical interoperability comes in two different forms. First, within-platform vertical interoperability enables third-party developers to provide complements for platform products or services (Bourreau et al., 2022; Kerber & Schweitzer, 2017; Riley, 2020). It requires public APIs and occurs in different forms as it depends on the restriction level a platform imposes on third-party developer APIs (Farrell & Simcoe, 2012). Second, there is cross-platform vertical interoperability, which combines within-platform interoperability with the option that third-party complementors can provide their offering to various platforms within a given market. This form needs a higher level of standardisation (Bourreau et al., 2022). Accordingly, the DMA derives the following main application fields for data interoperability.

2.1.1 Data interoperability with hardware and software features

DMA Article 6(7) defines vertical interoperability rules for hardware and software features of the gatekeepers' core platform services "accessed or controlled via the operating system or [a] virtual assistant" (Regulation (EU) 2022/1925). This applies to providers with the same hardware and software services as the gatekeeper but also to services "provided together with, or in support of, core platform services" (Regulation (EU) 2022/1925) – even in case where these features are not included in the gatekeeper's operating system. However, interoperability is restricted to a certain extent as gatekeepers are allowed to limit it to ensure the integrity of their hardware and software as well as their operating system and virtual assistants.

The rule is clearly influenced by the EC's experience with certain antitrust cases and inquiries in the past. One of the most notable cases in terms of software is EC versus Microsoft in 2004. In its decision C(2004) 900, the EC found Microsoft guilty of exploiting its market power in computer operating systems by neglecting its competitor's interoperability information and, thereby hampering their ability to challenge Microsoft's position in the work group server operating system market (Moldén, 2008). Other aspects reflected in the rules are the results of the sector inquiry conducted by the EC on consumer Internet of Things (SWD(2022) 10), which identified a lack of interoperability for voice assistants. In this context, the ongoing probe

against the Google Assistant (Competition Policy International (CPI), 2021) can be named as well. The extension to hardware interoperability is most likely due to the EC's investigation into Apple Pay (Akman, 2022). The EC accuses Apple to abuse its dominant position in mobile wallet markets by restricting the interoperability of its contactless payments technology, known as Near-Field Communication (NFC) or Tap and Go, with iOS devices (European Commission, 2020a, 2022; Stoltz, 2022).

2.1.2 Interoperability for third-party apps and app stores

The DMA establishes vertical interoperability in the realm of app stores and apps through various intertwined and mutually dependent prohibitions and obligations. First, DMA Article 5(5) requires gatekeepers to enable end users “to access and use (...) content, subscriptions, features or other items” (Regulation (EU) 2022/1925) through a business user app, even if users have acquired them outside of the gatekeeper's core platform service. Second, DMA Article 6(3) obliges them to allow end users to un-install apps and change to default settings. Third, DMA Article 6(4) prohibits sideloading restrictions by requiring gatekeepers to allow the installation and use of third-party apps or app stores via their operating system. Fourth, DMA Article 6(6) mandates that they must not prohibit switching between and subscribing to apps and services, incorporating also the choice of internet access services. However, the DMA grants them leeway, allowing for proportionate measures to secure the integrity of their operating system.

The main antitrust cases shaping this rule set revolve around Apple's and Google's app stores (Apple App Store and Google Play Store) and their respective operating systems (iOS and Android). A widely known case is the complaint by music streaming service Spotify, which marks the starting point of an EC antitrust investigation into Apple's App Stores rules for developers on app distribution (European Commission, 2020b). In a preliminary view (European Commission, 2021), the EC states that Apple's in-app-purchase mechanism and its restriction on app developers to inform Apple's end users of alternative purchasing possibilities not only limit competition but also cause higher prices for consumers. Similarly, the Epic Games complaint (Epic Games Inc., 2021) points out Apple's abusive behavior in the markets for app distribution and iOS in-app payment processing, which enables Apple to charge higher commissions. There is also a study of mobile app stores and their impact on competition by The Netherlands Authority for Consumers and Markets (Autoriteit Consument & Markt, ACM), (2019). The ACM findings show that the lack of competitors for both Apple's App Store and

Google's Play Store potentially establishes a competitive environment that facilitates misuse of market power. The agency considers interoperability as a solution without elaborating on it in detail. In a later case (The Netherlands Authority for Consumers and Markets (Autoriteit Consument & Markt), 2021), ACM ordered Apple to modify its App Store's conditions for dating-app providers to allow them to choose a purchasing payment system according to their preferences.

2.1.3 Interoperability for number-independent interpersonal communication services

DMA Article 7 outlines horizontal chat and call interoperability measures for number-independent interpersonal communication services (NIICS) as defined in the European Electronic Communications Code (Directive (EU) 2018/1972). This includes enabling interoperability for basic functionalities with the services of other NIICS such as "end-to-end text messaging (...)[,] (...) sharing of voice messages, videos and other attached files in end-to-end communication between two individual end users" immediately after the gatekeeper designation decision (Regulation (EU) 2022/1925). Within two years from it, these rules shall also apply to groups of individual end users (DMA Article 7(1)(b)), and within four years, to end-to-end voice and video calls between individual users as well as between group chats and individual users (DMA Art. 7(1)(c)). Note that these obligations are nearly congruent with rules from the telecommunication sector (Budzinski & Mendelsohn, 2022).³

Following the gatekeeper and core platform service designation after DMA Article 3, these obligations will so far only affect Meta's WhatsApp Messenger. Apple's iMessage is currently under investigation through the EC after the company presented a rebuttal (European Commission, 2023). In the future, further core platform services affected could be Meta's Facebook and Instagram Messenger, Microsoft's Skype and Teams as well as Alphabet's Google Meet and Chat (Brown & Korff, 2022). However, making use of these measures is optional for the interoperability requesting NIICS provider and the end users (DMA Art. 7(7)). This implies that smaller NIICS competitors, such as Zoom, Telegram or Signal, and potential market entrants are free to choose interoperability (Federal Network Agency (Bundesnetzagentur), 2021), while the final decision lies with the end user. Note that security

³ Compare to rules for interoperability of interpersonal communications on European level such as Article 61 et seq. Directive (EU) 2018/1972 or Articles 20 and 21 of German Telecommunication Act.

issues are referred to in DMA Article 7(4-6) as gatekeepers shall “maintain the necessary level of security, including end-to-end encryption where applicable” (Regulation (EU) 2022/1925).

