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App stores, antitrust and their links to net neutrality: A review of the European policy and academic debate leading to the EU Digital Markets Act

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Abstract: Google and Apple's smartphone and tablet 'app' stores are facing significant antitrust scrutiny in Europe, culminating in enforcement action by the European Commission and specific obligations in the new EU Digital Markets Act. In a field previously dominated by US law and jurisprudence, we review the main European antitrust-related evidence and policy arguments for and against such app store regulation. We further show how this discourse is linked to the heavily-contested policy area of network neutrality.

Introduction

More than five billion people now use the Internet. For the majority of users, their primary means of access is via mobile devices which run apps, as well as mobile browsers (ITU, 2022). Apple's iOS/iPadOS and Google's Android operating systems feature the firms' own "app stores", which act almost exclusively as distribution channels for smartphone and tablet apps.[1] In a detailed market study of the two companies, the UK's Competition & Markets Authority (CMA) concluded that they "have an effective duopoly in the provision of operating systems that run on mobile devices", as well as "substantial and entrenched market power over the users of their mobile operating systems" and "in the distribution of native apps within their ecosystems" (2021, pp. 122-124). In its *Google Android* decision, the European Commission similarly found that the firm held a dominant position for Android app stores globally outside China since 2011.[2]

There are widespread concerns that such dominance can lead to the exclusion of competitors (including platforms steering users to their own services and using consumer data to imitate successful services) and harm to consumers, including increases in price and reductions in quality and innovation (Klingler, 2021). This has also resulted in high-profile legal cases in the US,[3] and world-first legislative changes in South Korea (Yang, 2021) and the EU, with further legislative proposals in the United States (the Open App Markets Act), China (draft platform guidelines) and other jurisdictions (Brown, 2022).

After two years of debate in the EU's Commission, Council and Parliament, these institutions agreed in May 2022 to a sweeping package of regulatory measures in the Digital Markets Act (DMA), intended to rapidly improve the "contestability and fairness" of digital markets. Rather than waiting for narrow *ex post* competition law enforcement, the DMA introduces broad *ex ante* requirements for "gatekeeper" firms, including Google and Apple, to open up their platforms and app stores to competitors. At the national level, the UK government has proposed legislation that would impose up front competition regulation on such "strategic market status" firms (UK Department for Business, Energy & Industrial Strategy, 2021), while

1. Smartphone operating system market shares in Europe in November 2021 were 64% for Android (owned by Alphabet, holding company of Google) and 35% for iOS (owned by Apple Inc.),(Statcounter, n.d.). Neither firm's market share changed significantly in the entire 2012-2020 period (Statista, n.d.).
2. European Commission DG Competition (2018), Google Android, case ATT.40099, p. 128.
3. *Epic Games, Inc. v. Apple Inc.* 2021 (United States District Court for the Northern District of California) September 10, Case No. 4:20-cv-05640-YGR.

Germany has already amended its competition law to impose specific rules on firms "of paramount cross-market significance" (Maier-Witt et al., 2021).

Given the location of many large technology firms' headquarters, much of the antitrust academic discourse on digital markets is heavily focused on US law and legal cases. In this article, we review the main European antitrust-related evidence and policy arguments for and against app store regulation (section 1), and academic literature (section 2), which has been most influential to date. We provide a Table in the Annex on prominent European enforcement actions. We further show how some of these digital market-specific arguments have evolved in Europe out of the heavily-contested policy area of network neutrality. Net neutrality – or 'open Internet' – is the well established principle that Internet access providers (IAPs) must by law be required to offer users non-discriminatory access to the devices, content, services and applications of their choice, subject to limited legal exceptions (Regulation (EU) 2015/2120). The EU has taken some of the most robust global measures, limiting IAPs' ability to charge competitors for privileged access to their customers. The decade of debate about net neutrality prior to 2015 provides a prior policy case study for later ongoing debates about app store discrimination. This 'lightning' review should be of particular use to policymakers, practitioners and the wider public, and for specialists to show how the intellectual underpinnings of the Digital Markets Act and EU/UK competition law reform were developed in relation to app distribution.

The Main European arguments for and against app store regulation

In this section, we lay out the main arguments in the European policy discourse for and against app store regulation, taken from the law and economics literature (which is most influential in this field) and decisions by European competition law enforcers. Further detail on the enforcement cases discussed here is included in the Annex.

Pro-regulation

There are four main linked pro-regulation arguments, discussed in turn below, indicating that Apple and Google have abused their market power (A); that vertical integration has led to abuse (B); that there is no effective antitrust remedy given the decade or more of market investigation prior to enforcement (C); and that this market power abuse should be addressed through proposed platform regulation, notably the EU Digital Markets Act, and UK legislative reform promised by the gov-

ernment (D).

Abuse of market power (A)

The UK's Competition & Markets Authority has concluded there is "limited user-driven competition between mobile devices", since users rarely switch operating systems while Apple targets high-priced devices and Android dominates low-priced devices sales. Rival OS providers face barriers to entry and expansion, including strong indirect network effects, economies of scale, Google's agreements with manufacturers and Apple's tight integration between its own "apps, services and connected devices" (2021, pp. 122-123). Hence, major "platforms have become gatekeepers that control third-parties' access to markets, information and consumers", giving them power to engage in "exclusionary and exploitative practices to the detriment of app developers and mobile device users" (Geradin & Katsifis, 2021).

Apple's 30% transaction fee for payments for "digital goods or services"[4] in the App Store is seen by many competitors as abusive and potentially discriminatory. This is also seen in Apple's ability to impose unfair trading conditions, such as blocking app developers from notifying users of alternative payment mechanisms, using consumer data to identify and imitate successful services (Klingler, 2021) and to exclude downstream competition with its own services (such as requiring alternative Web browsers to use its own WebKit software). This was the main component in the ongoing European Commission case AT.40437, as well as in the US cases of *Apple v Pepper* (2019) and *Epic v Apple* (2021).[5]

Unlike Apple, Google does not block alternative app stores on Android, but it requires all phone manufacturers who wish to include Google's premium apps to also include its Play app store. This means in the UK it "retains over 90% of native app downloads across Android, HMS, and Fire OS devices, in part due to material barriers to entry and expansion faced by rival app stores" (Competition & Markets Authority, 2021, p. 124).

