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The effects of the revised approach to Article 22 EUMR on the M&A activities of the largest digital firms

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Abstract

The jurisdictional thresholds for merger control are often incapable of catching M&A involving emerging firms with competitive potential but little turnover that are commonly observed in the digital economy. The revised approach to the referral mechanism under Article 22 EUMR allows for closing this enforcement gap in a targeted manner. Still, it also increases the degree of uncertainty imposed on firms engaged in M&A. This thesis examines whether and how this change in approach has affected the behaviour of the largest digital firms. The before and after comparison of their M&A activities shows that the number of transactions has decreased, and the characteristics of completed transactions have changed in a way that may reduce the likelihood of Article 22 EUMR being applied to them. These observations merit attention when assessing the desirability of the new policy given that much of the value created by digital markets is attributable to their tendency towards concentration.

Keywords: competition law, digital economy, merger control, uncertainty

JEL codes: G34, K21, L41

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Authorship declaration

I hereby declare and confirm that this thesis is entirely the result of my own work except where otherwise indicated. I acknowledge the supervision and guidance I have received from Dr Gilbert Bougi. This thesis is not used as part of any other examination and has not yet been published.

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Emmi Ovaskainen

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Abbreviations

Article 22 Guidance	Communication from the Commission – Guidance on the application of the referral mechanism set out in Article 22 of the Merger Regulation to certain categories of cases 2021/C 113/01
Commission	European Commission
DMA	Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act)
EU	European Union
EUMR	Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings (Merger Regulation)
GAFAM	Google (Alphabet), Amazon, Facebook (Meta), Apple and Microsoft
M&A	Mergers and acquisitions
SD	Standard deviation

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1. Introduction

Over the past decade, the mergers and acquisitions ("**M&A**") of large and powerful digital firms and how to best deal with them have been subject to continuous policy discussions worldwide. The five leading firms in digital markets, Google (Alphabet), Amazon, Facebook (Meta), Apple and Microsoft ("**GAFAM**"), are among the most active acquirers in the global market for technology M&A with almost 600 acquisitions just in the 2010s. On a per-firm basis, this was on average almost three times the number of acquisitions completed by other top acquirers that were similarly active in the technology sector (Jin et al., 2023, p. 8). A striking feature of these acquisitions is that the targets are often young start-ups that are still in the process of developing their product and business model. Some of them could, however, have the potential for challenging the leading firms in digital markets in the future if they were to remain independent.[1]

Like in any economic sector, M&A activities pursued in digital markets can have effects that both enhance welfare and reduce it. Such activities may enable firms to improve their products and production processes, leading to greater consumer satisfaction. At the same time, they change the structure of a market by reducing the number of firms that compete against each other in satisfying consumer demand. A high level of market concentration gives rise to problems related to market power, most notably higher prices and lower quantities compared to a perfectly competitive market. To limit the harm arising from market power, a large majority of all jurisdictions have enacted merger laws (OECD, 2021a, p. 9) imposing an obligation on firms to notify competition authorities of their M&A activities which are one strategy to increase their market power.

[1] For example, it would be interesting to know if digital markets would look different if Facebook had not been able to acquire Instagram in 2012. There is hardly any doubt that Facebook and Instagram, two leading social media apps, could be close competitors today. The acquisition has indeed been considered a good example of a case involving a loss of potential competition (Shapiro, 2018, p. 740). Interestingly, the acquisition was reviewed in the United States and the United Kingdom, but neither of the competition authorities considered it necessary to take further action (Glick & Ruetschlin, 2019, pp. 30, 32).

All merger control regimes must somehow distinguish between transactions that might cause harm to competition and those that are unlikely to do so. Traditionally, turnover has been used as a proxy for identifying potentially competitively significant transactions that require scrutiny. In the digital economy, products and services are however usually launched before the businesses are monetised. In this environment, it has become obvious that the current jurisdictional thresholds are ill-equipped to capture transactions that involve recent entrants with no or only little turnover. This deficiency prevents having such transactions examined, a development which appears particularly relevant in the context of GAFAM. Furman et al. (2019) note in this regard that "[n]one [of their transactions have] been blocked and very few have had conditions attached to approval, in the UK or elsewhere, or even been scrutinised by competition authorities" (p. 12). The inability of current merger rules to deal with transactions with targets with low turnover has also been acknowledged by many other authors (Cremer et al., 2019; Scott Morton et al., 2019; Bourreau & de Streel, 2020).

The issue was thoroughly examined in an evaluation of procedural and jurisdictional aspects of the European Union ("**EU**") merger control launched in 2016. On 26 March 2021, the European Commission ("**Commission**") published a new soft law document in which it explains its revised approach to Article 22 of Regulation (EC) 139/2004 ("**EUMR**"). Article 22 EUMR is a legal provision that enables Member States to request the Commission to review, under certain criteria, any transaction that does not meet the jurisdictional thresholds set out in the EUMR. The Commission had until then discouraged requests from Member States that did not have original jurisdiction to review the case themselves. Under the revised approach, the Commission no longer requires reviewability from a transaction at the national level for accepting it to be referred under Article 22 EUMR.

The wider use of Article 22 EUMR is a less interventionist way to close the enforcement gap. The revised approach to Article 22 EUMR did not require amending hard law, nor does it

lead to many additional notifications being made unlike establishing a new generally applicable notification obligation would. Nevertheless, it increases uncertainty faced by firms engaging in M&A activities by making it harder for them to rule out the possibility of merger control. This may lead not only to increased transaction costs, but also possibly reduced transaction volume and value. Given these drawbacks and the characteristics of digital markets, some authors have expressed more sceptical views on using merger control and Article 22 EUMR to alleviate the market power related problems in the digital economy (Cabral, 2021; Franck et al., 2021; Looijestijn-Clearie et al., 2022).

Without disregarding the theoretical context, an important question arises about the actual effects of the revised approach to Article 22 EUMR on firms and sectors now that over two years have passed since its adoption. One group of firms whose M&A activities appear more likely to become subject to Article 22 referrals are the largest digital firms, in particular GAFAM. Although prior literature has examined various aspects of their M&A activities (Argentesi et al., 2020; Gautier & Lamesch, 2021; Motta & Peitz, 2020; Jin et al., 2023), potential changes in their M&A activity brought about by policy changes remains a largely unexplored topic. Building upon the prior literature on policy uncertainty and M&A (Bonaime et al., 2018; Dissanaike et al., 2020), this thesis aims to alleviate the existing knowledge gap by examining the following research question: How has the adoption of the revised approach to Article 22 EUMR affected the M&A activities carried out by GAFAM?

This thesis analyses the effects of law by making use of economic theory and methods, consistent with the law and economics approach. The research question is approached from two perspectives: First, economic literature is reviewed to shed light on the aspects relevant to forming an answer to the research question in theory. Second, the consistency of that theoretical prediction with reality is tested by using summary statistics to analyse data on the M&A activities completed by GAFAM during a period of 10 years between 26 March 2013 and 25

March 2023. The transactions that took place during the last two years of this period were exposed to increased uncertainty under the revised approach to Article 22 EUMR.

The remainder of the thesis is structured as follows. Chapter 2 provides an overview of prior literature. It is first examined what drives M&A activities in digital markets and what are their effects. The focus then shifts to the revised approach to Article 22 EUMR and how it contributes to addressing the problem around transactions involving low turnover targets. Finally, it is discussed how uncertainty exacerbated by the change in merger policy affects incentives to engage in M&A activities. Chapter 3 formulates the expected answer to the research question based on theory. Chapter 4 describes the data collected for testing that prediction and the methodology used in the analysis. Chapter 5 presents the results of the analysis and takes notice of its limitations. Chapter 6 summarises the contribution of this thesis and provides concluding remarks on the topic.

2. Literature review

2.1. M&A in digital markets

M&A are a term that is generally used for describing corporate activities in which the operations of at least two previously independent firms are combined to create a single, but larger firm. Despite leading to similar outcomes in the bigger picture, mergers differ from acquisitions in the way they are legally structured. A merger occurs when one firm merges with another and ceases to exist post-transaction, or when firms are combined to form an entirely new firm and all original firms cease to exist (Gaughan, 2018). On the other hand, an acquisition or takeover refers to a transaction where a firm acquires control over another firm by purchasing a majority of its shares from their current owners (Davies et al., 2017, p. 201). The target preserves its legal personality post-transaction but becomes a subsidiary of the acquirer.

As McCarthy (2013) states, "[m]ergers are everyday occurrences" (p. 11). To explain why firms so often engage in them, a distinction can be made between value-maximising and non-value-maximising theories (Madura et al., 1991; Romano, 1992; Weitzel & McCarthy, 2013). The former departs from the assumption that M&A activities increase the value of the firms involved.[2] There are a variety of reasons for such an increase, one being greater efficiency. For example, Manne (1965) argues that takeovers lead to greater efficiency when agency costs are reduced by replacing inefficient management. Another common explanation is the realisation of synergies which is possible when the value of a combined firm exceeds the sum of its parts separately (Gaughan, 2018). Operating synergies result from economies of scale or scope that are present when cost savings can be made by increasing production or producing more than one product type, whereas financial synergies are those achieved through reduced cost of capital (Romano, 1992, pp. 126-128).

Another theory seeking to explain the existence of M&A activities relates the increase of the value of the acquirer to an increase in its market power (Romano, 1992, p. 142). Based on standard economic theory that shows how market power enables firms to raise prices above marginal cost, the source of value increase here is the transfer of wealth from consumers to the acquirer. Even if no monopoly position is obtained due to the limitations of merger laws, a more concentrated market structure might facilitate a collusion between market participants which also leads to higher prices (Stigler, 1964). Despite the attractiveness of this theory, no evidence has been found to support it (Ghosh, 2004; Eckbo, 1983). Thus, where a value increase is observed post-transaction, it might be better explained by efficiency-related reasons than those related to market power.

[2] As for non-value-maximising theories, the starting point is the opposite, that is, not all transactions result in a value increase. These theories often stress managerialism as an explanation for unprofitable transactions. For example, boundedly rational managers can make well-intentioned but poor decisions, or rational but self-serving managers can make decisions to maximise their own utility instead of that of shareholders (Weitzel & McCarthy, 2013).

More recently, the theory concerning so-called killer acquisitions has gained much attention in economic literature. The notion was first used by Cunningham et al. (2021) to describe a phenomenon where an incumbent firm acquires a potential competitor with a promising, yet nascent innovation and terminate it to eliminate competition that could arise in the future. To test this theory in the pharmaceutical sector, the authors analysed data on over 16,000 pharmaceutical projects initiated by over 4,000 firms between 1989 and 2010, almost 24% of which were acquired at some point of the development process. They found that projects that were acquired and overlapped with the products of the acquirer were more likely to be discontinued compared to those that were not acquired or overlapping. It was suggested that about 6% of all pharmaceutical acquisitions are killer acquisitions, and these often occur shortly below the jurisdictional threshold for merger control in the United States.

The notion of killer acquisitions was quickly adopted in the digital sector to describe acquisitions by incumbents of start-ups whose products disappeared from the market post-transaction. The existence of this phenomenon was cautiously supported by Gautier and Lamesch (2021) who studied it in the context of GAFAM. However, some authors have rejected extending the theory of killer acquisitions to the digital sector. Even Gautier and Lamesch (2021, p. 10) acknowledge that they were not able to screen between different explanations for post-transaction product discontinuation, some of which can be perfectly valid. While product overlaps were an important predictor of discontinuation for Cunningham et al. (2021), Cremer et al. (2019, pp. 117-118) note that products acquired in digital markets are often complementary to the acquirers' ecosystems or products. For this reason, such products are more likely to be integrated into the acquirers' offering than terminated. Furthermore, although both digital and pharmaceutical industries are known for substantial spending in research and development, Holmström et al. (2019, p. 10) and Manne et al. (2021, p. 1096-1097) emphasise the differences between them in innovation and product development.

While the development of pharmaceutical products and their use is highly regulated, this is not the case for digital products, the use of which can evolve quickly after their launching. Due to these inherent differences, applying the findings from one industry to another might be problematic without further industry-specific research.

With the considerations of motives for M&A activities aside, there is no doubt that the digital sector belongs to those economic sectors whose M&A intensity is particularly high. From all acquirers operating within that sector, GAFAM are the largest and most active ones, and their targets are typically young and innovative start-ups (Jin et al., 2023; Gautier & Lamesch, 2021; Argentesi et al., 2020; Furman et al., 2019). When policy decisions about how to deal with these transactions are made, several authors stress how crucial it is to sufficiently understand and consider the characteristics of digital markets (Bourreau & de Streel, 2020; Calvano & Polo, 2021; Argentesi et al., 2020). At the same time, the characteristics of digital markets may help explain why firms engage in M&A activities in those markets as often as they do.