2.2 Rules on data portability

The term data portability describes the “ability (...) of a natural or legal person to request that a data holder transfer to the person, or to a specific third party, data concerning that person in a structured, commonly used and machine-readable format on an ad-hoc or continuous basis” (Reimsbach-Kounatze et al., 2021, p. 9). The term can be constrained to personal data, but – in the context of competition – it often aims at a broader definition which includes data acquired by businesses (Graef et al., 2018; Mancini, 2021). To define the scope of data portability, data can be categorised according to their generation. Data on users are either provided by users themselves in an explicit way, i.e., through a social media profile, observed by a data controller, i.e., data on website usage behaviour, inferred via probabilistic analyse, or acquired from a third party (Graef et al., 2018; Krämer, Schnurr, et al., 2020; Reimsbach-Kounatze et al., 2021).

In DMA Article 6(9), policymakers enshrine the obligation for gatekeepers to enable data portability for end users.⁴ Data have to be either provided by (private and business) end users or observed by a data controller during the use of a gatekeeper’s core platform service. Gatekeepers shall ensure effective portability for data provided or generated through using their core services. Moreover, they shall establish continuous and real time access to these data (WP 242 Rev.01, Recital 60). The DMA does not include inferred or acquired data (Janal, 2016; Reimsbach-Kounatze et al., 2021; WP 242 Rev.01).⁵

Note that the role of data portability is of a hybrid nature as it originates from data protection policies but also has influence on competition and innovation. However, the latter aspect was limited in terms of impact and enforcement in the past. Therefore, the EC seeks to supplement the right to data portability under the General Data Protection Regulation (GDPR) through the DMA (Graef, 2020). This also reflects experience from past competition cases, for example, the Microsoft/LinkedIn merger decision in which the EC stated that the GDPR⁶ restricts

⁴ Data portability is closely connected to data access rules in the DMA (Lundqvist, 2021). This paper does not examine the role of data access in this context and leaves this task for further research.

⁵ While Art. 20 GDPR only refers to provided data, the Article 29 Working Party states that data portability should not only include data provided (actively) by users but also data observed by data controllers (Reimsbach-Kounatze et al., 2021; WP 242 Rev.01), for example, data revealed by cookies (Janal, 2016). For the time being, it is not clear if European courts support this interpretation (Krämer et al., 2020)

⁶ The Microsoft/LinkedIn merger decision took place at the end of 2016, while the GDPR entered into force in May 2018. Nevertheless, it shows the importance of data portability for antitrust decisions (Graef, 2020).

Microsoft in its use of personal data (C(2016) 8404). Similarly, the EC argued in its Google/Sanofi merger decision that the GDPR data portability right would be an efficient barrier against consumer lock-in (C(2016) 1223).

3. Implications based on economic theory

In this section, the paper examines the outlined DMA provisions from an economic perspective. It presents the underlying theory, discusses the interoperability measures and assesses their potential effects. Subsequently, the implications of the data portability rules are reviewed.

3.1 Interoperability and data portability as remedies

Networks play a decisive role in modern market economics. Economides (1996) describes a network as the collection of nodes joined by links. All nodes have the potential to be interconnected. As the count of links expands quadratically with the count of nodes, the utility which users derive from being part of the network and consuming the goods or services offered depends on the number of actually linked users.

This phenomenon exhibits network externalities. (Farrell & Klemperer, 2007). Positive network externalities cause network effects in the market, meaning that users take the participation of other network users into account by deriving positive value from interacting with them (Liebowitz & Margolis, 1994). Negative externalities caused by too many additional users are called congestion, implying that capacity constraints arise, for instance, as a result of growing search and transaction costs (Engels, 2016). Rochet & Tirole (2005) also distinguish between direct and indirect network effects. On the one hand, direct network effects refer to a joining user's increasing utility derived from the existing size of a network. On the other hand, they include growing utility for the incumbent users resulting from the new joiner as part of the overall expansion in the number of other network users. Indirect network effects describe the increased utility a user of a complementary good or service derives from an additional user, for example through standard setting or learning effects. In this context, Farrell & Klemperer (2007) emphasize the total network effect. One user's network entrance increases the utility of all current network members and, thus, the marginal network effect as the entrance raises incentives of outsiders to join. This explains the dynamics that bigger networks grow faster than smaller ones in the absence of congestion and under the assumption of homogenous goods.

Network effects are linked to the concept of switching costs. User are confronted with switching costs if they consider costs too high to switch from one network to another. These costs also

occur if a user, who seeks to consume complementary goods or services, decides to stick to the original supplier because switching is too costly (Farrell & Klemperer, 2007). Without considering nuances, switching cost can appear as learning costs, for example, the effort and loss of time to learn using a different operating system, transaction costs for the switch itself (Chen, 2017; Nilssen, 1992) and relational costs. The latter includes emotional costs as result of losing identity or social bonds because users provide their own data and also consume data provided by others (Burnham et al., 2003; Gans, 2018).

If there is incompatibility of products or services with other networks, network effects and switching costs bind users. These lock-in effects increase barriers for users to switch from one network to another or to multi-home on several networks. This bestows platform providers with significant ex post market power as they ex ante gain an initial advantage by pro- or anticompetitive means. If successful, this often results in weakened competition, strengthening the then dominating market incumbent against potential competitors from inside or outside the market (Chen, 2016; Farrell & Klemperer, 2007). It also facilitates market tipping through the incumbent's increased leveraging powers (Bedre-Defolie & Nitsche, 2020).

To increase compatibility, policymakers and regulators consider interoperability and data portability as potential remedies to raise contestability and re-strengthen competition. Crémer et al. (2019) advocate for a competitive environment in which multi-homing and switching for consumers are secured and cannot be blocked by dominant firms. However, Gal & Rubinfeld (2019) stress the importance of taking the market conditions into account because inefficient levels of data interoperability and portability could harm consumer welfare, economic productivity, and innovation. Also, Kerber & Schweitzer (2017) elaborate on interoperability that it should not be considered as a standalone objective. It needs to be assessed in the context of the individual competition case as well as the prevalent economic and technological circumstances in a market, which determine the optimal interoperability degree and design. These aspects are examined in greater detail in the following.