4. See section 3.1.3 of the App Store Review Guidelines, which explains review excludes "reader apps" such as Netflix, Spotify and Kindle which provide access to "magazines, newspapers, books, audio, music, and video" purchased elsewhere; and multi-platform apps, where content or features have been purchased on another platform (such as a PC). Further exceptions have been made for "real-time person-to-person experiences between two individuals" such as a fitness class; apps sold directly "to organizations or groups for their employees or students (for example professional databases and classroom management tools)"; and "free apps acting as a stand-alone companion to a paid web based tool (eg. VOIP, Cloud Storage, Email Services, Web Hosting)".

5. European Commission DG Competition (2020-1) Apple - App Store Practices (music streaming), case AT.40437. *Apple Inc v Pepper* (2019) 139 S. Ct. 1514. *Epic Games, Inc. v. Apple Inc.* 2021 (United States District Court for the Northern District of California) September 10, Case No. 4:20-cv-05640-YGR.

Apple responded to criticism of its policies in 2019, stating: "the vast majority of apps, over 84% — many of which rely on advertising to make money — share none of the revenue they make from our store with Apple" (*Online Platforms and Market Power, Part 2: Innovation and Entrepreneurship*, 2018). Geradin and Katsifis (2021) have pointed out that this means "the many (84%) free-ride on the few (16%) that get to pay the fare for everyone", and that Apple handling payments forces a "separation between the provision of a good or service (for which the app developer is responsible) and the provision of customer support (which is handed over to Apple), resulting in a host of inefficiencies".

Following significant pressure, in January 2021 Apple reduced its fees to 15% for developers earning less than $1m/year from the store (Apple, 2020). Facing legal challenges in the US, Apple has gone further with a proposed class action settlement in that market (Fried, 2021). But the European Commission's Case AT.40437 against Apple is ongoing, and a statement of objections was sent in April 2021 on music streaming apps.

Vertical integration (B)

Apple operates a tightly-linked ecosystem of products and services, from smartphones, tablets and PCs, operating systems, media editing and access, and office software – all tied together via its App Store: "the gateway through which app developers have to go in order to reach the valuable audience of iOS users" (Geradin & Katsifis, 2021). Google is a much smaller manufacturer of devices (such as the Pixel smartphone), but otherwise offers a similar range of services.

Apple and the other Big Tech companies have grown rapidly by acquiring smaller companies who have developed complementary technologies that can be integrated into those established platform ecosystems. Apple and Google's approved mergers with Shazam (2018) and Fitbit (2021)[6] demonstrated continued vertical integration and market exclusion (Stucke, 2018). In terms of competition policy, Apple operates tied markets due to the vertical integration of Apple products into the app store and ancillary markets (Case AT.40437). The European Commission has previously taken action against "vertical leveraging" by Microsoft (Case T-201/04), Google (AT.39740 – Shopping) and Amazon.[7]

In 2021, the European Commission encouraged national competition authorities to

6. European Commission DG Competition (2018) Apple-Shazam, case M.9660.

7. *Microsoft Corp. v Commission of the European Communities* (2007) European Court Reports 2007 II-03601; *Google LLC and Alphabet, Inc. v European Commission* (2021) Court of Justice of the EU, Case T-612/17. European Commission DG Competition (2019) Amazon Marketplace, case AT.40462.

refer concerns about mergers to them even when they do not (yet) meet minimum turnover levels (European Commission, 2021). The special advisers to Commissioner Vestager on digital competition suggested that such digital mergers should be subject to a lower (though not reversed) burden of proof for competition authorities to test deals for lack of competitiveness (Crémer et al., 2019). Similarly, the independent panel appointed by the UK government (the "Furman Review") suggested a "balance of harms" test (Furman et al., 2019). The European Commission changed its merger referral guidelines in February 2021 to encourage national competition authorities to refer mergers to it "where the turnover of at least one of the companies concerned does not reflect its actual or future competitive potential" (European Commission, 2021).

While Germany published a legal opinion arguing merger control measures could be included in the Digital Markets Act, other EU member states, and some academics, argued the DMA's internal market harmonisation legal basis rules this out (Lamadrid de Pablo & Bayón Fernández, 2021). The UK government proposed a much more minor change to the standard for proof of harm required in its 2021 proposals, from the current "balance of probability" test, where harm must be shown as more likely than not, to a lower "realistic probability" standard (UK Department for Business, Energy & Industrial Strategy, 2021). More radical suggestions have included a reversal of the burden of proof in digital mergers for dominant firms. Fig. 6 in the UK proposal (Appendix F) sets out the range of tests for firms with strategic market status ('GAFAM' dominant companies):