The digital economy comprises various products and services, the provision of which relies on the utilisation of digital technologies. Although firms of very different size and nature are present in digital markets, the structure of these markets is often highly concentrated. Cremer et al. (2019, p. 19) distinguish between three important features of digital markets that explain this development. First, many digital products enjoy network effects which can accelerate their growth since their value to a user depends on the number of other users, inducing users to coordinate on which product to use and preventing them from switching from one product to another. Second, digital products are often characterised by economies of scale and scope, in the presence of which average costs can be reduced by growing the business and expanding it to adjacent markets. Third, digital products can be used for collecting and analysing data to understand better user preferences, enabling quality improvements and targeted offering. These

features can further facilitate and induce the development of digital ecosystems where complementary and interconnected products are integrated to create greater value than if they were offered as standalone products.

These features often provide an important competitive advantage to an incumbent firm and a significant barrier to entry. They also make digital markets often prone to tipping where competition *in* the market shifts to competition *for* the market, leading to one firm eventually winning the market (Cremer et al., 2019; Furman et al., 2019; Scott Morton et al., 2019). This brings us to another feature of digital markets, namely the unpredictable but disruptive nature of innovation (Bourreau & de Streel, 2020, p. 5). Digital markets evolve quickly, and incumbents that do not keep up with technological progress will be displaced by more innovative entrants. However, Furman et al. (2019, p. 4) argue that competition for the market cannot be trusted to address the problem of market power in the digital economy. A less problematic explanation for this the fact that GAFAM themselves clearly take innovation seriously as their enormous spending on research and development implies (Furman et al., 2019, p. 20). Yet these same firms have repeatedly been investigated and fined by competition authorities for their anticompetitive practices which may explain their ability to hold their strong position in digital markets.

2.2. Effects of M&A on digital markets

There is an extensive body of literature that examines the effects of M&A on the economy at large and digital markets more specifically. That literature can be divided into two broader categories, the theories that focus on competition and the ones that concern innovation. It should be stressed that from the perspective of both competition and innovation, M&A can have both welfare-enhancing and welfare-reducing effects. In many cases, they can lead to greater efficiency and cost reductions due to economies of scale and scope (Van den Bergh et. al, 2017). In addition, the increase in market power may equip the merging firms with a stronger

bargaining power and improved abilities to make investments (Gaughan, 2018). As a result, they can be better positioned post-transaction to put competitive pressure on the other firms, enhancing the overall level of competition in the market.

The largest digital firms are known to systemically acquire young and innovative start-ups, some of which could become a competitive threat in the future, which raises concerns about the elimination of potential competition (Gautier & Lamesch, 2021; Motta & Peitz, 2021; Katz; 2021). Both actual and potential competition imposes a "competitive constraint on a firm's behaviour" (OECD, 2021b, p. 9) by preventing it from raising prices, lowering quality, narrowing selection, and slowing innovation. In markets where competition is *for* the market rather than *in* the market, potential competitors are crucial because they can be the only mechanism that disciplines incumbents (Argentesi et al., 2020, p. 96). Given that monopoly profits cannot be earned if entry occurs, Gilbert and Newbery (1982, p. 514) show that a firm with market power has an incentive to prevent entry by taking pre-emptive actions such as acquisitions to preserve its position, and this pre-emption will occur if its cost is below the profits gained from preventing entry.

The use of acquisitions to eliminate potential competition was famously demonstrated by Cunningham et al. (2021) in the pharmaceutical sector. Cabral (2020, p. 3) however argues that pre-emptive acquisitions are less likely to occur in digital markets because it is much more difficult to predict which entrant could pose a threat to the incumbent in the future. According to him, acquisitions are instead a means for transferring technology. Argentesi et al. (2020, p. 99) similarly find that the largest digital firms often acquire complementary or otherwise related products or services, while purely horizontal transactions appear to be rarer. Yet, even if there are no concerns about the elimination of potential competition between the incumbent and potential entrant, M&A could still have a detrimental effect on competition if they reinforce leading incumbents by widening the technological gap between them and their competitors.

Bryan and Hovenkamp (2020, pp. 623-625) demonstrate that leading incumbents have an incentive to acquire promising technologies even when they do benefit their own business, to prevent them from being acquired by their competitors who could consequently catch them up.

The other strand of literature focuses on the effects of M&A on innovation. Fundamentally, there are two diverging views on how market structure may affect incentives to innovate. For Schumpeter (1942), the prospect of market power is what drives innovation, and higher prices from a temporary monopoly in the short run are necessary for enabling technological progress in the long run. By contrast, Arrow (1962, pp. 620-621) shows that a monopolist has less incentives to innovate than a firm that faces competition. This stems from the fact that the former already generates monopoly profits and introducing a new product would cannibalise some of its own profits. Although useful, the link between market structure and innovation may not be directly relevant to assessing the effects of M&A. This is because M&A do not just reduce the number of firms on the market but rather affect the firms' incentives and abilities to innovate (Calvano & Polo, 2021). Some authors claim that M&A inevitably reduce the firms' incentives to innovate by internalising the negative externality that innovation by one firm has on the other (Federico et al., 2017, p. 137). At the same time, M&A can prevent duplicative efforts and pool complementary resources in research and development that may ultimately lead to a positive overall effect on innovation (Denicolò & Polo, 2018).

In assessing the innovation effects of acquisitions of potential entrants, it is helpful to distinguish between the entrant's incentives and abilities to innovate and the incumbent's actions after the acquisition. From the perspective of a potential entrant, Rasmusen (1988) shows that the possibility of being bought out by an incumbent firm increases its incentives to enter the market compared to a situation where that possibility does not exist. Consequently, more efforts to innovate may be undertaken to facilitate entry, although inefficient entry may also take place (Bourreau & de Streel, 2020, p. 9). Moreover, a potential entrant may lack

necessary resources to develop its innovation, in which case it may only reach the market if it is being acquired (Fumagalli et al., 2020, p. 1). On the other hand, Kamepalli et al. (2020, p. 3) argue that quick acquisitions may also make it harder for potential entrants to find investors to finance their entry. This is because the investment decision relies on the acquisition price which in turn depends on the ability of the entrant to attract customers if it were to remain independent. If customers anticipate a quick acquisition however, they are not willing to incur the cost from switching between the incumbent's and entrant's products. Bryan and Hovenkamp (2020, p. 628) further suggest that the anticipation of buyout may affect the direction of innovation because it is more profitable for a start-up to sell its innovation to the leading incumbent than its rivals.

Whether the products of the acquirer and target are substitutes or complements to each other may be an important indicator of what happens to the target's innovation post-transaction. An incumbent who acquires a potential entrant must decide whether to continue to develop its innovation or shelve it (Fumagalli et al., 2020). Bourreau and de Streel (2019, p. 11) argue that incumbents may have more to gain from developing innovations than entrants if there are strong synergies either on the supply-side or demand-side. In this case, the acquisition would fasten the development and deployment of the innovation. Gilbert and Newbery (1982, p. 514) however note that pre-emptive actions taken by incumbent to eliminate potential competition can also lead to unused assets. Cunningham et al. (2021, p. 3) indeed show that product overlaps between the acquirer and target increase the likelihood of the acquired innovation being shelved. Gautier and Lamesch (2021) observe that most brands acquired in digital markets by GAFAM disappear from the market post-transaction, but this may also relate to explanations other than killer acquisitions. Ivaldi et al. (2023) reject the existence of killer acquisitions in the digital sector, although their results may be limited by the fact that they do not analyse

transactions below the jurisdictional thresholds for merger control which could be where killer acquisitions are more likely to occur (p. 21).

2.3. Revised approach to Article 22 EUMR

From an economic point of view, the social cost of market power has traditionally been considered to justify the enactment and enforcement of competition laws (Van den Bergh et. al, 2017). While other areas of competition law operate on an *ex post* basis by reacting to unilateral or collective exercise of market power, merger control focuses on the acquisition of market power through M&A activities. In essence, merger control is tasked with distinguishing between welfare-enhancing and welfare-reducing transactions and only allowing the former ones. In doing so, the scarcity of resources requires that enforcement efforts are directed at transactions that are most likely to cause harm. Designing and operating systems that can succeed in these tasks is a fundamental challenge for regulators and competition authorities. This is not least due to the informational disadvantage that they face compared to firms, and this information asymmetry is even more significant in the context of digital markets (Furman et al., 2019, p. 4). Merger control thus entails a risk of error by either preventing welfare-enhancing transactions or allowing welfare-reducing ones, and the question which one of these is costlier divides opinions (Cremer et al., 2019, p. 4; Manne et al., 2021, p. 1053).

In the EU, the legal basis for merger control is the EUMR. It aims to ensure that concentrations, including mergers, acquisitions of control and full-function joint ventures, do not result in lasting damage to competition. To this end, the EUMR provides for a mandatory *ex ante* notification system which requires all concentrations with an EU dimension to be notified to and cleared by the Commission prior to their implementation. Under Article 1 EUMR, a concentration has an EU dimension if the combined worldwide turnover of its participants exceeds EUR 5 billion, and the individual EU-wide turnover of at least two of them exceeds EUR 250 million. Alternatively, it has an EU dimension if the combined worldwide

turnover of the participants exceeds EUR 2.5 billion, their combined turnover exceeds EUR 100 million in each of at least three Member States, the individual turnover of at least two of them exceeds EUR 25 million in those three Member States, and the individual EU-wide turnover of at least two of them exceeds EUR 100 million. However, if each participant generates at least two thirds of their EU-wide turnover from one and the same Member State, a concentration has no EU dimension.

The competence to review concentrations with an EU dimension lies exclusively with the Commission. This allows firms with cross-border operations to benefit from a so-called one-stop shop principle, according to which they can obtain a clearance for their transaction from the Commission instead of having to go through several investigations in Member States with possibly diverging outcomes. On the other hand, concentrations with no EU dimension fall within the exclusive competence of Member States based on their national jurisdictional thresholds. It is however possible that jurisdiction is not always assigned to the authority that is best positioned to examine a particular concentration. For such cases, the EUMR contains corrective mechanisms which enable reallocating jurisdiction from the Commission to Member States or the other way around. One such mechanism, and the subject of this thesis, is set out in Article 22 EUMR.

Under Article 22 EUMR, Member States may request the Commission to examine any concentration that does not have an EU dimension. A referral can be made under two requirements: First, a concentration must affect trade between Member States and second, it must threaten to significantly affect competition within the territory of the Member States making the request. The wording of Article 22 EUMR leaves a considerable margin of discretion to Member States and the Commission in deciding whether a referral request is made or accepted. In exercising that discretion, the Commission had established a practice of discouraging requests from Member States that did not have jurisdiction to review the

transaction themselves. This practice rested upon the fact that most Member States had national merger control systems in place by that time and the presumption that if transactions did not merit a review at the national level, they were also unlikely to have a significant impact on the internal market (Commission, 2021, p. 2).

On 26 March 2021, the Commission completed the evaluation of procedural and jurisdictional aspects of EU merger control and concluded that neither the jurisdictional thresholds in the EUMR nor their national equivalents have been able to capture all competitively significant transactions in the internal market. Especially transactions taking place in the digital and pharmaceutical sectors, where target firms often have little or no turnover at the time of the transaction, have been escaping scrutiny (Commission, 2021, p. 2). To address this, the Commission decided to make use of the discretionary nature of Article 22 EUMR, the wording of which makes no reference to the notifiability of transactions at the national level. Its revised approach to Article 22 EUMR was presented in a soft law document ("**Article 22 Guidance**") that sheds light on the categories of cases that may be good candidates for a referral. In essence, these include transactions where the actual or future competitive potential of the target is not reflected in its turnover. A copy of the publication of the Article 22 Guidance in the Official Journal of the EU is provided in Appendix 1.

The Article 22 Guidance makes it clear that the industries concerned, the profile of the target, and the size of the transaction are among the most important factors to consider when assessing if a particular transaction could be a good candidate for a referral (de Ugarte et al., 2022, p. 20-21). First, although not limited to any particular sectors, the digital and pharmaceutical sectors are mentioned as sectors where it is more common that targets are acquired before they start to generate significant turnover. Second, it is noted that low turnover does not mean that these firms do not have a significant role on the market. This holds especially where the target is a recent entrant with significant competitive potential, while still

being in the process of developing its business model. This could further be the case if the target is an important innovator, it is an important competitive force, it has access to competitively significant assets, or it provides key inputs for other industries. Third, it is pointed out that if the value of the transaction is particularly high compared to the turnover of the target, this might be a useful indication of its competitive significance.

The revised approach to Article 22 EUMR does not create any obligation to firms to notify competition authorities of their M&A that could meet the requirements set out in the Article 22 Guidance. They can nevertheless contact the Commission to get an indication about the applicability of Article 22 EUMR to their transaction. This is one way for the Commission to identify relevant transactions, in addition to which it may receive information from national competition authorities or third parties and monitor markets on an *ex officio* basis. Considering that a long time might elapse before competition authorities discover non-notifiable transactions, there is no binding deadline for referrals. Referring a transaction would generally not be appropriate however if over six months has passed from its implementation. As for GAFAM and other large digital firms falling in the scope of Regulation (EU) 2022/1925, commonly referred to as the Digital Markets Act ("**DMA**"), becoming aware of their transactions is not going to be an issue. This is due to Article 14 DMA that imposes an obligation on them to inform the Commission of all their transactions related to the digital sector. The information received this way can then be used for the purposes of Article 22 EUMR.