3.2 Horizontal interoperability

As outlined above, horizontal interoperability describes the degree to which users can communicate between rivalry services. It does not necessarily emerge in markets as it depends on the pace of innovation in a network and, among other factors, the resulting time-lag for the standard-setting process of regulators. While horizontal operability evolved in the telecommunication sector and was subsequently partly mandated by regulators, especially in

Europe, it has not yet developed in digital markets on its own (Cave et al., 2019). This raises the question if it needs to be induced externally through regulatory intervention.

3.2.1 Arguments for an intervention

Scott Morton et al. (2021) show that horizontal interoperability can contribute to market fairness by redefining property rights on network externalities. Dominant platforms profit from network effects because the main share of the resulting total welfare surplus remains with them. This significantly lowers the ability of competitors to challenge the dominant incumbent in its market, while it steadily increases the leveraging power of the incumbent. It also reduces consumer welfare because users benefit from interacting with each other on the platform but are not able to make a credible threat to switch to another platform. Additionally, it is unlikely that they benefit from a distinguishing feature of the dominant platform due to the lack of competition in the market. The introduction of interoperability would give competitors access to the network effects the incumbent benefits from. Then, they can compete for users by differentiating their offer, for example, through privacy solutions, while relying on the dominant platform's user base. As the property rights of network externalities now belong to the platform users, they can create a credible threat of migrating to other providers, which, in turn, gives them opportunity to negotiate a higher consumer surplus.

Moreover, horizontal interoperability decreases the barriers to entry. It eliminates the need for a market entrant to meet a critical user mass. The entrant can rely on an extensive user base from the beginning and compete on an equal footing with the incumbent (Bourreau et al., 2022). Besides, horizontal interoperability reduces collective switching costs as it guarantees users access to a market-wide network regardless of the application (Farrell & Klemperer, 2007). Crémer et al. (2000) elaborate that horizontal interoperability raises consumer demand for both larger and smaller networks. Further, they show that it increases the competitiveness of a smaller network. Thus, larger networks have an incentive to agitate against interoperability, which suggests that it may not develop endogenously but possibly needs to be induced externally. Overall, this indicates that horizontal interoperability increases static efficiencies in terms of product offering, processes, or capabilities (Bourreau et al., 2022).

3.2.2 Arguments against an intervention

However, horizontal interoperability can also have anti-competitive effects or unclear total effects on competition. A high degree of horizontal interoperability entails high organizational

and technical implementation costs due to standardising requirements for functionalities and APIs between different products and services (Bourreau et al., 2022). There might also be a loss of variety for consumers as it limits differentiation options between competing networks (Competition & Markets Authority, 2020; Federal Network Agency (Bundesnetzagentur), 2021; Monopoly Commission (Monopolkommission), 2021). So far, there are no examples from digital markets that prove this argument. Notably, the opposite occurred in the telecommunication sector. After the establishment of telecommunication standards in the US, smaller competitors of AT&T, the back then dominant provider, decided against horizontal interoperability with AT&T services to increase service differentiation (frontier economics, 2022). Moreover, as a result of the complexity of implementing horizontal interoperability, there is a high likelihood that measures are imperfect and only a subset of functionalities – or standards – is defined by regulators. This implies that with imperfect interoperability, the market depends on the degree of proprietary network effects. Imperfect interoperability gives competitors only limited access to the network effects the dominant incumbent benefits from. Thus, the proprietary network effects remain mainly with the incumbent, enabling it to sustain its position due to its larger customer portfolio and maintain its competitive advantage. This establishes a scenario in which customers stick to the full set of functionalities of the dominant platform provider, while imperfect interoperability allows them to exchange with smaller networks (Bourreau et al., 2022; Competition & Markets Authority, 2020; Scott Morton et al., 2021). On the other hand, interoperability could induce competition, making it ineffective. This would be the case if networks compete for non-standardized features to improve differentiation from each other. While this is not a problem for competition itself, the accompanying standard setting process of regulators would cause high implementation costs and could harm innovation, for instance, by choosing a wrong timing for making new features interoperable (Bourreau et al., 2022; Scott Morton et al., 2021). Additionally, there is no clear evidence if interoperability is a substitute for multi-homing and, therefore, reduces (Bourreau et al., 2022) or benefits it (Basaure et al., 2018). As a result, lower dynamic efficiencies cannot be ruled out. Finally, it needs to be emphasized that horizontal interoperability might not have evolved in digital markets because innovations there happen faster and with higher frequency (OECD, 2021; Riley, 2020) than in the telecommunication sector. On this basis, the high pace of innovation could be a result of a low level of regulation in digital markets (Oxera, 2020), indicating the potential trade-off between regulatory intervention and innovation when establishing interoperability.

3.2.3 DMA design assessment

DMA Article 7 defines horizontal interoperability for NIICS. This might increase market fairness as property rights on gatekeeper's network externalities – for the time being of Meta's WhatsApp Messenger – get redefined to platform users. In this case, already existing competitors and market entrants could differentiate their offer as end users can more easily deviate to another platform. This might not only reduce the requirement of competitors to meet a critical user mass but also lower user dependency on a specific application and thus switching costs. In this way, the measure might enable smaller networks to compete and increase static efficiencies.

However, the measure as envisaged in DMA Article 7 has a high likelihood to be imperfect, as emphasized by Bourreau et al. (2022). They point out that regulators are most likely to apply interoperability to basic features of gatekeeper services. The EC decided to follow this path. The ensuing imperfect degree of interoperability reduces options to differentiate via basic features and at the same time increases competition for non-basic features. As a result, it also raises the complexity of the standard setting process for regulators, for example, through high organizational and technical costs of API standards. This is because non-common features pose the question of making them interoperable, which leads to high regulative monitoring costs as well as the danger of harmful regulation. Consequently, the market outcome depends on the allocation of proprietary network effects as outlined above. Accordingly, imperfect horizontal interoperability raises the likelihood that proprietary network effects remain with the gatekeeper and thus consolidate the position of the already dominant core platform service. This is because users can reach users of competing services conveniently due to the interoperability of basic services. This leads to lower incentives to multi-home and, therefore, to the loss of market contestability. Thus, the gatekeeper, in this case, Meta and its WhatsApp Messenger, will likely remain uncontested due to its larger customer portfolio, and interoperability measures would consolidate its position instead of increasing competition as originally envisaged.