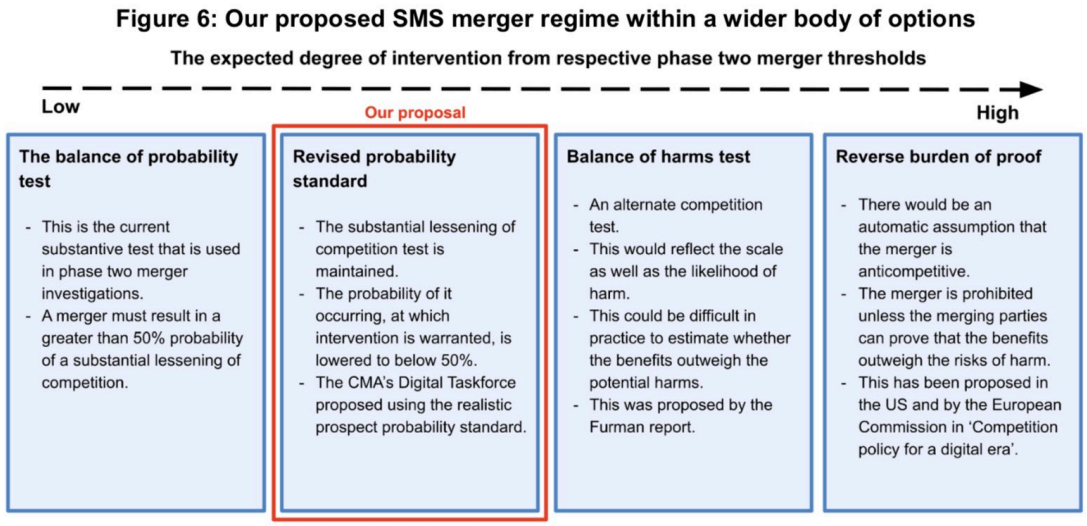

FIGURE 1: UK government proposal for a revised digital market merger threshold.

Effective remedy: extreme delays in market investigation (C)

Apple and Google have increased their dominance across various digital markets through vertical integration via merger and predatory practices, even though their practices have been investigated by multiple competition enforcers, including the European Commission (Bourreau et al., 2020). Cases have taken far too long to have a significant impact on highly dynamic technology markets, as pointed out by the UK regulator: "cases that have been brought by the European Commission against Google in recent years: Android took more than five years, Shopping took more than seven years and AdSense took nine years, excluding respective appeal processes" (Competition & Markets Authority, 2020).

Even where multi-billion euro fines have been imposed, for example against Google in T-612/17 (the *Google Shopping* case), this is a relatively small cost of doing business for one of the highest valued corporations in history, worth trillions of dollars. These fines were fought by Google all the way to the General Court of the EU, which confirmed the €2,424,495,000 fine in a hearing against Google's appeal in case T-612/17. Google appealed yet again in that case to the EU Court of Justice. While this fine was issued for abuses by Google Shopping in the period 2008-17, some abuses took place over 13 years prior to the General Court ruling.

Platform regulation (D)

Many commentators, in Europe and elsewhere, argue "Big Tech" platforms need wider regulation, with "growing concerns over the digital platforms' role in facilitating misinformation, the spread of illegal or harmful content online, as well as the massive surveillance of citizens for commercial and political aims" (Geradin & Katsifis, 2021). There are advanced proposals in several European countries (such as the UK's Online Safety Bill, 2022) and the proposed EU Digital Services Act (DSA) to address these problems.[8] Critics have also suggested the very size of the major platforms significantly increases these harms. Note that the DSA applies to all online commercial sites, although some of its provisions apply only to Very Large Online Platforms (VLOPs), whereas the DMA is directly targeted at only the largest firms, who act as "gatekeepers" between other businesses and end-users. To give an illustration, the DMA would not currently apply to Twitter, for example, as its market capitalisation is too low.

Regulation of platform businesses has failed across antitrust investigations – with Google, Amazon, Facebook and Microsoft, as well as with Apple investigations

8. COM/2020/825 final Proposal for a REGULATION on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC.

since the 2000s. Therefore, regulations have had a limited impact on what are now some of the world's most valuable companies (Cave, 2005; Economides & Tåg, 2012). Brown and Marsden (2013) argued that strengthening competition regulation and enforcement via legislative reform and updated enforcement practices and criteria, would also allow these non-economic problems to be addressed. Practices relating to app stores are a central part of these reforms.

Against regulation

The antitrust case against *ex ante* regulation principally concerns the popularity of app stores with smartphone users and app businesses. It can be summarised in five arguments, considered in the following subsections: the product market definition should not be drawn too narrowly to persecute individual app stores (A); Apple demonstrates premium product differentiation in a broad app market (B); there are no proven consumer harms from app store self-regulation by Apple and Google (C); and mergers are pro-competitive (D). As a final argument, regulatory capture is argued by the 'public choice' school to follow from *ex ante* regulation as in telecoms and utilities regulation, and institutional paralysis would follow, which would slow innovation in app store markets (E).

Product market definition (A)

Apple is the third largest phone manufacturer, and is not dominant in any single device market (tablets, PCs, laptops, or watches), while Google's own hardware sales have historically been relatively insignificant, prior to the 2021 introduction of the Pixel 6 (Ibáñez Colomo, 2021). In November 2021, Android had a European mobile OS market share of around 67% (split between multiple manufacturers) and iOS of 32% (Statcounter, n.d.). In many markets, such as automobiles, a 32% market share would not be grounds for intervention. Meanwhile, the Android and iOS app stores provide a convenient distribution channel for developers to reach potentially billions of customers.

Some competition lawyers, such as Voelcker and Baker (who acted for Apple), have argued that the correct market definition would include all mechanisms by which developers can distribute apps to customers – including stores on competing platforms such as iOS and Android, and web apps running in web browsers, as well as "gaming consoles, web-based gaming platforms, smart-TVs, and e-book readers" (2020). One counter-argument is that web apps have much more limited functionality, such as limited user interface features and access to device hardware (Geradin & Katsifis, 2021), which the UK Competition & Markets Authority found "is in large part down to restrictions on functionality within Apple's ecosystem,

which could undermine the incentives to develop web apps across both ecosystems" (2021, p. 124). The CMA concluded that "Apple and Google face a limited competitive constraint from alternative devices such as PCs, laptops, gaming consoles and smart TVs. These devices are primarily used for different purposes and are mainly viewed by users as complements rather than substitutes, such that not being available on either iOS or Android devices is not an option for app developers" (2021, p. 124).

Premium product differentiation in a broad app market (B)

Apple App Store consumers purchase a premium product with higher quality of service offered to remove harmful apps and this encourages responsible innovation by smaller app developers (Borck et al., 2021) – "the average mobile app makes four times more revenue on iOS than Android and the App Store generates twice as much revenue for app developers, despite having half as many downloads as the Play Store" (Geradin & Katsifis, 2021). Attention should focus on the under-regulated and much larger Google Play Store (despite the record €4.34bn fine in Case AT.40099). Google was indeed the European Commission's regulatory focus prior to Apple.