The Article 22 Guidance began to apply with immediate effect. So far, the only referral request of a non-notifiable transaction is the acquisition of Grail by Illumina, both United States-based firms operating at the different levels of the blood-based cancer test market, was accepted in April 2021 only a few weeks after the new policy was adopted. The Commission's decision was later endorsed by the General Court of the EU. By mid-December 2022, the

Commission had examined the suitability of over 30 transactions for a referral under Article 22 EUMR (Brockhoff, 2022, at 2:32:11). About one fourth of them took place in the digital sector. With the exception of the above acquisition of Grail by Illumina, none of the examined transactions ultimately merited for a referral.

2.4. Effects of uncertainty on M&A

The criticism towards the revised approach to Article 22 EUMR has centred around the wide discretion enjoyed by Member States and the Commission in making referral requests and accepting them. One open issue relates to its effectiveness and effects on the one stop shop system (Franck et al., 2021; Looijestijn-Clearie et al., 2022). With some Member States having already amended their national jurisdictional thresholds to capture competitively significant transactions involving low turnover targets, it is uncertain whether competition authorities are willing to make use of Article 22 EUMR as intended. This creates a risk of parallel investigations by the Commission and those Member States that did not join the referral request made by another Member State with possibly diverging decisions. Even if they are aligned, it is clear that multiple filings increase the costs and burden imposed on those firms affected. A recent example of parallel investigation is the acquisition of Kustomer by Facebook that was examined by both the Commission and the German competition authority (Commission, 2022; Bundeskartellamt, 2022).

Another concern raised in the literature is the impact of increased uncertainty under the revised approach to Article 22 EUMR on firms pursuing M&A activities. It should be noted that legal certainty and legitimate expectations which are general principles of EU law do not prevent the Commission from changing its policy when the effective enforcement of competition rules so requires (Looijestijn-Clearie et al., 2022, pp. 561-562). This does not change the fact that firms that were previously able to assess merger control risks based on clear and precise criteria now face a risk of their below-threshold transaction being called back

for review even after its completion. While this type of uncertainty may diminish over time when the revised approach becomes more established (Franck et al., 2021, p. 25), the extent to which it may still discourage M&A activities remains unclear. On a similar note, Sokol et al. (2022) report mixed views from practitioners when asked about how increased uncertainty under the Biden administration has affected M&A, some observing more failed transactions while others insist that "no one is abandoning deals just because of the current state of agency investigations and rhetoric" (p. 27).

To better understand how uncertainty embedded in the revised approach to Article 22 EUMR may affect incentives to pursue M&A activities, both welfare-enhancing and welfare-reducing, it is essential to first understand how such decisions are made. Building upon Smith (1776/1993) who stresses self-interest as a driver for human behaviour and Mill (1836/2011) who associates human nature with a desire to possess wealth and capability to judge which means to use for reaching that end, the proponents of rational choice theory suggest that "human behavior can be explained by a generalized calculus of utility-maximizing behavior" (Stigler & Becker, 1977, p. 76). In other words, rational individuals make decisions based on a cost-benefit analysis to maximise their utility. If a decision must be made between choices with uncertain outcomes, individuals weigh the probabilities of each outcome and choose an action from which they expect to yield the highest utility (von Neumann & Morgenstern, 1944).[3]

The classical theory of the firm assumes analogously that firms seek to maximise their profits. This assumption has been challenged by Simon (1959) and Shubik (1961) who find the theory inadequate in explaining decision-making at the level of a firm. An outcome where a firm does not maximise its profits can stem from several factors. Most importantly, the

[3] Insights from behavioural economics have later been used to challenge expected utility theory, an extension of rational choice theory. For example, Kahneman and Tversky (1979) show in their prospect theory how individuals tend to evaluate choices with uncertain outcomes differently depending on whether they involve gains or losses. Individuals generally prefer certain gains over uncertain gains even if the expected utility derived from the former is lower compared to the latter, whereas in terms of losses, the opposite holds.

delegation of decision-making powers from owners to managers may lead to conflicting goals being pursued. Other explanations relate to the facts that business decisions are typically complex in their nature, uncertain in their outcomes, made based on incomplete information and in anticipation of what other market participants do. Despite its deficiencies with regard to the realities where firms operate, the classical theory continues to find use in business and policymaking due to its ability to explain many phenomena related to firm behaviour (Pindyck & Rubinfeld, 2018, p. 28).

One of the strategies that firms often use to maximise their profits is engaging in M&A activities. These activities can be considered investment decisions made by the acquirer (Madura et al., 1991, p. 31). The concept of investment rests on the assumption that resources are a source of income, and those resources can be used in more than one way to secure that income. Resources can be diverted from the production of present goods to the creation of capital goods through investment, enabling the production of future goods. An investment implies thus a trade-off between present income and future income. Anyone in that situation is torn between an impulse to spend and an impulse to invest, as described by Fisher (1930). Whilst the former is caused by the impatience for an instant enjoyment, the latter is driven by the opportunity to increase it through delay. It is this subjective element of human impatience, the preference for present over future, and that objective element of investment opportunity that determines the rate of interest, the price paid for exchanging present goods for future ones. A given rate of interest, however, determines which one of the alternative uses of resources has the maximum present value and is thus chosen (Fisher, 1930).

Postponing present income to the future in the hopes of being able to make more profit always entails a level of uncertainty. The nature of that uncertainty that firms face when they make investment decisions varies. It can include uncertainty over the cost of an investment, the difficulty to complete it, and the future profit that follows from it. In this respect, an important

distinction must be made between risk, uncertainty that is measurable, and uncertainty that is not (Knight, 1921). The former should not be considered uncertainty at all because firms can take it into consideration in their probability calculations, while dealing with the latter requires a subjective judgment call. For Knight (1921), the emergence of profit is linked with the ability and willingness of certain individuals to take up opportunities, the success of which cannot be known in advance. It is generally assumed that where the future reward for taking certain action is uncertain, it must be larger than the reward that would be obtained with certainty, reflecting the degree of uncertainty.

There is a growing body of literature on the effects of economic policy uncertainty on firm-level decision-making. Baker et al. (2016) define economic policy uncertainty as "uncertainty about *who* will make economic policy decisions, *what* economic policy actions will be undertaken and *when*, and the economic *effects* of policy actions (or inaction)" (p. 1598). This type of uncertainty arises especially in connection with tax, government spending, monetary, and regulatory policies. Economic policy uncertainty is generally associated with a negative impact on the economy, including increased stock price volatility and reduced growth; investment; and employment (Baker et al., 2016, p. 1596). Al-Thaqeb and Algharabali (2019, p. 9) confirm that claim in a literature review, concluding that economic policy uncertainty has a significant impact on firm financial decisions overall and a high degree of it induces firms to act more conservatively. For example, it creates incentives for firms to delay their investments if such investments are at least partially irreversible (Dixit & Pindyck, 1994, p. 6).

Several recent studies suggest that policy uncertainty significantly affects firm behaviour in the context of M&A. Nguyen and Phan (2017) find that policy uncertainty both reduces firm acquisitiveness and delays the completion of transactions. This leads to reduced M&A volume and value at the industry level. However, policy uncertainty appears to increase the profitability of transactions for acquirers since they are encouraged to choose more carefully which firms

to acquire and enjoy a wealth transfer from financially constrained targets. Bonaime et al. (2018) similarly show that policy uncertainty decreases the number and value of M&A at the macroeconomic level but also the likelihood that a firm announces M&A in the year following heightened policy uncertainty. These transactions appear not to be delayed but rather lost completely. Moreover, policy uncertainty increases the probability that transactions that have already been announced are cancelled at a later stage (Dang et al., 2022). Gregoriou et al. (2021) further show that fewer cross-border M&A are directed into countries with high policy uncertainty, whereas high policy uncertainty in the acquirer country increases the number of outbound M&A.

With the exception of the study by Dissanaike et al. (2020), the impact of uncertainty arising from merger control on M&A activity has remained a largely unexplored topic in the literature.[4] Dissanaike et al. (2020, p. 4-5) suggest that merger control imposes two-fold costs on firms: Real costs such as process-related transaction costs, reputational risks, and the cost of disclosing private information determine the profitability of a transaction, while uncertainty-related costs lessen the attractiveness of engaging in transactions possibly subject to merger control. This uncertainty stems from the vagueness of the EUMR, the discretion of the Commission, the susceptibility of merger control to political influences, and legal uncertainty arising from questionable decisions. These costs together discourage not only anticompetitive but also procompetitive transactions by reducing their profitability and lead to reduced overall M&A activity. By comparing transactions that were reviewed under the EUMR with those that were not, Dissanaike et al. (2020, p. 8) find that merger control has a negative effect on the profitability of M&A. Given that the EUMR was reformed in 2004 in a way that reduced

[4] On a more general but related note, Bittlingmayer (2001) studies the impact of antitrust enforcement, as a proxy for policy uncertainty, on capital investment in the United States between 1947 and 1991. He finds that low investment rates in certain periods can be explained, at least in part, by aggressive antitrust enforcement during those periods (p. 321-322).

uncertainty, they further observe that reviewed transactions that were announced post-reform had higher acquirer returns compared to pre-reform period.

3. Theoretical contribution

The current trend where large digital firms, with GAFAM at the forefront, acquire small and innovative start-ups is well-documented in prior literature. These acquisitions may well have positive implications for digital markets, but they may also simultaneously harm competition and innovation. Until recently, there was practically no way of having the effects of these transactions examined because the turnover of the targets is typically below the jurisdictional thresholds set out in the EUMR or its national equivalents, and competition authorities have thus no jurisdiction over them. To close this enforcement gap, the Commission changed its approach to the referral mechanism under Article 22 EUMR and can now obtain jurisdiction over cases that meet its legal requirements. The Commission has also expressed its intention to encourage referrals when a transaction falls within the categories of cases that are considered to constitute good candidates for a referral under the Article 22 Guidance.

A striking feature of the Article 22 Guidance is that it does not explicitly express what it aims to achieve. However, it does state that the revised approach to Article 22 EUMR allows for ensuring that "additional transactions that merit review under the [EUMR] are examined by the Commission, without imposing a notification obligation on transactions that would not warrant such review" (Commission, 2021, p. 3). Considering that the EUMR empowers the Commission to challenge transactions that would significantly impede effective competition, merger control deters such transactions by discouraging firms from attempting them in the first place and preventing those that are still pursued. The revised approach to Article 22 EUMR widens the enforcement powers of the Commission and enables that two-channel deterrence effect to be extended to transactions that do not initially trigger merger control in the EU. The aim of the policy change could thus be the deterrence of low-turnover transactions that have a

significant anticompetitive effect. At the same time, there is a trade-off between having a flexible discretion-based system with targeted referrals and uncertainty imposed on firms engaged in M&A activities.

Prior literature finds consistently that uncertainty has important implications for all decision-making at the firm level, including those related to M&A. Evidence on the negative relationship between policy uncertainty and M&A activity is apparent, and the study by Dissanaike et al. (2020) demonstrates that merger control as a policy area is no exception in this respect. Merger control and especially uncertainty embedded in it deters M&A activities by reducing their profitability, leading to fewer transactions overall, both anticompetitive and procompetitive ones. The degree of uncertainty has an important role in determining the gravity of the decrease in the profitability of M&A activities following from merger control. From the perspective of an optimal merger policy, keeping uncertainty at minimum appears thus to be of key importance in preserving incentives to pursue procompetitive transactions.

This is the context in which the research question of this thesis is to be examined. The aim of this thesis was to find out whether the adoption of the revised approach to Article 22 EUMR has influenced the M&A activities of the largest digital firms and the most active acquirers in the digital economy, namely GAFAM. Following Dissanaike et al. (2020), since the adoption of the revised approach to Article 22 EUMR creates a risk of certain previously unreviewable transactions being investigated and challenged, it can similarly be expected to reduce the profitability of these transactions and consequently also their frequency. The prediction that amending merger policy in a manner that increases uncertainty leads to a decrease in M&A activity is also in line with the insights from more general literature on investment and uncertainty. One should thus be able to observe a decrease in M&A activities carried out by GAFAM after the adoption of the revised approach to Article 22 EUMR. In addition, it is

reasonable to expect that changes in other M&A characteristics occur too if this way the risk of the transaction being a good candidate for a referral can be reduced.