3.2.4 Horizontal interoperability as unnecessary measure for NIICS

As explained above, the interoperability obligation for NIICS in DMA Article 7 (1) focuses on basic functionalities. Regulators establish only a subset of interoperability rules for messages, voice messages, videos, other attached files, and for video calls between individual end users and/or groups. They refer to end-to-end encryption, emphasizing that security and data

protection are considered a crucial aspect of the basic features gatekeepers provide.⁷ Thus, the regulation design deviates significantly in practice from the theoretical viewpoint. Given this imperfection, Bourreau et al. (2022) argue that horizontal interoperability only increases competition when the pace of innovation in the market is slow and/or multi-homing is restricted.

Regarding multi-homing, a report of the German Federal Network Agency (Federal Network Agency (Bundesnetzagentur), 2021) indicates that consumers do not have a strong interest in interoperability measures for messaging services. This is due to the user's perception that multi-homing is uncomplicated and free of charge. However, the Federal Network Agency found a correlation between multi-homing and age. While nine out of ten users under 40 years practice multi-homing, only four out of ten users in the age group above 40 years do so. Similar results have been achieved in a study by the Federation of German Consumer Organizations (Verbraucherzentrale Bundesverband, VZBV) (2021), which indicate that there could be a generation (or education) gap that biases regulators' perception of realized consumer choice. VZBV also emphasizes that with interoperability measures, a striking majority of users would stay with the market leader, namely Meta's WhatsApp Messenger. In DMA Recital 64, the EC circumvents the argument that end users in the NIICS market multi-home as it attaches more weight to NIICSs as part of a gatekeeper's ecosystem. This is most likely induced by the EC's experience from the mentioned Facebook/WhatsApp merger decision, after which the EC learned that Meta, at that time still Facebook, was able to match Facebook and WhatsApp user accounts, putting user privacy at risk although the company denied being able to do so beforehand.

With respect to the pace of innovation, the assessment remains unclear. There is a lack of research on this issue in markets for messenger services. Regulators appear to have not taken into consideration the pace of innovation in the sector when outlining horizontal interoperability obligations for NIICSs. DMA Recital 64 emphasizes only that the objective of reducing entry barriers outweighs a high level of multi-homing. In this regard, WhatsApp Messenger launched several innovations within its basic service only in 2022, such as a group connecting features called communities, new privacy features, or emoji reactions on messages, among others (WhatsApp, 2024). The same applies to competitors like Signal (Signal, 2024) or Telegram (Telegram, 2024). Thus, this might indicate that the pace of innovation is not slowed down.

⁷ See also DMA Recital 64.

Overall, neither multi-homing nor pace of innovation seems to be distorted in messenger markets. Considering the outlined decision parameters of Bourreau et al. (2022), horizontal interoperability measures for NIICs might have not been necessary in the DMA to foster competition. On the contrary, it could result in strengthening incumbents' advantages instead of creating a fair level playing field. Overall, it seems that other arguments weighted more for regulators, for instance, keeping dominant platform providers away from collecting massive amounts of data (Federal Network Agency (Bundesnetzagentur), 2021) and facilitating privacy-focus software to overcome the incumbent's advantage (Brown & Korff, 2022).

3.2.5 Future importance of standardization and data protection rules

This aspect raises further issues in terms of standardization and data protection efficiency. NIICS interoperability implies that competitors of gatekeepers have to technically integrate in a federated network in which all participants mutually exchange data. This would affect end users as they would have to rely not only on security standards of their choice but also on those of all other providers involved (Federal Network Agency (Bundesnetzagentur), 2021). This has raised heavy criticism. According to a preliminary sector enquiry into messenger and video services of the German Federal Cartel Office (Bundeskartellamt) (2021), NIICS providers assess interoperability as a disadvantage in terms of innovation, data security and protection. Gatekeepers and smaller competitors alike argue predominantly that interoperability reduces consumer choice and undermines data protection standards. To account for that, DMA Article 7(5) allows providers to decide if they want to request interoperability with the gatekeeper based on all basic functionalities, only a subset of functionalities, or not at all. Further, DMA Article 7(7) leaves it to the end users to decide whether they make use of the interoperability offering of the gatekeeper and the requesting provider. However, whether this can be realized depends on a variety of different technical factors. For example, the extent to which smaller competitors have to give up their privacy protection to connect with dominant providers remains unclear. This directly affects end users' trust in their messenger service. Finding an applicable standard that balances interoperability and the end-to-end encryption requirement will depend upon developing specification based on the highest common denominator (Hodgson, 2022).

Moreover, the development of APIs and data storages to address this lack of standardization (Federal Network Agency (Bundesnetzagentur), 2021) and ensure interoperability causes high costs (Bourreau et al., 2022). It is also hampered by the fact that neither consumer nor businesses showed extensive demand for such a measure (Federal Network Agency

(Bundesnetzagentur), 2021; German Federal Cartel Office (Bundeskartellamt), 2021). On the contrary, there might be significant welfare losses because a likely market outcome could be fragmentation due to different security assessments and privacy protection standards. Of course, there are potential technical solutions at the horizon, such as the Messaging Layer Security (MLS) protocol⁸, which might enable an end-to-end encryption between messenger services. Still, this regulation depends highly on future technological developments, causing an uncertain trade-off between innovation beliefs and actual data security as well as protection concerns (Federal Network Agency (Bundesnetzagentur), 2021)