No proven consumer harms (C)

Apple and Google both argue that they have offered full transparency in previous investigations and no harm to consumers has been proven. There is no compelling argument to change consumer protections, as the EU is proposing in its Digital Markets Act (Wright & Mungan, 2021). Mobile phone and tablet buyers have choices, and they choose Android on a variety of devices, and iOS on Apple hardware. It is in the interests of Google and Apple to maximise the value of those platforms; this includes encouraging the development of apps. Their pricing policies are their business decisions to make, and are in line with a range of industry comparators (Cusumano et al., 2020; Cusumano et al., 2021; Voelcker & Baker, 2020; Competition & Markets Authority, 2021, p. 124).

Mergers (D)

Approved mergers have been pro-market as Apple competes against companies with a far larger percentage of the app market share – e.g. Facebook and Google.[9] There would therefore not be a compelling case to adjust or even reverse the burden of proof (Hovenkamp, 2021a). There is no evidence Apple has varied its app store policies or enforcement when its own apps compete with third-party apps.

9. *American Express v Ohio* 2018 138 S. Ct. 2274.

Over time, it has made its policies *more* favourable to third-party apps, and there is no evidence of markets where its apps have "displaced competition to the point of exclusion, resulted in increased prices for consumers, reduced output, or undermined the scale or pace of innovation" – or where it has applied policies such as "review of apps, iOS privacy settings, or App Store search algorithms" in a discriminatory manner (Voelcker & Baker, 2020).

Regulatory capture and institutional paralysis (E)

Platforms have innovated for over two decades without direct regulation, relying largely on legislation and case law. To regulate platforms directly constitutes a serious risk that those regulators both slow down platform development, and are gradually captured by the regulated companies as staff move between the two entities (the 'revolving door' of regulators moving into regulated companies and back again) (Cave, 2005; Stigler, 1971). To regulate the major platforms as if they were telecoms platform monopolists would stymy innovation in downstream markets and punish risk taking, e.g. Apple Pay (Krzepicki et al., 2020). It would also potentially lead to the regulation of other app stores, such as Samsung, to the detriment of rapid innovation in the app store market.

For its power, this analysis relies on the example of the telecommunications market, and the arguments made by telecoms companies that their markets should be deregulated, rather than app stores be more heavily regulated. Telecoms companies self-evidently supply the data and services upon which app stores rely. Telecoms companies have tried to leverage these regulatory capture and innovation arguments to argue that a mythical "level playing field" should be created with less regulation, between telecoms operators and Internet access providers, app stores and Instant messaging from the GAFAM companies (Marsden, 2010; Marsden, 2017).

Specific European contributions to digital competition reviews

To identify the most influential academic works on digital competition policy in Europe, we reviewed all the citations of academic works in the three main EU, German and UK digital competition reviews published in 2019/2020 (the so-called "Vestager", Competition 4.0 and Furman reviews, respectively). There is not an equivalent report for France. Two works stood out for multiple citations: Federico et al. (2020) (cited seven times in the German review) and Bourreau and de Streel (2019) (cited five times in the EU review, and twice in the German review). Veil

(2017) was cited four times in the German review, while Jean, Perrot and Philippon were cited three times in the German review (Jean et al., 2019).

In France, the competition authority, Autorité de la concurrence (ADLC), published a discussion paper on this topic in 2019 which cites only competition decisions and other reviews. Previously, the ADLC published studies on several aspects of digital competition (the joint paper with its German counterpart Bundeskartellamt (BKA) on big data in May 2016, Opinion No. 18-A-03 on online advertising of 6 March 2018, the joint study with the BKA on algorithms of November 2019 and the study on behavioural remedies of 17 January 2020[10].

In addition to these specific works, we also identify below two decades of development of antitrust-related platform regulation arguments in Europe. The most well known statement on public policy issues in regulated digital markets, notably on two-sided platforms such as app stores, is from Rochet and Nobel prize winner Tirole. Rochet and Tirole (2003, p. 990) stated:

> *Many if not most markets with network externalities are two-sided. To succeed, platforms in industries such as software, portals and media, payment systems and the Internet, must "get both sides of the market on board." Accordingly, platforms devote much attention to their business model, that is, to how they court each side while making money overall.*

This statement builds on his early classic contributions (Rochet & Tirole, 2003). The review of the literature it launched, part of Tirole's Nobel Prize in Economics award citation, demonstrates his leading global contribution (Schmalensee, 2014).

Earlier, Cave (2005), a leading regulatory economist (now Chair of the UK energy regulator Ofgem), analysed the early application of competition law and regulation in the value chain for television broadcasting in the UK. He analysed interoperability and must-carry arguments, notably analysing the path-breaking BiB "app store" decision of 1999, the first such decision by the European Commission of digital apps, and broader UK competition laws and regulatory interventions. In the digital age, he argued the need for public intervention is weakened, but further development of competition law is required to prevent abuse of the market power. A broad debate about the role of public intervention in the marketplace is now taking

10. Autorité de la concurrence (ADLC), joint paper with Bundeskartellamt (BKA) on big data (May 2016); Autorité de la concurrence (ADLC), Opinion No. 18-A-03 on online advertising of 6 March 2018; Autorité de la concurrence (ADLC), joint study with the BKA on algorithms (November 2019); Autorité de la concurrence (ADLC), study on behavioural remedies (January 2020).

place, and the paper proposes that such interventions be largely confined to competition policy and regulation directed toward the goal of competitive markets.