Nevertheless, there are certain reasons to believe why the revised approach to Article 22 EUMR might not have induced a notable change in the behaviour of GAFAM. It should be remembered that the change in the Commission's policy only concerns the possibility to review certain transactions that have previously escaped scrutiny, while the substantive test for intervention has remained the same. Current rules on merger control are in many ways ill-equipped to deal with M&A in digital markets, which is also reflected in the fact that the few GAFAM acquisitions that have been scrutinised have often been cleared without conditions, even the acquisition of WhatsApp by Facebook in 2014 that possibly led to a loss of potential competition (Glick & Ruetschlin, 2019, p. 49). Given that most GAFAM acquisitions are not clearly horizontal, it is more difficult for the Commission to prove their harm to competition, and the firms may thus consider the probability of their transactions being challenged low. Another thing that may dilute the deterrence effect of the revised approach to Article 22 EUMR is the fact that it has only been used once after its adoption almost two and a half years ago, implying that the decision to apply it is reserved for more exceptional situations. The firms may thus not be deterred from engaging in M&A if they expect that the chance of their transaction being caught by Article 22 EUMR is small.

4. Data and methodology

4.1. Sample and variables

Given the widespread concerns about GAFAM using M&A to maintain and increase their already significant market power and the need for addressing this, there is little doubt that Article 22 EUMR will be used for catching their transactions as soon as the requirements for its application are met. Furthermore, the notification obligation under Article 14 DMA ensures that competition authorities will be aware of all of their transactions in the digital sector and

have sufficient information to assess whether there are grounds for these transactions to be referred. GAFAM are thus an ideal group for studying the effects of the revised approach to Article 22 EUMR since they, if anyone, are at risk of having their low-turnover transaction referred to the Commission and will adapt their M&A behaviour in anticipation of this.

To study whether the adoption of the revised approach to Article 22 EUMR has affected the M&A behaviour of GAFAM as predicted above, data corresponding to that topic is required. For this purpose, data is collected from Refinitiv Eikon, a financial market data platform containing details over 1.3 million global transactions from the 1970s until today. Refinitiv Eikon extracts its data from the same M&A database as Refinitiv SDC Platinum, another platform that is commonly used in studies that examine the effects of uncertainty on M&A (Nguyen & Phan, 2017; Bonaime et al., 2018; Dissanaike et al., 2020; Gregoriou et al., 2021; Dang et al., 2022) and the GAFAM acquisitions (Jin et al., 2023). Refinitiv Eikon tracks different M&A types and provides various details on the transaction and firms involved.

The following filters are used to construct the sample: First, the ultimate parent of the direct acquirer is one of GAFAM. Second, the transaction concerns acquiring a stake of at least 50% in a target or raising an existing stake from below 50% to above it. Third, the transaction is unconditional and completed. Finally, the transaction is announced between 26 March 2013 and 25 March 2023. The first two filters contribute to ensuring that only those GAFAM acquisitions that result in a change of control are included in the sample. If there is no change of control, that is, the possibility of exercising decisive influence on a target is not transferred, merger control is not triggered under the EUMR. The third filter excludes rumoured, pending, and withdrawn transactions from the sample to give a true picture of the realised M&A activity in the past. The fourth filter captures a period of 10 years, including the date on which, the revised approach to Article 22 EUMR was adopted, that being 26 March 2021. This period

allows for making enough observations of the characteristics of the GAFAM acquisitions both before the policy change and after it.

These filters generate a sample of 391 observations, each of which represents one GAFAM acquisition and are listed in Appendix 2. Various details for each of them are extracted, including the transaction synopsis; the direct acquirer and its ultimate parent and their nations; the target and its nation; date of establishment and turnover; their macro-level and mid-level industry classifications based on SIC and NAIC codes and the firms' overall business description; the dates on which the transaction was announced and on which it was completed; the value of the transaction; and whether any regulatory authorities[5] had jurisdiction over the transaction. After downloading the data in a spreadsheet file, the raw data is altered where necessary for the purposes of the analysis. First, all dates are changed to a same format. Second, the geographic locations of the targets are used for creating a new variable to indicate whether the target is located in the EU. Third, the age of the targets is calculated by subtracting the date on which its acquisition was announced from the date on which it was established. Fourth, the missing transaction values are filled in by using the transaction synopsis. Finally, the variable indicating whether any regulatory authority had jurisdiction over the transaction is changed to yes or no.

4.2. Methodology

Considering that this thesis aims to explore how the characteristics of M&A activities carried out by GAFAM have developed since the revised approach to Article 22 EUMR was adopted and it is predicted that the increased risk of becoming subject to merger control should be reflected especially in the volume of transactions but possibly also in other M&A characteristics, the research question can be best answered by analysing the collected data by

[5] The notion of regulatory authorities includes but is not limited to competition authorities because Refinitiv Eikon does not differentiate between different regulatory authorities. Also, it does not always specify which regulatory authority had jurisdiction over the case but may only refer to an "unspecified regulatory authority".

using a quantitative approach. Conceptually, the research design of this thesis can be characterised as a quasi-experiment that uses summary statistics for analysing panel data on the same subjects over two periods, the latter of which is exposed to an intervention in the form of the revised approach to Article 22 EUMR. The results of the analysis will ideally allow for comparing pre- and post-intervention periods and observing changes or trends in the M&A behaviour that could be attributable to the intervention.

After composing the sample as described above, the variables of interest are chosen based on whether they contain information that could be relevant to the analysis. Given that prior literature examining the relationship between uncertainty and M&A activity has focused on the number of transactions as an indicator of the impact of uncertainty (Bonaime et al., 2018; Nguyen & Phan, 2017) and sudden increases or drops may imply that something has changed, it is similarly selected as a central variable to be examined. In addition, useful information can be obtained by analysing the variables related to the date of establishment, age, origin, and industry of the target and the value of the transaction and its need for regulatory clearance, indicating because they indicate the profile of the target and the size of the transaction, based on which it can be assessed whether the transaction could be a good candidate for a referral under Article 22 EUMR.

The analysis is conducted by using Stata, a statistical software developed by StataCorp for data science purposes across disciplines. The dataset is imported to Stata where the transactions are first computed to differentiate between those that occurred before the revised approach to Article 22 EUMR was adopted and those that occurred after it. The central values are then calculated for the number of observations and other variables of interest that are in a numeric form (including the year of establishment, age, and value) both for the total period and the period before and after the intervention. The string variables (including the nation, industry, and regulatory clearance) are measured by their frequency similarly in the total period and the

period before and after the intervention. The results for both periods are then compared with each other to observe any differences in the data.

5. Results

5.1. M&A activity of GAFAM

During the period of 10 years between 26 March 2013 and 25 March 2023, GAFAM announced a total of 391 majority acquisitions that have since been completed. The number of transactions in total and per firm during the 8 years before and 2 years after the revised approach to Article 22 EUMR was adopted is presented in Table 1. It shows that the number of transactions that Google and Microsoft have completed is considerably higher than that of Amazon, Apple, and Facebook in the reviewed period.

Article22	Google	Microsoft	Amazon	Apple	Facebook	Total
Before	**105**	**69**	**55**	**63**	**45**	**337**
After	**16**	**15**	**11**	**2**	**10**	**54**
Total	**121**	**84**	**66**	**65**	**55**	**391**

Table 1. The number of transactions per firm before and after.

When the beginning of the year is calculated from the date on which Article 22 EUMR was adopted, GAFAM completed on average 42.125 transactions per year or 3.51 transactions per month during the period preceding the adoption of the revised approach to Article 22 EUMR. During the subsequent period, the average number of transactions was 27 per year and 2.25 per month. Compared to the first period, the relative decrease in the average number of transactions in the second period was approximately 36%. There is some variation in the magnitude of the decrease on a per-firm basis. Facebook, Microsoft, and Amazon experienced a moderate decrease in their numbers (by 11%, 13%, and 20%, respectively), while those of Google and especially Apple decreased more sharply (by 39% and 87%, respectively).

The decreasing trend shows clearly in Figure 1, where the number of transactions completed by GAFAM as a whole is illustrated on a full calendar year basis, excluding the incomplete years of 2013 and 2023 from the review. The yearly numbers were already going down from the record years of 2014 and 2015 during the first period, but they remained fairly stable between 2016 and 2020 with the exception of the temporary rise that was perceived in 2019. However, the yearly averages are at their lowest in the two last years which is roughly the period affected by the revised approach to Article 22 EUMR given that it was adopted at the end of the first quarter of 2021.

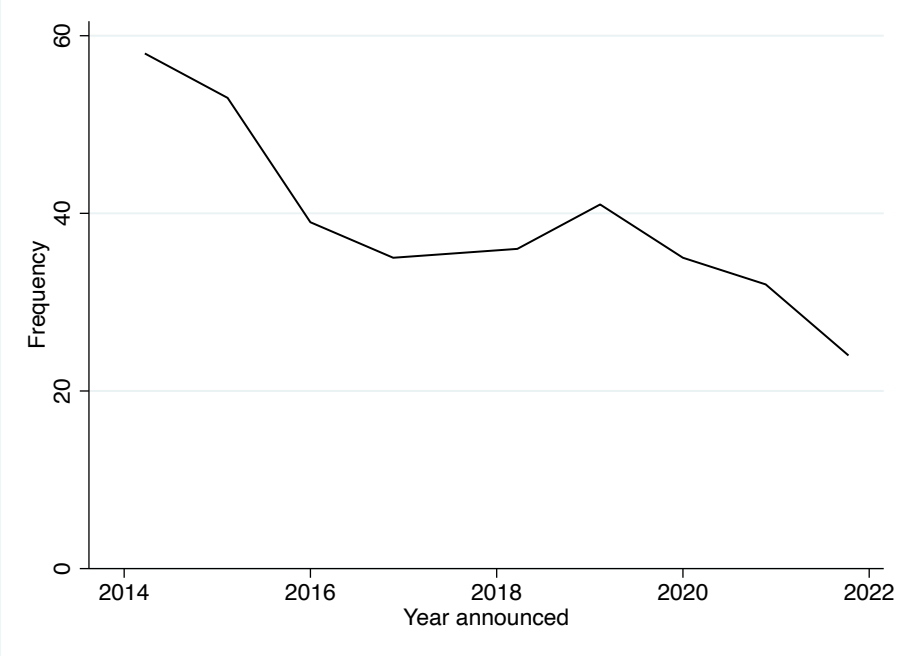

Figure 1. The number of transactions by GAFAM per year.

Although some variation can be observed in the nation where the direct acquirers are established, their ultimate parent that was one of GAFAM was always located in the United States. The geographic location of the targets, on the other hand, was spread across 27 jurisdictions as illustrated in Figure 2. Approximately 63% of the targets were similarly to the ultimate parents of the direct acquirers located in the United States, and other common jurisdictions included the United Kingdom with a share of 9%, Canada with a share of 5%, and

India with a share of 4%. During the reviewed period, less than 12% of the targets had their headquarters in the EU. The adoption of the revised approach to Article 22 EUMR did not have a significant impact on this: The post-adoption share of the EU-based targets decreased only 0.5 percentage points from their pre-adoption equivalent, these values being 11.1% and 11.6%, respectively.

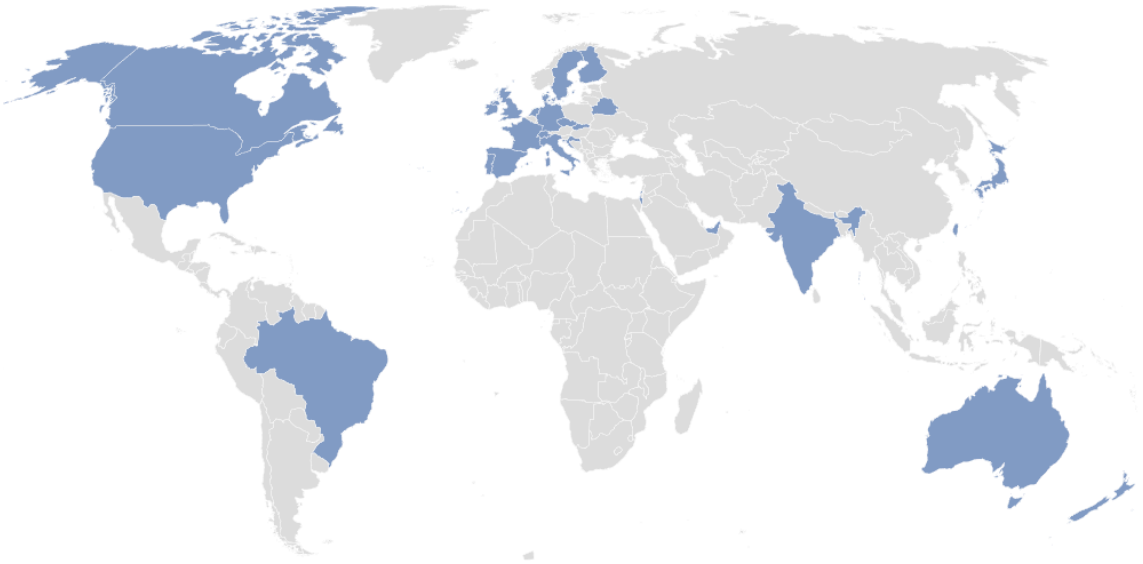

Figure 2. The geographic location of the targets.