Apart from that, there are further aspects of criticism from an economic point of view. First, DMA Recital 104 clarifies that the EC will constantly evaluate the scope of interoperability obligations for NIICSs. This indicates the underlying risk in the envisaged standard setting process. It is not necessarily selective and clear which basic functionalities fall under the interoperability scope and which could be labelled as non-basic features. For example, self-deleting messages could be considered a basic feature of NIICS providers in the future, while for the time being, companies just use it as measure to differentiate their services from one another. Second, Kerber & Schweitzer (2017) point to the divergence of interests between the regulation of physical and digital telecommunication infrastructure. Particularly the application of a universal service rationale, for instance, to secure basic telecommunication services in form of open systems as planned in DMA Article 7, lacks justification as it depicts a major intervention into a company's chosen business model. They show that this is especially true if multi-homing is common because users choose end-to-end connectivity on their own.⁹ This appears to be the case as described above. Therefore, the DMA fails to differentiate between physical infrastructure and digital platform regulation, which indicates further inefficiencies of the horizontal interoperability rules. Third, market-based solutions are on their way, such as the German company CLUP.life. At the end of 2022, the company announced to launch the app CLUP.chat which makes messaging apps such as WhatsApp, Signal or Telegram interoperable without sharing users' metadata (Oyedeji, 2022). Hence, it can be questioned if DMA Article 7 is needed at all as market solutions, adhering to high privacy standards, are already emerging.

⁸ MLS is a specific security protocol which includes, among other features, cryptographic operations necessary for scalable and secure group messaging (Federal Office for Information Security (Bundesamt für Sicherheit in der Informationstechnik), 2021).

⁹ Then, tipping might also be a minor problem (Kerber & Schweitzer, 2017).

3.3 Vertical interoperability

In the following, the paper discusses the arguments for and against vertical interoperability. It then addresses the debate on the optimal degree of this form of interoperability. Subsequently, it examines the respective DMA rules, distinguishing between vertical interoperability with hardware and software features. The latter is considered as basic requirement for interoperability with third-party apps and app stores. The paper reflects this aspect even though the DMA itself does not group them in that way.

3.3.1 Hybrid form as natural market outcome and its impact

Overall, vertical interoperability grants users the opportunity to mix and match products and services from different digital platforms (Brown, 2020; Matutes & Regibeau, 1988), which enables unbundling (OECD, 2021). This increases market variety and lowers market entry costs (Bourreau et al., 2022; Farrell & Simcoe, 2012). As a result, competition in complementary markets improves. Moreover, vertical data interoperability strengthens different forms of innovations (Baldwin & Clark, 2000; Baldwin & Von Hippel, 2011; Farrell & Simcoe, 2012). Hence, it does not only improve static efficiencies but also dynamic efficiencies because complementors become more innovative (Bourreau et al., 2022).

Despite these positive effects, full vertical interoperability does not emerge as a natural market outcome. Instead, a hybrid form usually develops over time. At their early stage, platforms show a higher interoperability level. However, they tend to decrease it as they mature, for example, through killer acquisitions or bundling strategies. This is because even though the total value of a platform increases, the platform is less capable of internalizing the additional value (Eisenmann et al., 2008). In this context, Bourreau et al. (2022) show that vertical interoperability can cause inefficiencies of vertical separation due to reduced economies of scale and scope, as well as information asymmetries leading to hold-up problems (Claici et al., 2020). Vertical interoperability might also decrease dynamic efficiency to some extent, causing a potential decline in technological progress and innovation as rents from innovations could be divided between a platform and its complementors (Krämer & Schnurr, 2014).

This shows that the optimal degree of vertical interoperability is dynamic, which can potentially lower the quality of products and services as well as innovation incentives (Aghion et al., 2005; Boudreau, 2010; Boudreau, 2012). Boudreau (2010; 2012) finds evidence that the interdependence of market innovation and platform openness to complementors can be

described as an inverted U-shaped curve. Hence, a high degree of openness is accompanied by an increased risk of low-quality complementors. In turn, he emphasizes that too strong competition can lead to a lack of innovation incentives for high-quality complementors.

3.3.2 Optimal degree of horizontal interoperability as a regulative challenge

Due to its inherent dynamics, vertical interoperability – or market openness – is challenging for regulators to determine and rarely optimal in terms of maximising consumer welfare (Gal & Rubinfeld, 2019; OECD, 2021). Regulators have to balance the potential benefits of increased competition and innovation in complementary markets, enabled by mixing and matching processes, against the risk of a decline in radical innovations due to reduced innovation incentives for both gatekeepers and competitors if market openness is too high. Furthermore, they have to consider that vertical interoperability often decreases over time in practice as platform providers intentionally reduce interoperability during their maturation process to exploit their growing market power. Without intervention, the long-term market outcome is likely to result in a low degree of market openness, where dominant platform providers maintain their capabilities for radical innovations at the expenses of potential complementors. Assuming the total effect on innovation is negative¹⁰, this leads to a loss of consumer welfare. Thus, vertical operability appears to be noticeably more pro-competitive than its horizontal counterpart, particularly concerning static efficiencies. Given this context, there appears to be sufficient economic reasoning for regulators to intervene. However, a definite statement on whether vertical interoperability is a necessary measure to restore competition is not possible. This assessment highly case-dependent and regulation should be designed accordingly (Kerber & Schweitzer, 2017).

Nevertheless, European regulators decided against such an approach. Instead, the DMA generalises vertical interoperability obligations. Considering that determining the optimal interoperability degree of interoperability in a market is challenging, a cautious approach should be taken from an economic perspective to prevent path dependencies. This is especially important as regulators have to balance incentives for platform providers and their complementors to minimise dynamic inefficiencies and maintain an adequate level of

¹⁰ This assessment is, of course, debatable. In the context of transatlantic relations, it might be a political influenced decision. While it is true that European startup activities remain low and potentially suppressed by gatekeepers, European regulators do not take into consideration radical innovations mainly driven by American Big Tech companies (Broadbent, 2021). Given the lack of research on this topic, this paper adheres to the argument and the resulting legislative status quo that the total effect on innovation might be negative.

innovation (Bourreau et al., 2022), while they face a lack of standardization – a basic requirement for interoperability. Gal & Rubinfeld (2019) point out that private standardization efforts have so far mainly focussed on data portability. This is due to diverging incentives of market players, a high level of specificity when voluntary standards are created, and collective action problems. Consequently, they argue that policymakers have to play an active role in shaping the interoperability standards needed to enable the use of data and prevent a loss of international competitiveness and welfare. Accordingly, European authorities need to focus on developing the necessary vertical interoperability standards to minimise inefficiencies resulting from the current DMA approach.