Marsden (2010, p. 52) explained the 'European Approach' to two-sided telecoms markets, and the need for proactive regulation to ensure neutrality in the treatment of Internet traffic over those networks:

> *Two-sided markets are those in which an intermediary – such as an ISP – can differentiate pricing and service to each side of the market, suppliers and consumers, making efficiencies as they mediate between the two. Obviously this means both suppliers and customers are reliant on the middleman for access to the other. The ISP has good information about what each will charge and can make strategies accordingly, but suppliers and consumers cannot directly influence each other's behaviour as minutely as the ISP, because it is the middleman's extra information (even if it has no monopoly power) that enables him to make better – i.e. more fully informed – decisions. It may be that abusive discrimination can take place even where an ISP does not have dominance.*

This summarises concerns expressed by Economides and Tag (2012), that two-sided markets in Internet access could form a particularly pervasive form of platform discrimination to the disadvantage of content providers and advertisers on one side of the market, and users of the Internet on the other. Those access providers, the telecommunications companies, for the most part, were therefore regulated in many nations by forms of network neutrality regulation, such as Regulation 2015/2120 in the European Economic Area. Those forms of regulation were designed to prevent Internet access providers' from discriminating between the two sides of the market, to effectively remove their market power. It has proved hugely contentious in the United States especially, where telecoms companies have sponsored many economic studies designed to undermine the two-sided abusive platform argument (Marsden, 2017).

Mac Síthigh (2013) has assessed the regulation of smartphone 'app stores'. He highlighted the importance of the Apple App Store, and the need to explore forms of regulation that are not linked with a violation of competition law. 'Developer-focused issues' deal with the relationship between Apple and app developers; three themes of Apple's Guidelines are identified (content, development and payments), and the ways in which control can be challenged (through jailbreaking, 'web apps' and regulatory intervention) are scrutinised. He considers three ways in which apps are already regulated by law, focusing on the protection of consumers. Finally, the tension between comparatively 'open' (Google) and 'closed' (Apple) app

stores is highlighted, and the problems with applying general provisions to emerging formats are emphasised. He concludes that the emerging status of non-carrier app stores as neither retailer nor platform means that in 2013 it was not yet possible to identify the form of regulation in operation, but that some steps are now available to legislators that could shift the balance between closed and open models.

Brown and Marsden (2013, p. 22) explained developing digital competition cases, and the likelihood of a retreat from Chicago School analysis based on evidence of harm towards the proactive regulation of software code by the dominant social media companies:

> *The outcome of the two decades of Microsoft competition litigation, beginning with U.S. antitrust investigation in 1991 prior to the dawn of mass Internet adoption, was to enforce interoperability and application programming interface disclosure, with Intel settling a similar long-standing investigation into interoperability and anticompetitive practices. The interoperable code solution was extended and adapted by the complainants in both Google and Facebook investigations by the EC opened in 2010 (IP/10/1624). Apple's iTunes faced similar calls in its price discrimination settlement by the EC in 2007–2008 (IP/08/22) and its preliminary antitrust investigation into Apple's iPhone AppStore policies (IP/10/1175).*

There is an interesting mini-debate which Marsden (2017) describes in the evolution of ISP network neutrality, which was later repeated for app stores. In the 2000s, telecoms companies emphasised to both advertisers and app developers their control over their users via two-sided markets, and excluded rival apps such as Skype, Vonage and WhatsApp from the market. This is all according to the evidence the telecoms companies volunteered to the European group of regulators, BEREC. Literature in business studies lauded such dominance of two-sided markets as performed by these platforms in permitting excess rents to be reinvested in the access market (broadband connections upgraded). From 2013 onwards, in the negotiation of the Open Internet regulation passed in 2015, and in the enforcement of that Regulation from 2016 onwards, the emphasis changed to assess the abusive dominance of those two-sided platforms. Marsden (2017) also predicted and foreshadowed the competition law problem in assessing its intersection with data protection law, and the abuse of data ownership (via predatory privacy policies) to discriminate in two-sided platforms, such as the Apple and Google app stores.

Cremer et al. (2019) is a hugely influential report, commissioned by Competition Commissioner Margrethe Vestager to drive forward policy towards remedying plat-

form dominance and abuse in the next decade. It is written by two senior economics professors (Jacques Cremer and Heike Schweitzer) and a technical expert (Yves-Alexandre de Montjoye). These so-called 'Three Wise Men' explain on p. 2:

> *The assessment of market power has to be case-specific, and it must take into account insights drawn from behavioural economics about the strength of consumers' biases towards default options and short-term gratification. The assessment should also factor in all the ways in which incumbents are protected (and can protect themselves) from competition.*

They add on p. 22: "our definition of platforms goes beyond online intermediation to include desktop, mobile operating systems and browsers, "offline" software, and app stores". This market power assessment became the accepted approach to analysing two-sided platforms in the European Commission from 2019.

Bourreau et al. (2020) is an economic analysis of the harms to competition caused by Google's continued dominance; it especially focused on the proposed (and now accomplished) merger with Fitbit. Co-authors include Valletti, former chief competition economist at the European Commission, and the influential economic experts Bourreau and Caffara. The authors state on p. 2:

> *The acquisitions of Doubleclick and AdMob sealed Google's current monopoly in ad intermediation. In addition to these high-profile acquisitions, Google has made dozens of others, mostly under the radar of competition agencies,involving multiple complementary functionalities facilitating its mission of data collection, data analysis, and exploitation. There is a term for this – "platform envelopment": offering convenience to consumers while throttling competition. And (as the competition authorities know well) the strategy has also involved a track record of proven anti-competitive leveraging from one market into others (from Android to Shopping to adtech).*

While Bourreau et al. did not succeed in convincing the European Commission to veto the proposed merger, it was still a very influential argument. On 30 November 2021, the UK Competition and Markets Authority vetoed the Facebook-Giphy merger, the first prominent GAFAM merger to be vetoed by a European competition authority.