Data on the date on which the target was established was largely missing, it being reported in approximately 57% of the transactions. Of those transactions, the range was between 1953 and 2018, with the average year of establishment being 2009 and standard deviation ("**SD**") 6.996. The age when the targets were acquired ranged from less than 8 months to almost 70 years, with the average age being approximately 8 years and 5 months, SD 7.098 and the median age 6 years and 6 months. The distribution of the year of establishment of the targets is illustrated in Figure 3, and the distribution of the age of the targets is provided in Figure 4. Before the adoption of the revised approach to Article 22 EUMR, the average age of the targets was approximately 7 years and 10 months, SD 5.956, and the median age 6 years and 2 months.

After its adoption, the same values were 10 years and 7 months, 10.831, and 7 years and 10 months.

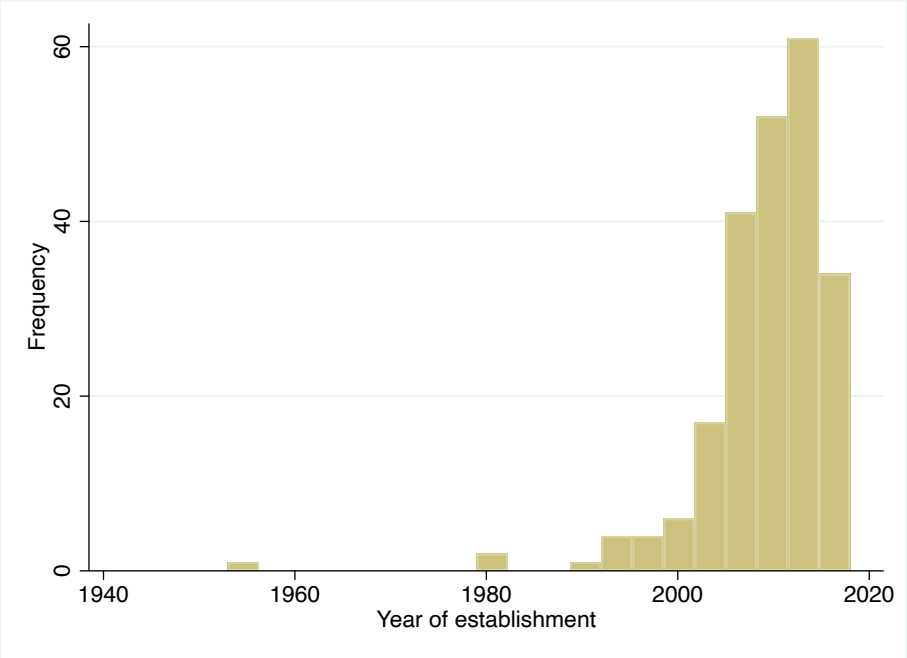

Figure 3. The year of establishment of the targets.

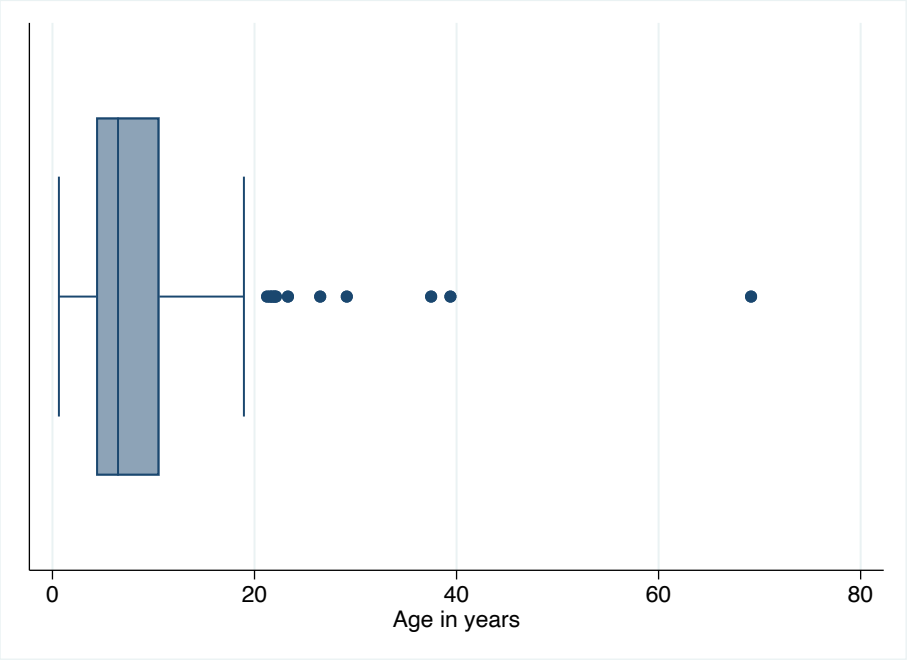

Figure 4. The age of the targets when the transaction was announced.

With the exception of Amazon which is active in the retail industry, and more specifically in internet and catalogue retailing, the ultimate parents of the direct acquirers operate in the

high technology industry. The mid industries in which they operate are computers and peripherals for Apple, internet software and services for Facebook, e-commerce and B2B (business-to-business) for Google, and software for Microsoft. The macro industries in which their targets operate were spread across 13 categories, the most common of which was high technology with a share of 78%. Other categories included consumer products and services with a share of 4% and retail, media and entertainment, and industrials, all three with a respective share of 3%. The distribution of the macro industries of the targets is presented in Figure 5.

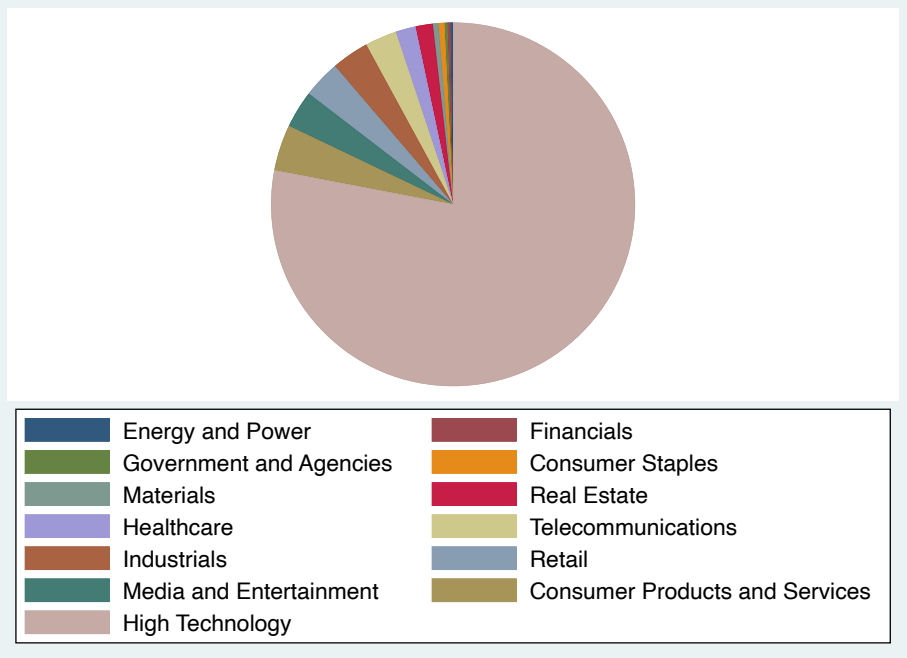

Figure 5. The macro industries of the targets.

At the mid industry level, there were a total of 40 categories, the largest of which were software, IT consulting and services, internet software and services, and computers and peripherals. These all belong to the high technology category, within which their shares were 66%, 13%, 7%, and 6%, respectively. The distribution of the mid industries within the high technology category is presented in Figure 6.

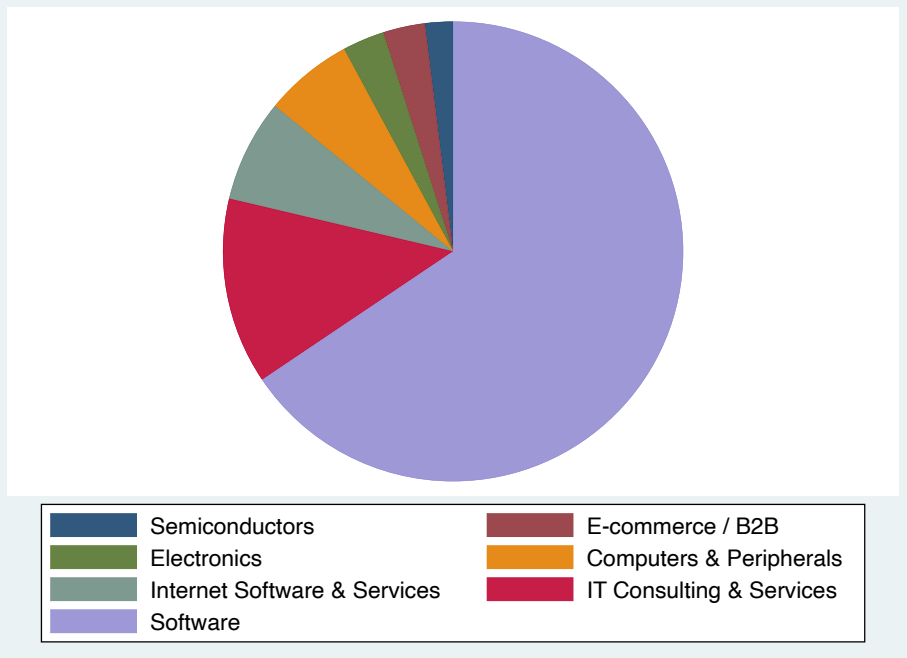

Figure 6. The mid industries of the targets within the high technology category.

The comparison between the pre- and post-intervention periods reveals that the shares of high technology has decreased from 80% to 69% and industrials from 4% to 0%, whereas the shares of media and entertainments has increased from 2% to 9%, retail from 2% to 7%, and consumer products and services from 4% to 7%. This implies that there has been a shift towards firms active in the consumer interface, although the focus is still in acquiring technology firms.

Data on the value of the transaction, even when estimates based on sources close to the situation are filled in the dataset, is available only in approximately 24% of the transactions. The lack of data on this variable conforms to what was found by Argentesi et al. (2020, p. 104) and Jin et al. (2023, p. 11). Of those 92 transactions that did have their value reported, the lowest was USD 1.5 million and highest almost USD 25 billion. The mean value of the transactions was USD 1.6 billion with a SD of 4124.64, while the median value was only USD 200 million. The distribution of the value of the transactions is illustrated in Figure 7. The same values were USD 1.4 billion, SD 3955.444, and USD 200 million for the pre-intervention

period and USD 2.8 billion, SD 4958.352 and USD 750 million for the post-intervention period.

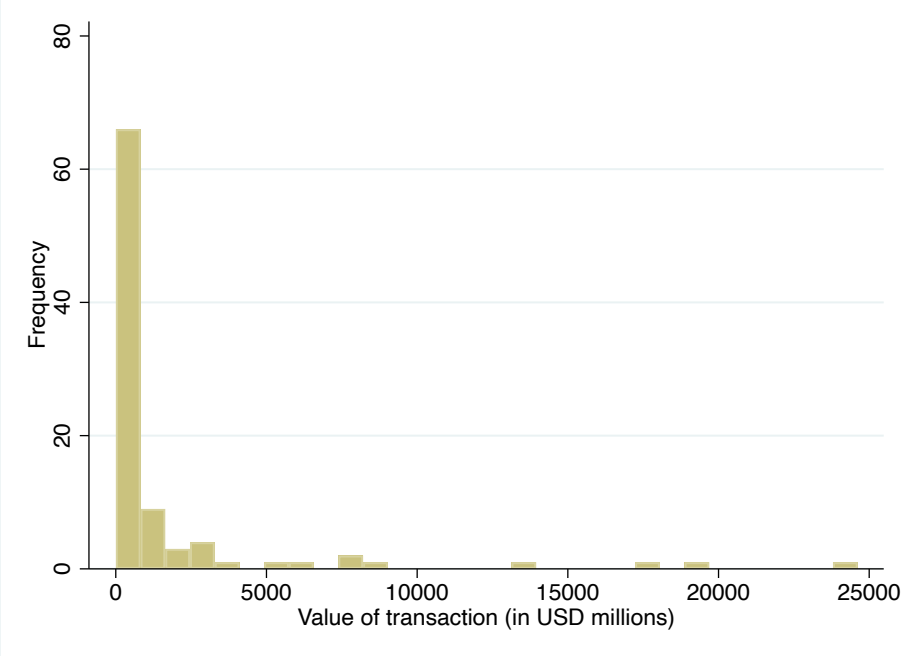

Figure 7. The value of the transactions in USD millions.

Finally, at least one regulatory authority had jurisdiction over the case in less than 7% of the transactions. The share of transactions conditional upon receiving a clearance from a competition authority was even lower than that given that the notion of regulatory authority includes all types of regulatory authorities as pointed out above. The share of transactions in which a regulatory clearance was required remained almost unchanged when the periods before and after the policy change were compared, these being 6.5% and 7.4%.