3.3.3 DMA design assessment for hardware features

Even though vertical interoperability facilitates market contestability, the inclusion of hardware features in Article 6(7) DMA is not necessarily an obvious decision. In mobile ecosystems, competitive bottlenecks are usually caused by the operating system and app stores – not by the hardware (Krämer & Feasey, 2021). However, as Akman (2022) and Cabral et al. (2021) emphasize, the experience with the Apple Mobile Payments investigation (European Commission, 2020b) has led European regulators to adopt a different view. This is also evident in DMA Recital 56. The EC explicitly mentions near-field communication (NFC) technology for contactless payment when emphasizing the dual role of gatekeepers as developers of operating systems and device manufacturers. According to the EC, Apple has a dominant position in the market for mobile wallets. It argues that Apple restricts access to its smartphone NFC chip, a technology used for contactless payments. By restricting this payment solution to iOS mobile devices, Apple is suspected to limit market contestability, innovation activities of entrants and consumer choice. Motta (2022) shows that incentives for anticompetitive foreclosure exist. Restrictions on NFC interoperability enable Apple to extract rents in the form of transaction fees from NFC payments within its own app store and hinder dynamic innovation (Loser, 2024; Motta, 2023). To address the outlined competition concerns and as anticipatory reaction to Article 6(7) DMA, Apple decided to disclose NFC interface information and, among other measures, to provide an interoperability request form in January 2024 (Apple, 2024a). In March 2024, however, the company also made it clear that it is still concerned of security risks, making further talks with the EC on the interoperability measures necessary (Apple, 2024b).

Given the outlined theory, the argumentation regarding anticompetitive foreclosure seems consistent. Another aspect is that for hardware features – contrary to software features – the

costs of multi-homing are high as they depend usually on a costly device. In other words, multi-homing of users would require them to have more than one smartphone (Wiewiorra et al., 2022), which seems unlikely for the majority.¹¹

Considering that the Article 6(7) DMA has routes in open banking regulation (Bourreau et al., 2022), the experience there can serve as a blueprint. Borgogno & Colangelo (2021) point out that hardware interoperability successfully reduced switching costs and promoted multi-homing in that sector. Thus, similar effects might be likely when it comes to payment solutions enabled by hardware on digital platforms. However, it should be noted that vertical interoperability is not a remedy itself. For example, Apple was obliged to open the NFC APIs to all payment service providers in Germany. But instead of launching their own payment systems, major service providers decided to continue their cooperation with Apple Pay due to the unharmed network effects of the Apple ecosystem (Franck & Linardatos, 2020).

Overall, Article 6(7) DMA has the potential to effectively increase competition as it appears to be a rather specific remedy for a clearly defined case. It seems to balance incentives for Apple to maintain an adequate innovation level while allowing complementors to interconnect with their complementary products. Apple's relatively extensive adherence to the regulation might underline this assumption.¹² Nevertheless, as the described example of open banking shows, the strength of these effect remains to be seen.

3.3.4 DMA design assessment for software features

The competitive benefits of vertical interoperability with software features are hardly negligible from a theoretical point of view. Still, there exists a trade-off between the degrees of market openness and innovation. On the one hand, vertical interoperability can limit radical innovations as it reduces innovations incentives and investment security for dominant platform providers (Oxera, 2020; Portiere, 2021, 2022a, 2022b). On the other hand, innovation activities of

¹¹ Note that regulators' opinions on these questions can diverge internationally. For example, even though a US court stated that Apple does not have a dominant position in the sale of smartphones, (Lovejoy, 2022), the EC reflected it as an important element in its gatekeeper designation decision C(2023) 6100.

¹² In this context, DMA Recital 55 indicates that regulators are not only targeting payment hardware but also wearable devices, such as smartwatches or fitness trackers. Again, hardware interoperability is considered a means to overcome proprietary network effects and user lock-in, as envisaged in the EC's sector inquiry into the Internet of Things (SWD(2022) 10). Although this measure appears to be a legitimate solution to reinforce competition, the NFC issue shows that an economic assessment will highly depend on the actual DMA application and the respective vertical interoperability design.

complementors might increase as competition in their markets is restored through better mixing and matching processes (Bourreau et al., 2022).

Considering the described inverted U-shaped curve of innovation and openness, regulators need to carefully balance the application of DMA rules to avoid swings in either direction (Kerber & Schweitzer, 2017). In this context, obligations such as DMA Article 6(6), which prohibits switching and subscribing of apps and services provided via a core platform service, and DMA Article 6(3), which enables end users to un-install apps and change to default settings, are consistent from a pro-competitive perspective. As digital platform markets are highly concentrated and switching has pro-competitive effects (Fabra & García. Alfredo, 2014), it appears consequential to prohibit gatekeepers from preventing switching. Further, DMA Article 6(3) strengthens the fundamental European competition principle of consumer choice.

Regarding DMA Articles 5(5), 6(4), and 6(7), it is important to consider that European regulators decided against a more cautious and individual analysis of interoperability standards. As the optimal path of interoperability depends on technology and the respective market, the actual outcome of the DMA regulation, such as end user installing side-loading apps form outside the gatekeeper's app store, businesses creating independent app stores, or consumers switching AI assistants, remains to be seen (Blankertz, 2022).

Nevertheless, a major regulatory inefficiency could arise from the lack of standardization – a basic requirement for interoperability (Gal & Rubinfeld, 2019). In DMA Recital 96, European regulators indicate that not all interoperability obligations have corresponding technical standards. As enshrined in DMA Article 48, these standards still have to be developed by businesses in exchange with European standardization bodies.¹³ On the contrary, in the United States and Great Britain, regulators have emphasized the importance of developing interoperability standards beforehand (Bauer et al., 2022). However, it is important to note that defining interoperability standards is not an objective in itself. Standard-setting bodies might be too slow in determining software standards (Riley & Vasile, 2021) or reduce them to the lowest common denominator (Bietti, 2020; Eisenmann et al., 2008; Farrell & Simcoe, 2012; Kerber & Schweitzer, 2017). Thus, the vague DMA guidelines entail the danger that vertical interoperability might be hard to operationalize (Schwab, 2022).