Geradin and Katsifis (2021) provide an exceptionally thorough contemporary analysis of app store antitrust. The Apple App Store is the only channel through

which app developers may distribute their apps on iOS. First launched in 2008, the App Store has evolved into a highly profitable marketplace, with overall consumer spending exceeding $50 billion in 2019. However, concerns are increasingly expressed on both sides of the Atlantic that various Apple practices in the App Store may breach competition law. The paper examines whether this is the case and, if so, how these concerns can be addressed. It first introduces the reader to the app ecosystem and the Apple App Store, with a focus on Apple's in-app payment policies, along with the 30% commission charged for in-app purchases. After engaging critically with the distinction between apps selling "digital" and apps selling "physical" goods or services, the authors conclude such a distinction to be unclear, artificial and unprincipled. The article then critically reviews several Apple practices that appear to be at odds with competition law, and in particular the EU's treaty competition rules (Article 102 TFEU):

- Market definition and dominance with regard to the App Store, finding that Apple is a monopolist in the market for app distribution on iOS, as it is not subject to any meaningful competitive constraint from alternative distribution channels, such as Android app stores. The result is that Apple is the gateway through which app developers must pass to reach the valuable audience of iOS users.
- This bottleneck position affords Apple the power to engage in several prima facie anticompetitive practices. Apple may exploit app developers by charging excessive fees for the services it provides, and by imposing unfair trading conditions.
- Based on four case studies, the paper illustrates how Apple may use its control of the App Store or iOS to engage in exclusionary behaviour to the detriment of rival apps. These practices should be investigated by competition authorities, as they are likely to result in considerable consumer harm, in the form of higher app prices, worse user experience or reduced consumer choice.

The paper finally proposes a combination of concrete remedies that address the competition concerns identified. Cusumano et al. (2020) builds on earlier work by Gawer, explaining the pro-innovation effects of platform differentiation, as well as the possibility of abusive monopoly. It demonstrates that the power of two-sided platforms is becoming so well known in both economic literature and market deployment, that the policy questions that arise must be dealt with in an ever-expanding set of market circumstances (Gawer & Cowen, 2012). They explain that: "to survive long-term, platforms must also be politically and socially viable, or they risk being crushed by government regulation or social opposition". This is a public policy departure from the earlier literature, which lauded two-sided platforms as more efficient rent-seekers, a response to their overwhelming success at achieving

dominance. They set out a series of competition and public policy issues that platform owners must consider to avoid creating competition law breaches in a later article (Cusumano et al., 2021).

Ibáñez Colomo (2021, p. 309) rebuts arguments for an intervention to prevent platform monopoly, explaining the testing of evidence of anti-competitive conduct from a Chicago School anti-intervention perspective on the notion of anticompetitive effects in EU competition law:

> *The exercise shows that it is possible to discern a concrete meaning to the notion of anticompetitive effects…it has long been clear that anticompetitive effects amount to more than a mere competitive disadvantage and/or a limitation of a firm's freedom of action. The impact on equally efficient firms' ability and/or incentive to compete would need to be established.*

On that basis, the author considers that the regulation of app stores may be premature (Ibáñez Colomo, 2021).

Conclusion

Twenty years or more of literature on the antitrust issues related to the extraordinary rise of digital app stores has created a body of evidence and analysis, which has led to significant proposals for legislative reform towards *ex ante* regulation of dominant app stores. The continued entrenched dominance of Google and Apple is of course the most important determinant of the increased need for regulatory action. In this article, we reviewed the main European antitrust-related evidence, as well as policy arguments for and against app store regulation (section 1), and the academic literature (section 2) which has been most influential to date.

Following major reviews for the European Commission, and several European governments, including the UK's Furman panel and the German government's 'Competition 4.0 Commission', the EU has moved to comprehensive *ex ante* regulation of platform "gatekeepers" such as Apple, to complement *ex post* enforcement of competition law. The final Digital Markets Act (DMA, Article 6(4)) includes specific requirements for app stores operated by platforms designated as "gatekeepers" by the European Commission, such as Apple and Google. In particular, gatekeepers would be required to

> *allow and technically enable the installation and effective use of third party software applications or software application stores using, or interoperating with, its operating system and allow those software applications or software application stores to be accessed by means other than the relevant core platform services of that gatekeeper. The gatekeeper shall, where applicable, not prevent the downloaded third party software applications or software application stores from prompting end users to decide whether they want to set that downloaded software application or software application store as their default. The gatekeeper shall technically enable end users who decide to set that downloaded software application or software application store as their default to carry out that change easily.*[11]

These digital competition reviews, as well as academic scholars, have also argued for broad interoperability requirements for platforms with independent oversight (Hovenkamp, 2021b). The DMA's Article 6(7) would require gatekeepers to "allow providers of services and providers of hardware, free of charge, effective interoperability with, and access for the purposes of interoperability to, the same hardware and software features accessed or controlled via the operating system or virtual assistant listed in the designation decision pursuant to Article 3(9) as are available to services or hardware provided by the gatekeeper" – which would limit the ability of companies such as Apple and Google to ring-fence features of their smartphones and operating systems (such as payment services), whether via their app stores or operating systems themselves.

In this article we also showed how some of these digital market-specific arguments have evolved in Europe out of the heavily-contested policy area of network neutrality, which provides a prior policy case study for the later ongoing debates about app store discrimination. The decade of debates in 2005-15 over two-sided market regulation in the context of the EU's network neutrality regulation played an important part in the evolution of the app store policy debate. Non-discrimination has become an essential item in the regulatory toolkit when analysing barriers in both access and app store markets. Under the DMA, it has now been codified in a form that will permit further extensions of this principle, as for instance in interoperability between messaging apps and APIs.