5.2. Robustness check

The robustness of the above findings on the number of transactions carried out by GAFAM is tested by comparing them with the number of transactions carried out by similar firms as a control group. This approach has been earlier adopted by Jin et al. (2023) who compared in their study M&A activities of GAFAM to those of other technology firms that belong to top acquirers in the digital sector based on the 2019 Forbes ranking of top 100 digital companies.

These include firms such as Accenture, Samsung, Verizon, IBM, and Alibaba. For this purpose, M&A data on these 25 other firms is similarly collected from Refinitiv Eikon by using the same filters as for GAFAM, including the same period, the same M&A type, and the same requirement that the transaction has been completed. These filters yield a sample of 1,072 observations, of which 881 occurred before the adoption of the revised approach to Article 22 EUMR and 191 after it. When the same principles are followed as above, it is observed that the control group completed on average 110.125 transactions per year in the pre-intervention period and 95.5 transactions per year in the post-intervention period. The number of transactions completed by the control group has similarly decreased in the latter period but significantly less than what has been experienced by GAFAM. Whereas the relative decrease in the average number of transactions was around 36% for GAFAM, the same value for the control group is only 13%. Considering that both GAFAM and the control group operate in digital markets and are among the most active acquirers in those markets, the findings related to their M&A volume should arguably be somewhat aligned. Although both have seen their numbers drop, the change is much larger for GAFAM. One possible explanation for this could be that GAFAM consider their risk being caught by Article 22 EUMR higher than what is assessed by the control group and are thus more deterred from engaging in M&A.

5.3. Discussion and limitations

The results of the analysis show that the M&A behaviour of GAFAM has undergone some changes since the adoption of the revised approach to Article 22 EUMR. Most importantly, GAFAM have recently engaged in M&A with considerably less frequency than before, although the trend appears to already have started before the intervention. They have also acquired targets that are older at the time of transaction, and the value of the transactions has increased, but consequent to missing data on these variables no comprehensive inferences can be drawn in this respect. Moreover, the earlier focus on M&A in the high technology macro

industry has decreased. On the other hand, there are no significant changes in the geographic location of their targets, and especially the share of the EU-based targets has remained low over time. Considering that providing digital products and services is not limited to certain geographic locations like most traditional markets, the fact that the most targets of GAFAM are based elsewhere does not rule out that the change in their ownership would have an impact on markets in the EU. Finally, it is observed that only a marginal increase has occurred in the small share of transactions that required a regulatory clearance before their implementation.

The data is thus consistent with the prediction that the adoption of the revised approach to Article 22 EUMR would reduce the number of transactions carried out by GAFAM. This also conforms with prior literature that associates increased uncertainty with reduced M&A activity. Also, the changes in other variables that relate to M&A characteristics lend support to the prediction that GAFAM would shift away from transactions that are more likely to constitute good candidates for a referral under Article 22 EUMR. For example, the increase in the average age of the targets implies that there are less transactions where the target is still at a nascent stage and does not yet generate significant turnover. An increased focus on older targets also explains why the value of the transactions has increased in the post-intervention period given that the high-value transactions typically involve established market players, such as the acquisition of LinkedIn by Microsoft with a value of USD 25 billion. Interestingly, the increase in the number of transactions involving older targets that often already generate turnover did not correspondingly increase the number of transactions that required a regulatory clearance, implying that GAFAM still acquires almost exclusively targets with low turnover.

The results obtained in the analysis are naturally subject to limitations that may reduce their validity. Firstly, it cannot be excluded that selection bias has occurred when the sample was constructed. Although Refinitiv Eikon is among the most comprehensive and reliable M&A databases available, it may not have data on all transactions. This deficiency could be addressed

in future research by combining data from different databases, an approach that has already been adopted in several studies. Another source of error relates to the choice to include only completed transactions in the dataset. For example, the acquisition of Activision Blizzard by Microsoft with a record value of almost USD 69 billion is not included in the sample because it is still pending (Warren, 2023). On the other hand, some transactions have been pending for years and their cancellation may just not have come in the public domain, for which reason including them in the sample may also lead to problems with representativeness.

Secondly, and more importantly, it is possible that the changes in the M&A behaviour of GAFAM have not been induced by the adoption of the revised approach to Article 22 EUMR but some other external factor. Although the aim of this study was never to claim that those changes were brought about by the policy change, the chance of confounding variables must be considered also when the development of M&A completed by GAFAM is examined. For example, the global uncertainty-increasing events such as the COVID-19 pandemic naturally affect also GAFAM. In this context, it has however been suggested that the pandemic might have enabled opportunistic M&A for strong firms with good cash reserves (Kooli & Lock Son, 2021, p. 106), and a recent thesis finds that it did not slow down M&A in the digital sector unlike in other economic sectors (Webster, 2023, p. 22). Nevertheless, there is a need for future research to determine to which extent the current trends in the M&A behaviour of GAFAM can be explained by the change in the Commission's policy and what its other drivers could be.

6. Conclusion

This thesis was tasked with exploring the relationship between uncertainty and M&A activity in the specific setting of an uncertainty-increasing change in the Commission's merger policy and its implications for M&A engaged in by a particular group of large digital firms. The results of the analysis show that the M&A behaviour of GAFAM, the firms under review, has indeed changed in the period following the adoption of the revised approach to Article 22

EUMR compared to the period preceding it. Most importantly, these firms have completed fewer transactions, but there have also been changes in the characteristics of their targets and the transactions themselves. In particular, the targets are older than before at the time of transaction, and their operations have started to shift, at least to a certain extent, from high technology towards consumer-specific industries such as retail, media and entertainment, and consumer products and services.

The aim of this thesis was to answer the research question about how the adoption of the revised approach to Article 22 EUMR has affected the development of the M&A activities carried out by GAFAM. The above findings are consistent with the theoretical prediction that increased uncertainty about becoming subject to merger investigation is likely to reduce the number of transactions and change the characteristics of those that still occurred in a manner that reduces the likelihood that they are considered good candidates for a referral under Article 22 EUMR. Although the primary source and relevance of each of these changes cannot be accurately determined in this thesis due to the limitations in its scope and the chosen research methods, the findings of this thesis are significant in the sense that they show a deviation from an established pattern of behaviour that merits further research.

Given that the attempts to curb the market power of GAFAM appear to be the *zeitgeist* of the 2020s, it must be stressed how important it is that competition enforcers and regulators consider in a balanced manner the intended and unintended effects that their actions may have on the economy at different levels. It is possible that evoking a change in the M&A activities of GAFAM is exactly what revising the approach to Article 22 EUMR was after, but in doing so, sight should not be lost of the substantial benefits created by the digital economy and its fundamental characteristics. Although the need for stricter merger control appears evident in the context of GAFAM, the risk of regulatory failure when intervening in the market turns out to be costlier to the society than its counterfactual is also to be borne in mind.

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Appendix 1: Copy of the revised approach to Article 22 EUMR

II

(Information)

INFORMATION FROM EUROPEAN UNION INSTITUTIONS, BODIES, OFFICES AND AGENCIES

EUROPEAN COMMISSION

COMMUNICATION FROM THE COMMISSION

Guidance on the application of the referral mechanism set out in Article 22 of the Merger Regulation to certain categories of cases

(2021/C 113/01)

1. The purpose of this document is to provide practical guidance regarding the Commission's approach to the use of the referral mechanism set out in Article 22 of Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings ('the Merger Regulation') ([1]). The aim is to facilitate and clarify its application in certain categories of appropriate cases.

2. This document complements, for such cases, the guidance provided in the Commission Notice on Case Referral ([2]), which provides general guidance on the overall case referral system established in Article 4(4) and (5), Article 9 and Article 22 of the Merger Regulation.

3. The document aims to provide only general guidance on the appropriateness of particular categories of cases for referral under Article 22 of the Merger Regulation: the Member States and the Commission retain a considerable margin of discretion in deciding whether to refer cases or accept referrals, respectively ([3]). The Commission may revise this Guidance at any time in light of future developments. It may also decide to consolidate the content of this Guidance in the Notice on Case Referral, in the light of experience gathered in applying the revised approach to referrals under Article 22.

4. This Guidance applies, *mutatis mutandis*, to the referral rules contained in the EEA Agreement ([4]).

1. Introduction

5. The Merger Regulation grants the Commission exclusive jurisdiction to review concentrations with an EU dimension, defined by the application of combined turnover-based thresholds. Such thresholds delineate the transactions whose impact on the market is deemed to go beyond the national borders of any one Member State and which, as such, are

([1]) OJ L 24, 29.1.2004, p. 1.

([2]) Commission Notice on Case Referral in respect of concentrations. OJ C 56, 5.3.2005, p. 2. This Guidance should thus be read in conjunction with the Notice on Case Referral. Additional guidance can be found in the European Competition Authorities ('ECA') *Principles on the application, by National Competition Authorities within the ECA, of Articles 4(5) and 22 of the EC Merger Regulation* (2005).

([3]) Cf. point 7 of the Notice on Case Referral.

([4]) According to Article 6(3) of Protocol 24 of the EEA Agreement, one or more EFTA countries may join a request for referral made by a Member State under Article 22 of the Merger Regulation if the concentration affects trade between one or more Member countries and one or more EFTA countries and threatens to significantly affect competition within the territory of the ETFA country or countries joining the request.

in principle best dealt with at the EU level ([5]). The Merger Regulation contains a corrective mechanism to the application of these quantitative jurisdictional thresholds, allowing, under specific circumstances, a referral of individual cases between the Commission and one or several Member States ([6]). This system of referrals aims to ensure that the more appropriate authority or authorities for carrying out a particular merger investigation review(s) the case despite not being initially competent.

6. Article 22 of the Merger Regulation allows for one or more Member States to request the Commission to examine, for those Member States, any concentration that does not have an EU dimension but affects trade between Member States and threatens to significantly affect competition within the territory of the Member State or States making the request. It is clear from the wording, the legislative history and the purpose of Article 22 of the Merger Regulation, as well as from the Commission's enforcement practice, that Article 22 is applicable to all concentrations ([7]), not only those that meet the respective jurisdictional criteria of the referring Member States ([8]).

7. The mechanism set out in Article 22 of the Merger Regulation has allowed the Commission to review a significant number of transactions in a wide array of economic sectors, such as industrial, manufacturing, pharmaceutical and digital. These have included cases eventually subject to an in-depth investigation and/or authorised only following modification by the remedies offered by the parties ([9]).

8. With the progressive implementation of national regimes for merger control in almost all Member States, the Commission, in exercising the discretion granted to it by the Merger Regulation ([10]), developed a practice of discouraging referral requests under Article 22 from Member States that did not have original jurisdiction over the transaction at stake. This practice was notably based on the experience that such transactions were not generally likely to have a significant impact on the internal market.

9. In recent years, however, market developments have resulted in a gradual increase of concentrations involving firms that play or may develop into playing a significant competitive role on the market(s) at stake despite generating little or no turnover at the moment of the concentration. These developments appear particularly significant in the digital economy, where services regularly launch with the aim of building up a significant user base and/or commercially valuable data inventories, before seeking to monetise the business. Similarly, in sectors such as pharmaceuticals and others where innovation is an important parameter of competition, there have been transactions involving innovative companies conducting research & development projects and with strong competitive potential, even if these companies have not yet finalised, let alone exploited commercially, the results of their innovation activities. Similar considerations apply to companies with access to or impact on competitively valuable assets, such as raw materials, intellectual property rights, data or infrastructure.

10. Against this background, the Commission has examined the effectiveness of the turnover-based jurisdictional thresholds of the EU Merger Regulation in its Evaluation of procedural and jurisdictional aspects of the EU Merger control ([11]). It has concluded that, while these thresholds, complemented by the referral mechanisms set out in the Merger Regulation, have generally been effective in capturing transactions with a significant impact on competition in the EU internal market, a number of cross-border transactions which could potentially also have such an impact have escaped review by both the Commission and the Member States. This includes in particular transactions in the digital and pharma sectors.

([5]) Cf. Article 1 of the Merger Regulation. Concentrations with an EU dimension, i.e. those above these turnover thresholds, fall within the exclusive jurisdiction of the Commission. Concentrations falling below these thresholds may fall within the competence of the Member States, according to the jurisdictional rules of their respective national regimes.

([6]) Cf. Article 4(4) and (5), Article 9 and Article 22 of the Merger Regulation.

([7]) As defined in Article 3 of the Merger Regulation.

([8]) Article 22 of the Merger Regulation is also applicable when the referring Member State has not established a dedicated national merger control regime.

([9]) Under, respectively, Article 6(1)(c) and Articles 6(1)(b) with 6(2) and Article 8(2) of the Merger Regulation.

([10]) Cf. Article 22(3) of the Merger Regulation. See also point 7 of the Notice on Case Referral.