¹³ In this context, DMA Recital 96 also refers to data portability and data access.

Another unresolved matter is if interoperability as enshrined in the DMA might be (rightfully or abusively) overturned by intellectual property (IP) rights, trade secret rules, or the GDPR. For example, even though data are not protected by property rights, copyrights on APIs could be a reason to limit interoperability (Lundqvist, 2021). Focusing on prohibiting side-loading restrictions in DMA Article 6(4), Apple has stated that this might pose a security risk for its operating system iOS, as personal information on iPhones could no longer be sufficiently protected (Porter & Vincent, 2022).¹⁴ However, the DMA clarifies that gatekeepers are allowed to take proportionate measures to ensure the integrity of their operating system. There are also voices who argue that these concerns can be overcome by market forces, making the regulation itself unnecessary (Le Pape, 2022).

While the outlined vertical interoperability rules follow clear economic reasoning, the DMA gives neither an answer on the standards required nor on the interplay with corresponding regulations. Additionally, even though a – so far undefined – periodic DMA review is envisaged, it is unlikely that the DMA can keep pace with the fast-changing behaviour in digital markets. In comparison, telecom regulators approach this issue with routine regulatory updates. Considering that European regulators address this challenge, for example, in the case of cyber security by exemption in the DMA, the opposite seems to be the case. This also raises further doubts whether lawmakers can keep up with the fast-changing environment (Killock & Mruk, 2022). This is further underscored by the EC’s scrutinising and reviewing process of the technical implementation and interpretation of the DMA by gatekeepers. The compliance reports by the currently designated gatekeepers¹⁵ appear to lack a deeper explanation on how they intend to establish compliance under the DMA – leaving it to the capabilities and, most importantly, the guidance of the EC as the regulator to assess whether the regulation’s prohibitions and obligations are properly applied (Ribera Martínez, 2024).

3.4 Data portability for end users

Subsequently, this paper discusses the pros and cons of data portability. It examines the context specificity of the concept and its intertwining, with interoperability measures before delving into the corresponding DMA rules.

¹⁴ Note that Apple allows Mac users to download third-party apps. Apple argues that Macs contain less sensitive information (Porter & Vincent, 2022).

¹⁵ The EC has designated six gatekeepers under the DMA by March 2024, namely Alphabet, Amazon, Apple, ByteDance, Meta and Microsoft (European Commission, 2023).

3.4.1 Data portability as supplement instrument

Data portability aims to overcome users lock-in by giving them the option to transfer their data to another platform (Mancini, 2021). As Giovannetti & Siciliani (2020) examine, this can lead to a reduction in switching costs, lower market entry barriers, and, thus, strengthened competition in the market. Moreover, it might empower users to multi-home because it creates the possibility for them to transfer data to different platform providers, thereby reducing their dependence on a dominant platform (Engels, 2016). Additionally, data portability can decrease the risk of market tipping as dominant platforms are limited in their potential to extend their market power to adjacent markets by leveraging their data power (Bourreau, 2020; Mancini, 2021).

Mancini (2021) underlines that the effects of data portability on competition are subject to the respective market environment. For example, the utility users derive from data portability depends on the degree to which a product or service is tailored (Krämer et al., 2020). Moreover, the design and scope of the measure matters. For instance, the relevance of observed and provided data can differ (Engels, 2016). Complementary measures such as interoperability rules or privacy laws also influence the effectiveness of data portability. Additionally, there is evidence that data portability is most effective in sustaining competition in new or developing markets rather than being a solution for already dominated markets (Krämer et al., 2020).

The negligible effect of portability on markets with a dominant incumbent is due to indirect network effects. These create positive feedback loops for algorithmic learning (Lerner, 2014) and, therefore, superior analytics capabilities for the already dominant platform provider for provided and observed data, or in other words, inferred data. However, this also implies that entry barriers established through a competitor's lack of data access are created by the users themselves (Hagiu et al., 2022; Schäfer et al., 2018). Moreover, while provided and observed data are contributed by users because of a dominant incumbent's innovative services or products, inferred data do not depend on these innovations. On the contrary, it requires only innovation at the analytics level, which can be achieved by market entrants as well. Data portability can make provided and observed data accessible to both the dominant incumbent and its competitors, breaking up the former's exclusive data control while not limiting its innovation capabilities. Note that this relies heavily on context, and the decision to port data has to be user-initiated (Krämer et al., 2020). This is also underlined by the fact that economies of scale for market entrants are limited to the degree users are willing to port their data. If this

willingness remains low, the competitive advantage of an incumbent, for instance through algorithm quality, is preserved (Gal & Aviv, 2020; Nicholas & Weinberg, 2019).

Finally, data portability alone cannot overcome strong network effects, as users' willingness to switch also depends on the behaviour of other users and their respective switching decisions (Gans, 2018; Giovannetti & Siciliani, 2020). There remains a high likelihood that users will stick to the dominant incumbent (Competition & Markets Authority, 2020). Evidence from the United Kingdom shows that this might be because individual decision-making is not as rational as assumed by regulators. Thus, consumers can be affected by time inconsistencies, regret aversion, and an endowment effect, meaning that they overestimate the value of something they already own (Regan-Stansfield et al., 2021). Additionally, given strong network effects in markets with two networks, transaction costs caused by a lack of data portability can also prevent markets from tipping as they discourage users from switching to the platform with the highest network effects. In such a situation data portability could remove this barrier and – unintentionally – facilitate market tipping (Krämer et al., 2020; Suleymanova & Wey, 2011).