In Europe, the DMA appears to be the medium-term outcome of that evidence and

11. Proposition de Reglement du Parlement europeen et du Conseil relatif aux marches contestables et equitables dans le secteur numerique (legislation sur les marches numeriques) 2020/0374, 11 May 2022, Article 6(4).

analysis; but literature on regulatory enforcement has shown previous efforts to be extremely cumbersome, heavily resisted by Microsoft, Google and Apple, and ineffective in preventing further abuses of market power. The enforceability of new regulatory requirements is therefore just as important as the content of those requirements in improving the contestability of digital markets mediated by app stores – and is one reason why the European Commission and Parliament rejected member state arguments that enforcement should be the responsibility of national competition authorities rather than the Commission. Civil society groups also emphasised enforceability in their later stage campaigning over the DMA, and successfully argued that representative actions should be allowed by groups, such as consumer associations (Reyna, 2021).

Ironically, following the political agreement of the DMA, European telecommunications companies publicly renewed their fight to water down net neutrality requirements. Thirty-four digital rights groups criticised the proposals as harmful to "freedom of expression, freedom to access knowledge, freedom to conduct business and innovation in the EU" (epicenter.works et al., 2022). It remains to be seen whether the EU institutions build on the rich digital competition evidence base we have described in their response to this lobbying.

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Appendix

TABLE 1: App Store & Associated European Competition Cases

YEAR	CASE	OUTCOME
1997-2001 CASE IV/36.539 BRITISH INTERACTIVE BROADCASTING (BIB, RENAMED OPEN)	COMMISSION DECISION of 15 September 1999 (1999/781/EC) sets out TEN detailed conditions for 7 years from 1998 on the interoperability for BiB set top boxes & associated marketing, and excluding Sky, BT from cable TV market.	Open discontinued 2001 when it became clear that interactive TV shopping was overtaken by WWW - and then iTunes.
2005-8 CASE 39154 30.03.2007 ITUNES	2005 complaint by the British consumer group Which? iTunes tracks in France and Germany were only 99 euro cents ($1.32) for each download, compared with the 79 British pence ($1.56) paid by UK residents.	Reduced UK prices to match the rest of the European market, priced in Euros.

YEAR	CASE	OUTCOME
2014 CASE M.7217 FACEBOOK/ WHATSAPP MERGER	Para 139: "Commission considers that technical integration between WhatsApp and Facebook is unlikely to be as straightforward from a technical perspective as presented by third parties. Moreover, it would pose a business risk for the merged entity as users could switch to competing consumer communications apps".	Commission decision of 3 October 2014 permitted merger with no conditions.
2017 CASE NO. M.8228 – FACEBOOK / WHATSAPP C(2017) 3192 FINAL IMPOSING FINES UNDER ART 14(1) OF COUNCIL REGULATION (EC) NO. 139/ 2004 OF INCORRECT OR MISLEADING INFORMATION	Facebook fined for misleading information in 2014 case Para 70: "efforts being made by Facebook personnel to enable user matching were specifically aimed at matching FB and Instagram accounts, the Phone ID Matching Solution and the mechanisms needed to implement it on the different OSs were (and are) potentially applicable to any app belonging to Facebook. Indeed, during the Merger Review Proceedings, Facebook personnel were considering implementing the Phone ID Matching Solution to match users automatically across FB and WA once WhatsApp Inc. was acquired by Facebook".	"Commission considers it appropriate to impose fines under Article 14(1) of the Merger Regulation of the following amounts: (i) EUR 55 million for the infringement falling within Article 14(1)(a) of the Merger Regulation and Article 4(1) of the Implementing Regulation, and (ii) EUR 55 million for the infringement falling within Article 14(1)(b) of the Merger Regulation"
2020 CASE M.9660 GOOGLE FITBIT MERGER CONDITIONS	10 year (extendable by a further decade) interoperability requirements on APIs and data sharing.	17.12.2020: Art. 8(2) with conditions & obligations OJ C194 Of 21.05.2021 published on 11.05.2021.
2018 CASE M.8788 APPLE SHAZAM MERGER	The transaction raises non-horizontal concerns in relation to music streaming services. The transaction did not meet the EU Merger Regulation thresholds, and was instead referred to the Commission under Article 22.	Commission cleared the transaction, unconditionally following an in-depth phase II review.

YEAR	CASE	OUTCOME
2019-ONGOING AT.40462 AMAZON*	Parallel case: Use of non-public marketplace seller data allows Amazon to avoid the normal risks of retail competition, and to leverage its dominance in the market for the provision of marketplace services in France and Germany.	10.11.2020 Statement of Objections Also includes Amazon Prime "fulfilment by Amazon or FBA sellers": criteria to select the 'winner' of the "Buy Box" and to enable sellers to offer products to Prime users, leading to preferential treatment of Amazon's retail business, or of the sellers that use Amazon's logistics and delivery services.
2020 AT.40716 APPLE - ONGOING	App Store Practices.	IP/20/1073: investigation opened into whether Apple's requirement that developers use its in-app payment scheme, and prohibition on developers informing users of alternative payment mechanisms, are abuses of dominance.
2010 APPLE PRELIMINARY PROBE OVER RESTRICTIONS ON IPHONE APPS	Apple's decision in April 2010 to restrict the terms and conditions of its licence agreement with independent developers of applications, or 'apps', for its iPhone operating system.	IP/10/1175: rationale underlying Apple's requirement to use only Apple's native programming tools and approved languages when writing iPhone apps, which could have ultimately resulted in shutting out competition from devices running other platforms.
2020 AT.40652 APPLE – APP STORE PRACTICES - E-BOOKS	EU e-book/audiobooks pricing.	Note: earlier in 2013, they agreed to change agreements with four publishers (and later Penguin).
2011-13 AT.39847 EBOOKS	Apple's book distribution methods with publishers for iPhones and iPad tablets were anti-competitive.	Communication of the Commission published pursuant to Article 27(4) of Council Regulation (EC) No 1/2003 in Case COMP/39.847/E-BOOKS: J.58.11.