([11]) See Commission Staff Working Document of 26 March 2021.

strengthening of a dominant position of one of the undertakings concerned; the elimination of an important competitive force, including the elimination of a recent or future entrant or the merger between two important innovators; the reduction of competitors' ability and/or incentive to compete, including by making their entry or expansion more difficult or by hampering their access to supplies or markets; or the ability and incentive to leverage a strong market position from one market to another by means of tying or bundling or other exclusionary practices.

16. When examining both criteria, the Commission will particularly take into account the prospective nature of the merger control assessment.

17. The application of these two criteria ensures that the transaction has a sufficient nexus with the EU and the referring Member State(s).

2.2. *Other factors which may be considered*

18. As indicated in the Notice on Case Referral, when considering whether or not to exercise their discretion to make or accede to a referral request, the Member States and the Commission should above all bear in mind the need to ensure effective protection of competition in all markets affected by the transaction ([17]).

19. Besides the principles set out in the Notice on Case Referral ([18]), the categories of cases that will normally be appropriate for a referral under Article 22 of the Merger Regulation where the merger is not notifiable in the referring Member State(s) consist of transactions where the turnover of at least one of the undertakings concerned does not reflect its actual or future competitive potential. This would include, for example, cases where the undertaking: (1) is a start-up or recent entrant with significant competitive potential that has yet to develop or implement a business model generating significant revenues (or is still in the initial phase of implementing such business model); (2) is an important innovator or is conducting potentially important research; (3) is an actual or potential important competitive force ([19]); (4) has access to competitively significant assets (such as for instance raw materials, infrastructure, data or intellectual property rights); and/or (5) provides products or services that are key inputs/components for other industries. In its assessment, the Commission may also take into account whether the value of the consideration received by the seller is particularly high compared to the current turnover of the target.

20. The list above is provided for purely illustrative purposes. It is not limited to any specific economic sector or sectors and cannot be deemed in any way comprehensive.

21. While the referral is subject to the deadlines set out in Article 22, the fact that a transaction has already been closed does not preclude a Member State from requesting a referral ([20]). However, the time elapsed since the closing is a factor that the Commission may consider when exercising its discretion to accept or reject a referral request. Although assessments are carried out on a case-by-case basis, the Commission would generally not consider a referral appropriate where more than six months has passed after the implementation of the concentration. If the implementation of the concentration was not in the public domain, this period of six months would run from the moment when material facts about the concentration have been made public in the EU. In exceptional situations, however, a later referral may also be appropriate, based on, for example, the magnitude of the potential competition concerns and of the potential detrimental effect on consumers.

22. Finally, a circumstance where the transaction has already been notified in one or several Member States that did not request a referral or join such a referral request may constitute a factor against accepting the referral. However, the Commission will make its decision based on all relevant circumstances, including, as mentioned in the paragraph above, the extent of the potential harm, and also the geographic scope of the relevant markets.

([17]) Notice on Case Referral, point 8.
([18]) Cf. point 45.
([19]) In the sense of paragraphs 37 and 38 of the Horizontal Merger Guidelines.
([20]) The Merger Regulation acknowledges this possibility in Article 22(4).

3. Procedural aspects

23. The Commission will cooperate closely with the competent authorities of the Member States to identify concentrations that may constitute potential candidates for a referral under Article 22 of the Merger Regulation but do not meet the jurisdictional criteria relevant under the respective national laws. It may exchange information to that effect with national competition authorities ([21]). In such exchanges, confidential information will be protected in accordance with the applicable laws ([22]).

24. Merging parties may voluntarily come forward with information about their intended transactions. Where appropriate, the Commission may in such cases give them an early indication that it does not consider that their concentration would constitute a good candidate for a referral under Article 22 of the Merger Regulation, if sufficient information to make such a preliminary assessment has been submitted.

25. Third parties may contact the Commission or the competent authorities of the Member States and inform them of a concentration that, in their opinion, could be a candidate for a referral under Article 22 of the Merger Regulation. To enable the Commission and the competent authorities of the Member States to assess whether or not the transaction may be a candidate for referral, such contact should include sufficient information to make a preliminary assessment as to whether the criteria for referral are met, to the extent such information is available to the third party. Article 22 of the Merger Regulation does not impose any obligation on the competent authorities of the Member States or on the Commission to take any action following a contact by a third party.

26. Where the Commission becomes aware of a concentration that it considers as meeting the relevant criteria for a referral, it may inform the Member State(s) potentially concerned and invite that Member State or those Member States to make a referral request ([23]). It is up to the competent authorities of a Member State to decide whether they wish to make the request.

27. If a referral request is being considered, the Commission will inform the parties to the transaction as soon as possible ([24]). While being made aware of such consideration does not oblige the undertakings concerned to take or refrain from taking any action in relation to the implementation of the transaction ([25]), they may decide to take measures they consider appropriate, such as delaying the transaction's implementation until it has been decided whether a referral request will be made.

28. If no notification is required, a referral request must be made at most within 15 working days of the date on which the concentration is otherwise made known to the Member State concerned ([26]). The notion of 'made known' should be interpreted as implying sufficient information to make a preliminary assessment as to the existence of the criteria relevant for the assessment of the referral ([27]).

29. Once a referral request has been made, the Commission will inform the competent authorities of the Member States and the undertakings concerned without delay. Other Member States may join the initial request within a period of 15 working days of being informed by the Commission of the initial request ([28]). The Commission encourages the Member States to inform each other and the Commission as soon as possible whether or not they intend to join the referral request ([29]).

([21]) Notice on Case Referral, points 53 et seq. See also ECA Principles, paragraphs 3, 20 and 23 and 26–9.
([22]) Notice on Case Referral, points 57 and 58. See also ECA Principles, paragraph 34.
([23]) Article 22(5) of the Merger Regulation. See also ECA Principles, paragraph 22.
([24]) According to the ECA Principles, if a joint referral request is being considered, the national competition authorities should inform the parties to the transaction as soon as possible (cf. paragraph 25).
([25]) The suspension obligation set out in Article 7 of the Merger Regulation only applies as of the date on which the Commission informs the undertakings concerned that a request has been made, to the extent that the concentration has not been implemented on that date. See Article 22(4) of the Merger Regulation, first sub-paragraph.
([26]) Article 22(1) of the Merger Regulation, second sub-paragraph. See also Notice on Case Referral, point 50.
([27]) Cf. Notice on Case Referral, footnote 43. See also ECA Principles, paragraph 31.
([28]) Article 22(2) of the Merger Regulation. See also Notice on Case Referral, point 50 and ECA Principles, paragraph 24.
([29]) ECA Principles, paragraph 24.

30. At the latest 10 working days after the expiry of the 15-working-day period for Member States to join the referral request, the Commission may decide to examine the concentration if it considers that it affects trade between Member States and threatens to significantly affect competition within the territory of the Member State or States making the request. If the Commission does not take a decision within this period, it will be deemed to have adopted a decision to examine the concentration in accordance with the request ([30]).

31. The suspension obligation set out in Article 7 of the Merger Regulation applies to the extent the concentration has not been implemented on the date on which the Commission informs the undertakings concerned that a referral request has been made ([31]). The suspension obligation ceases if the Commission subsequently decides not to examine the concentration.

([30]) Article 22(3) of the Merger Regulation, first sub-paragraph.
([31]) Article 22(4) of the Merger Regulation, first sub-paragraph.

Appendix 2: List of transactions included in the sample

Acquirer	Target	Announced
Amazon.com Inc	Goodreads Inc	28.3.2013
Facebook Inc	Parse Inc	25.4.2013
Alphabet Inc	Wavii Inc	26.4.2013
Amazon.com Inc	Liquavista BV	13.5.2013
Alphabet Inc	Makani Power	22.5.2013
Alphabet Inc	Waze Ltd	11.6.2013
Apple Inc	Catch.Com	1.7.2013
Apple Inc	Locationary Inc	19.7.2013
Apple Inc	Hopstop.com Inc	20.7.2013
Apple Inc	Passif Semiconductor Corp	1.8.2013
Facebook Inc	Mobile Technologies	12.8.2013
Apple Inc	Matcha Inc	14.8.2013
Apple Inc	Embark Inc	22.8.2013
Facebook Inc	Midnox Inc	23.8.2013
Apple Inc	AlgoTrim AB	28.8.2013
Alphabet Inc	WIMM Labs Inc	30.8.2013
Microsoft Corp	Nokia Oyj's Devices & Services Business	3.9.2013
Alphabet Inc	Bump Technologies Inc	16.9.2013
Amazon.com Inc	Asian Oilfield Services Ltd	18.9.2013
Alphabet Inc	Building Portfolio	24.9.2013
Alphabet Inc	Flutter Inc	2.10.2013
Alphabet Inc	Bot Square Inc	2.10.2013
Apple Inc	Cue	3.10.2013
Amazon.com Inc	TenMarks Education Inc	10.10.2013
Facebook Inc	Onavo Inc	14.10.2013
Alphabet Inc	FlexyCore	22.10.2013
Microsoft Corp	Apiphany Inc	24.10.2013
Apple Inc	PrimeSense Ltd	25.11.2013
Apple Inc	Topsy Labs Inc	2.12.2013
Alphabet Inc	Meka Robotics LLC	4.12.2013
Alphabet Inc	SCHAFT Inc	6.12.2013
Alphabet Inc	Boston Dynamics Inc	14.12.2013
Facebook Inc	SportStream	17.12.2013
Amazon.com Inc	GoPago Inc's Mobile Payment Technology Assets	21.12.2013
Apple Inc	Broadmap	23.12.2013
Apple Inc	SnappyLabs	4.1.2014
Facebook Inc	Little Eye Software Labs Pvt Ltd	8.1.2014
Alphabet Inc	Nest Labs Inc	13.1.2014
Facebook Inc	Branch Media Inc	13.1.2014
Alphabet Inc	Impermium Corp	15.1.2014
Alphabet Inc	Deepmind Technologies Ltd	27.1.2014
Amazon.com Inc	Double Helix Games LLC	5.2.2014
Alphabet Inc	SlickLogin	17.2.2014
Facebook Inc	WhatsApp Inc	19.2.2014
Alphabet Inc	Spider.io	21.2.2014
Apple Inc	Burstly Inc	21.2.2014
Alphabet Inc	Green Throttle Games	12.3.2014
Facebook Inc	Oculus VR Inc	25.3.2014
Facebook Inc	Ascenta	28.3.2014
Apple Inc	Novauris Technologies Ltd	3.4.2014
Amazon.com Inc	Iconology Inc	10.4.2014
Alphabet Inc	Titan Aerospace	14.4.2014
Facebook Inc	ProtoGeo Oy	24.4.2014
Microsoft Corp	GreenButton	1.5.2014
Alphabet Inc	Rangespan	5.5.2014
Alphabet Inc	Adometry Inc	6.5.2014
Alphabet Inc	Appetas Inc	7.5.2014

Alphabet Inc	Stackdriver Inc	7.5.2014
Alphabet Inc	Quest Visual Inc	16.5.2014
Alphabet Inc	Enterproid Inc	20.5.2014
Apple Inc	Beats Electronics LLC	28.5.2014
Microsoft Corp	CAPPTAIN SAS	28.5.2014
Facebook Inc	Pryte Oy	3.6.2014
Alphabet Inc	Skybox Imaging Inc	10.6.2014
Alphabet Inc	mDialog Corp	19.6.2014
Alphabet Inc	Dropcam Inc	20.6.2014
Alphabet Inc	Appurify Inc	25.6.2014
Microsoft Corp	Syntaxtree SARL	2.7.2014
Microsoft Corp	InMage Systems Inc	11.7.2014
Microsoft Corp	Aorato Ltd	15.7.2014
Alphabet Inc	drawElements Oy	23.7.2014
Alphabet Inc	Tinker Square Inc	6.8.2014
Alphabet Inc	Directr Inc	6.8.2014
Alphabet Inc	Jetpac Inc	15.8.2014
Alphabet Inc	Gecko Design Inc	22.8.2014
Amazon.com Inc	Twitch Interactive Inc	25.8.2014
Alphabet Inc	Zync Inc	26.8.2014
Facebook Inc	Nonstop Games Inc	8.9.2014
Alphabet Inc	Lynx Design Inc	10.9.2014
Alphabet Inc	Input Factory Inc	11.9.2014
Microsoft Corp	Mojang AB	15.9.2014
Alphabet Inc	Hokanson Carpets Inc	16.9.2014
Alphabet Inc	Firebase Inc	21.10.2014
Alphabet Inc	Revolv Inc	24.10.2014
Apple Inc	Union Bay Networks	3.11.2014
Alphabet Inc	Relative Wave LLC	19.11.2014
Microsoft Corp	Acompli Inc	1.12.2014
Amazon.com Inc	Good Game Agency	10.12.2014
Microsoft Corp	Bit Stadium GmbH	11.12.2014
Facebook Inc	Nimble VR	12.12.2014
Microsoft Corp	Codenauts GmbH	15.12.2014
Facebook Inc	13th Lab AB	16.12.2014
Alphabet Inc	Vidmaker Inc	18.12.2014
Facebook Inc	Wit.ai Inc	5.1.2015
Facebook Inc	QuickFire Networks Corp	8.1.2015
Microsoft Corp	Equivio Ltd	20.1.2015
Apple Inc	Semetric Ltd	21.1.2015
Microsoft Corp	Revolution Analytics Inc	23.1.2015
Alphabet Inc	Launchpad Toys Inc	5.2.2015
Facebook Inc	Prologis Inc's Menlo Science & Technology Park, Menlo Park, California	6.2.2015
Microsoft Corp	Sunrise Atelier Inc	11.2.2015
Alphabet Inc	Athena Wireless Communications Inc	23.2.2015
Apple Inc	Camel Audio Ltd	23.2.2015
Alphabet Inc	Red Hot Labs Inc	24.2.2015
Amazon.com Inc	2lemetry Inc	12.3.2015
Facebook Inc	TheFind Inc	13.3.2015
Apple Inc	Acunu Ltd	26.3.2015
Microsoft Corp	LiveLoop Inc	28.3.2015
Amazon.com Inc	Shoefitr Inc	8.4.2015
Apple Inc	Dryft	8.4.2015
Apple Inc	Linx Imaging	14.4.2015
Microsoft Corp	Datazen Software Inc	14.4.2015
Alphabet Inc	Softcard	29.4.2015
Microsoft Corp	N Trig Ltd	1.5.2015
Microsoft Corp	N Trig Ltd's Advanced Digital Pen Technology	1.5.2015
Alphabet Inc	Timeful Inc	4.5.2015
Apple Inc	Coherent Navigation Inc	17.5.2015