These findings indicate that data portability might be most effective in markets with weaker network effects (Nicholas & Weinberg, 2019). This is further emphasized by Mancini (2021), who argues that, unlike one-off data exports, continuous data portability could potentially give dominant platforms an unfair advantage. These platforms could influence and gather insights on competitors' data usage behaviour by focusing on data access. The resulting superior knowledge could incentivize the dominant firm to modify API access unilaterally, hindering competitor's development. It also enables them to potentially copy certain functionalities of their competitors' services, which might the effectiveness of data portability (Nicholas & Weinberg, 2019).

3.4.2 DMA design assessment

As outlined in DMA Article 6(9), gatekeepers are obliged to enable data portability of provided or generated data for end users, including both businesses and consumers. It allows users to control their personal data, which is a fundamental condition for enabling switching. According to economic theory, end user switching can indeed increase competition and innovation activities. Moreover, it helps to lower market entry barriers by expanding the available customer pool for potential competitors. However, the current lack of common standards, high compliance costs, and low consumer engagement due to bounded rationality might limit the

effect of the DMA's data portability rules. Additionally, overall incentives to switch could be limited in practice.

Another aspect is that the relationship of DMA and GDPR still needs further clarification (de Streel et al., 2023; Graef, 2020) to define the scope, such as the not entirely certain exclusion of inferred data and the quantity of ported data that needs to be provided. In this context, portability also bears the risk of security breaches resulting from the accompanying system interoperability, such as the envisaged continuous data access (De Hert et al., 2018). Moreover, data sharing via APIs requires not only a clear implementation process but also proper standardization rules (Borgogno & Colangelo, 2019). As described in the case of data interoperability, this fundamental level playing field still needs to be developed and might therefore establish another barrier to the efficient enforcement of DMA's data portability rules. Overall, it can be questioned whether data portability as a stand-alone measure is able to increase competition (Florez Ramos & Blind, 2020). Instead, it needs to be emphasized that the impact of data portability is highly dependent on the design and enforcement of the DMA's interoperability measures and might only benefit end consumers in adjacent markets.

4. Conclusion

This paper aims to closely examine data interoperability and portability as envisaged in the DMA. After elucidating the respective concepts and presenting the relevant regulatory provisions, it provides an analysis of the underlying economic theory, expected impacts, and practical challenges of the measures as well as an assessment of its effectiveness based on theoretical considerations, the previous non-regulative environment and evidence from related fields. It concludes with remarks on potential improvements to the existing regulations and an outlook on future developments.

For horizontal interoperability, economic theory shows that full interoperability fosters competition on digital markets by redefining property rights on network externalities. This redefinition allows competitors to access an incumbent's user base, enabling them to challenge the incumbent through offer differentiation. Additionally, theory highlights that a high level of standardization for functionalities and APIs is indispensable to ensure its efficient functioning. However, the DMA only defines a subset of horizontal interoperability requirements, applied solely applied to NIICS providers. This imperfection increases the likelihood that the redefinition of property rights will fail, allowing the incumbent, in this case Meta's WhatsApp Messenger, to consolidate its dominant position. Thus, there is a clear indication that these

measures may be ineffective in practice. Moreover, the design of the rules is likely to incur extensive monitoring costs due to a current lack of existing standardization and a so far unclear relationship to data protection rules, raising concern regarding their efficient application. Overall, it can be doubted that the DMA's horizontal interoperability measures lead to a superior outcome compared to a situation with no regulation, and whether they were needed at all. As shown, neither multi-homing nor innovation appears to be limited in markets for NIICS providers, making the regulation unjustified from an economic standpoint. However, considering that early DMA drafts intended to apply such rules to social media platforms, where the lack of competition appears to be more evident than for NIICS providers, the potential benefits of such measures should not be neglected in general and warrant further explored.

For vertical interoperability, research shows that competition benefits of the improved mixing and matching process, as it enables unbundling, lowers market entry barriers, and strengthens innovations. Moreover, a regulatory intervention seems necessary as dominant platforms tend to disable vertical interoperability over time. However, regulators face the challenge that vertical interoperability is not a binary issue as it potentially causes inefficiencies of vertical separation, information asymmetries and stifles innovation if it is too pronounced. Given that the optimal degree of vertical interoperability remains unknown, the best approach for regulators would be to apply interoperability measures on a case-by-case basis and provide clear interoperability standards ahead of enforcement. The DMA partially fails in this regard. While the interoperability rules for hardware features are relatively specific remedies for the clearly defined case of NFC technology and potentially increase competition, the generalized rules for software make their outcomes harder to predict. To complicate matters further, both application areas suffer from a lack of standardization and technical access conditions – as their horizontal counterparts. Additionally, conflicts with IP rights, trade secret protections, and data security concerns cannot be ruled out, raising further economic uncertainties during the DMA's application and enforcement process. Despite the theoretical and to some extent practical suitability to improve competition on digital markets, regulators need expedite the standardization process and seek a common understanding with business on the relationship between interoperability and interconnected rules. For the future, and with further evidence from practical experience, it seems also advisable to review the generalized approach and switch to a more individual review.

In this context, data portability proves to be an important building block to overcome strong network effects. However, it becomes apparent that the impact of data portability as a stand-alone measure remains limited. It is highly dependent on the effectiveness of the established interoperability regime. Consequently, the described potential inefficiencies regarding the interoperability standardization process, as well as overlapping regulations, pose also for data portability a problem.

Overall, it is important to acknowledge the limitations of this paper. While it provides an overview on the economic reasoning behind the outlined DMA measures and their expected outcomes, it does not represent a deep dive into the regulation's details. Further research, based also on its practical application, is essential to understand the impact of the data interoperability and portability provisions on competition in digital markets.

In conclusion, the described prohibitions and obligations to gatekeeper's core platform services indicate that data interoperability and portability are context specific economic concepts and, in view of the actual DMA regulation, not in each case economically justified. However, the DMA is not a lame duck as a whole. With regard to the examined topics, it has the potential to improve competition in certain areas. But to become a true competition booster, European regulators have to overcome the outlined design flaws currently resulting in an – at least partially– ineffective and inefficient rules, limiting the regulation's pro-competitive impact and potentially stifling innovation. This paper emphasizes this need and the opportunity for regulators and business alike to solve these issues during the practical enforcement process and consider adjustments during the planned DMA review in 2026.

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