YEAR	CASE	OUTCOME
2020 AT.40452 (APPLE – MOBILE PAYMENTS – APPLE PAY)	Apple's terms, conditions and other measures for integrating Apple Pay in merchant apps and websites on iPhones and iPads. Apple's limitation of access to the Near Field Communication (NFC) functionality ("tap and go") on iPhones for payments in stores, and alleged refusals of access to Apple Pay.	16.06.2020 Press Release IP/20/1075: Commission opens an investigation into whether Apple Pay terms and conditions and limitations of access to secure iPhone hardware are violations of competition rules.
2020-1 AT.40437 APPLE - APP STORE PRACTICES (MUSIC STREAMING)	Mandatory use of Apple's own proprietary in-app purchase system and restrictions on developers to inform iPhone and iPad users of alternative cheaper purchasing possibilities outside of apps.	16.06.2020 Press Release: Commission opened an investigation to cover all apps. 30.04.2021 Press Release: Commission sends Statement of Objections to Apple on App Store rules for music streaming providers.
2021 - AT.40670 GOOGLE - ADTECH AND DATA-RELATED PRACTICES	Investigation of claims Google favours its own services in its adtech supply chain.	22.06.2021 Commission opens proceedings.
2021 - AT.40099 GOOGLE ANDROID	Commission determined Alphabet (Google) illegally restricted Android device manufacturers and mobile network operators in relation to its dominant search engine.	28.09.2021 EU Court of Justice heard an appeal by Google against the €4.34bn fine. Alphabet (Google) argues against the Commission's market definition; claims default apps and search settings constrain user choice and its anti-fragmentation agreement unnecessarily constraints device manufacturers; and they claim a revenue sharing agreement is an illegal exclusivity agreement.

YEAR	CASE	OUTCOME
2021 - AT.40684 FACEBOOK LEVERAGING	Is Facebook illegally using advertising data to compete with advertisers in markets such as classified ads, or tying its Marketplace service to its social network?	4.06.2021 Press Release: Commission opens investigation.
2021 GERMANY FEDERAL CARTEL OFFICE APPLE SIMILAR INVESTIGATIONS AGAINST FACEBOOK (28 JANUARY 2021), AMAZON (18 MAY 2021) AND GOOGLE (25 MAY 2021).	"…its proprietary operating system iOS, Apple has created a digital ecosystem around its iPhone that extends across several markets….Besides assessing the company's position in these areas, we will, among other aspects, examine its extensive integration across several market levels, the magnitude of its technological and financial resources and its access to data. A main focus of the investigations will be on the operation of the App Store as it enables Apple in many ways to influence the business activities of third parties".	Examine whether Apple has "paramount significance across markets" that thwarts competition. In January 2021, 10th amendment to German Competition Act (GWB Digitalisation Act) came into force. Section 19a GWB enables the authority to intervene earlier, against the practices of large digital companies. On 1 May 2022 the BKA determined Google met this test and would be subject to additional controls for a statutory five-year period.
2012-20 FRANCE COMPETITION AUTHORITY CASE CONVICTS APPLE & PREMIUM RESELLERS (NOTE: NOT IPHONE OR APP STORE)	Case opened 2012. Autorité de la concurrence fines Apple for engaging in anticompetitive practices within its distribution network, and abuse of a situation of economic dependency with regard to its "premium" independent distributors. The two wholesalers, Tech Data and Ingram Micro, were also fined, respectively, €76,1 million and €62,9 million for one of the anticompetitive practices.	€1.1billion Apple fine imposed Article L. 420-2, paragraph 2, of the French Code of Commercial Law.

YEAR	CASE	OUTCOME
2017-21 FRANCE COMPETITION MINISTRY OF ECONOMY V APPLE	Filed 26 June 2017, proceeding to court 2021 under Law 442-6-1.	DGCCRF (general directorate for competition, consumption and the repression of fraud) and France Digitale - hearing 17 Sept 2021.
2021 FRENCH COMPETITION AUTHORITY APPLE STORE	Investigating whether Apple favours its own services and products. June 2021: Terms of ad tracking in browser deemed acceptable despite risk of "privacy washing". L.442-1-I-2 French Commercial Code sanctions a commercial partner of "Subjecting or attempting to subject the other party to obligations creating a significant imbalance in the rights and obligations of the parties". Consequently, these unfair terms are deemed unwritten.	Decision expected 2022: according to article L.212-1 of the Consumer Code, unfair clauses are clauses which have the object or the effect of creating a significant imbalance between the rights and obligations of the parties to the contract: "dissuasive sanction system aimed at preventing abuse of buying or selling power".
2021 UK COMPETITION AND MARKETS AUTHORITY APPLE APP STORE	CMA is investigating Apple's conduct in relation to the distribution of apps on iOS and iPadOS devices in the UK, in particular, the terms and conditions governing app developers' access to Apple's App Store.	Follows CMA July 2020 report on online platforms and digital advertising, and advice to the government in December 2020 on a new pro-competition regulatory regime for digital markets. This investigation is under old Chapter II of Competition Act 1998.
2021 UK MARKET STUDY INTO APPLE AND GOOGLE 'MOBILE ECOSYSTEMS' ANNOUNCED JUNE	Apple and Google's dominance of the mobile ecosystem, examine respective smartphone platforms (iOS and Android); app stores (App Store and Play Store); and web browsers (Safari and Chrome).	Not expected until June 2022 - notes decisions in Netherlands, Sweden, Australia. Interim report published in December 2021.

YEAR	CASE	OUTCOME
2021 UK INVESTIGATION INTO GOOGLE'S 'PRIVACY SANDBOX' BROWSER CHANGES	CMA investigates whether Google's removal of cookies from its Chrome browser is anticompetitive.	CMA has accepted and will monitor the implementation of Google's "privacy sandbox" commitments.
2020-2021 UK INVESTIGATION INTO FACEBOOK ACQUISITION OF GIPHY	CMA assesses competition impact of merger.	CMA appeared to become more and more sceptical throughout the investigation, provisionally finding competition concerns, then fining Facebook £50.5m for failing to comply with the initial enforcement order. It finally ordered Facebook to comprehensively unwind the acquisition.

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