Facebook Inc	Surreal Vision Ltd	26.5.2015
Apple Inc	Metaio GmbH	28.5.2015
Microsoft Corp	6 Wunderkinder GmbH	2.6.2015
Alphabet Inc	Duolingo	10.6.2015
Microsoft Corp	BlueStripe Software Inc	10.6.2015
Alphabet Inc	Agawi Inc	18.6.2015
Alphabet Inc	Titan Outdoor LLC	23.6.2015
Alphabet Inc	Control Group Inc	23.6.2015
Amazon.com Inc	Trellis Automation Inc	14.7.2015
Facebook Inc	Pebbles Interfaces Ltd	16.7.2015
Alphabet Inc	Pixate Inc	21.7.2015
Microsoft Corp	Incent Games Inc	3.8.2015
Amazon.com Inc	Elemental Technologies Inc	3.9.2015
Microsoft Corp	Adallom Inc	8.9.2015
Microsoft Corp	Double Labs Inc	11.9.2015
Amazon.com Inc	Safaba Translation Solutions Inc	25.9.2015
Microsoft Corp	Adxstudio Inc	28.9.2015
Alphabet Inc	Jibe Mobile Inc	30.9.2015
Microsoft Corp	Telekinesys Research Ltd	2.10.2015
Apple Inc	VocalIQ Ltd	5.10.2015
Apple Inc	Perceptio Inc	5.10.2015
Alphabet Inc	Divshot Inc	13.10.2015
Alphabet Inc	Digisfera Fotografia e Informatica Lda	17.10.2015
Microsoft Corp	Mobile Data Labs Inc	5.11.2015
Alphabet Inc	Fly Labs Inc	7.11.2015
Alphabet Inc	Bebop Technology LLC	19.11.2015
Apple Inc	Faceshift AG	25.11.2015
Microsoft Corp	Metanautix Inc	18.12.2015
Microsoft Corp	Talko Inc	21.12.2015
Apple Inc	Emotient Inc	7.1.2016
Microsoft Corp	Event Zero Pty Ltd's UC Commander	13.1.2016
Apple Inc	LearnSprout Inc	28.1.2016
Apple Inc	Flyby Media Inc	29.1.2016
Apple Inc	Legbacore LLC	3.2.2016
Microsoft Corp	TouchType Ltd	3.2.2016
Alphabet Inc	BandPage Inc	12.2.2016
Amazon.com Inc	NICE Srl	12.2.2016
Facebook Inc	Masquerade Technologies Inc	9.3.2016
Amazon.com Inc	Cosme Farma Laboratories Ltd	11.3.2016
Amazon.com Inc	Adcock Ingram Healthcare Pvt Ltd	6.4.2016
Alphabet Inc	Synergyse	2.5.2016
Microsoft Corp	Solair Srl	3.5.2016
Facebook Inc	Two Big Ears Ltd	23.5.2016
Microsoft Corp	LinkedIn Corp	13.6.2016
Alphabet Inc	Webpass Inc	22.6.2016
Alphabet Inc	Moodstocks SAS	6.7.2016
Alphabet Inc	Anvato Inc	8.7.2016
Alphabet Inc	FortyTwo Inc	12.7.2016
Amazon.com Inc	Cloud9 IDE Inc	14.7.2016
Apple Inc	Booklamp	26.7.2016
Alphabet Inc	Orbitera Inc	8.8.2016
Apple Inc	Turi	8.8.2016
Microsoft Corp	Beam	12.8.2016
Amazon.com Inc	Curse Inc	16.8.2016
Apple Inc	Gliimpse	22.8.2016
Alphabet Inc	Apigee Corp	8.9.2016
Alphabet Inc	Urban Engines Inc	16.9.2016
Facebook Inc	Nascent Objects Inc	19.9.2016
Apple Inc	Tuplejump Software Pvt Ltd	22.9.2016
Alphabet Inc	Webpass Telecommunications LLC	3.10.2016

Alphabet Inc	FameBit Inc	11.10.2016
Facebook Inc	InfiniLED Ltd	13.10.2016
Alphabet Inc	Eyefluence Inc	24.10.2016
Facebook Inc	CrowdTangle Inc	11.11.2016
Facebook Inc	FacioMetrics LLC	16.11.2016
Alphabet Inc	Qwiklabs Inc	21.11.2016
Apple Inc	Indoor.io	1.12.2016
Facebook Inc	The Eye Tribe ApS	29.12.2016
Alphabet Inc	Limes Audio AB	5.1.2017
Microsoft Corp	Donya Labs AB	17.1.2017
Alphabet Inc	Twitter Inc's Fabric Software	18.1.2017
Alphabet Inc	PWV Studios Ltd	13.2.2017
Apple Inc	Icloud.Net	22.2.2017
Amazon.com Inc	Thinkbox Software Inc	7.3.2017
Alphabet Inc	Kaggle Inc	8.3.2017
Alphabet Inc	AppBridge Software Inc	10.3.2017
Alphabet Inc	Lightpad Inc	10.3.2017
Apple Inc	DeskConnect LLC	22.3.2017
Amazon.com Inc	Souq.com	28.3.2017
Microsoft Corp	Intentional Software Corp	18.4.2017
Amazon.com Inc	Sanjay Maintenance Services Pvt Ltd	21.4.2017
Apple Inc	Beddit Oy	8.5.2017
Alphabet Inc	Owlchemy Labs	10.5.2017
Apple Inc	Lattice Data Inc	13.5.2017
Microsoft Corp	Heighten Software Inc	30.5.2017
Amazon.com Inc	Whole Foods Market Inc	16.6.2017
Apple Inc	SensoMotoric Instruments Gesellschaft fuer innovative Sensorik mbH	26.6.2017
Amazon.com Inc	Game Sparks Technologies Ltd	8.7.2017
Facebook Inc	Source3 Inc	24.7.2017
Facebook Inc	Ozlo Inc	31.7.2017
Alphabet Inc	RS Equity Partners LLC's 2629 Terminal Blvd	4.8.2017
Facebook Inc	fayteq AG	11.8.2017
Microsoft Corp	Cycle Computing LLC	15.8.2017
Alphabet Inc	Aimatter OOO	17.8.2017
Amazon.com Inc	ClipMine Inc	18.8.2017
Alphabet Inc	HTC Corp's Pixel Phone Business	20.9.2017
Alphabet Inc	Bitium Inc	26.9.2017
Amazon.com Inc	Body Labs Inc	3.10.2017
Microsoft Corp	Altspace VR	3.10.2017
Alphabet Inc	Relay Media Inc	9.10.2017
Apple Inc	PowerbyProxi Ltd	25.10.2017
Apple Inc	Shazam Entertainment Ltd	11.12.2017
Amazon.com Inc	Immedia Semiconductor Inc	21.12.2017
Apple Inc	Doe Pics Hit Inc	2.1.2018
Alphabet Inc	NVF Tech Ltd	11.1.2018
Amazon.com Inc	Sqrrl Data Inc	23.1.2018
Facebook Inc	Confirm Inc	24.1.2018
Microsoft Corp	PlayFab Inc	29.1.2018
Amazon.com Inc	Ring Inc	27.2.2018
Alphabet Inc	Socratic Inc	14.3.2018
Alphabet Inc	Jamestown LP's Chelsea Market, New York City, NY	20.3.2018
Alphabet Inc	Tenor Inc	27.3.2018
Alphabet Inc	Velostrata Inc	9.5.2018
Alphabet Inc	Cask Data Inc	17.5.2018
Microsoft Corp	Semantic Machines Inc	20.5.2018
Microsoft Corp	GitHub Inc	4.6.2018
Microsoft Corp	Playground Games Ltd	5.6.2018
Microsoft Corp	Compulsion Games Inc	10.6.2018
Microsoft Corp	Ninja Theory Ltd	10.6.2018
Microsoft Corp	Undead Labs LLC	11.6.2018

Microsoft Corp	Flipgrid Inc	18.6.2018
Facebook Inc	Bloomsbury AI Ltd	3.7.2018
Amazon.com Inc	Innovsource Pvt Ltd	10.7.2018
Amazon.com Inc	V5 Global Services Pvt Ltd	10.7.2018
Facebook Inc	Vidpresso Inc	13.8.2018
Amazon.com Inc	Spoton Logistics Pvt Ltd	28.8.2018
Apple Inc	Akonia Holographics LLC	30.8.2018
Microsoft Corp	Lobe Artificial Intelligence Inc	13.9.2018
Microsoft Corp	Glint Inc	8.10.2018
Apple Inc	Dialog Semiconductor PLC's Certain Power Management Assets	11.10.2018
Microsoft Corp	inXile Entertainment Inc	10.11.2018
Microsoft Corp	FSLogix Inc	19.11.2018
Alphabet Inc	cwist Inc	27.11.2018
Microsoft Corp	BrightBytes Inc's DataSense Business	5.12.2018
Apple Inc	Platoon Ltd	7.12.2018
Alphabet Inc	Sigmoid Labs Pvt Ltd	10.12.2018
Alphabet Inc	DevOps Research & Assessment LLC	20.12.2018
Amazon.com Inc	TSO Logic Inc	21.12.2018
Apple Inc	Laserlike Inc	31.12.2018
Amazon.com Inc	Cloudendure Ltd	10.1.2019
Microsoft Corp	Citus Data Inc	24.1.2019
Facebook Inc	Grokstyle Inc	8.2.2019
Apple Inc	Operatedata Ltd	14.2.2019
Apple Inc	PullString Inc	16.2.2019
Alphabet Inc	Alooma Inc	19.2.2019
Apple Inc	Stamplay Ltd	22.3.2019
Amazon.com Inc	Natures Essence Pvt Ltd	27.3.2019
Amazon.com Inc	Blue Heaven Cosmetics Pvt Ltd	1.4.2019
Amazon.com Inc	Canvas Technology LLC	10.4.2019
Microsoft Corp	Express Logic Inc	18.4.2019
Microsoft Corp	Drawbridge Inc	28.5.2019
Alphabet Inc	Looker Data Sciences Inc	6.6.2019
Microsoft Corp	Double Fine Productions Inc	9.6.2019
Microsoft Corp	Good Software LLC	17.6.2019
Apple Inc	Drive.ai Inc	25.6.2019
Apple Inc	Intel Corp's Smartphone Modem Chip Business	25.7.2019
Microsoft Corp	BlueTalon Inc	29.7.2019
Microsoft Corp	Spotfront Inc	5.8.2019
Microsoft Corp	Jclarity Ltd	19.8.2019
Microsoft Corp	Movere Inc	4.9.2019
Amazon.com Inc	8 Dudes In A Garage AB	17.9.2019
Microsoft Corp	Semmle Inc	18.9.2019
Facebook Inc	Servicefriend Ltd	22.9.2019
Facebook Inc	CTRL-Labs Corp	23.9.2019
Amazon.com Inc	INLT	25.9.2019
Apple Inc	IKINEMA Ltd	4.10.2019
Microsoft Corp	Mover Inc	21.10.2019
Amazon.com Inc	Health Navigator Inc	23.10.2019
Alphabet Inc	Zya Inc	25.10.2019
Amazon.com Inc	Imex Salud SL	25.10.2019
Amazon.com Inc	Zarek Distribuidora de Produtos Hospitalares Ltda	31.10.2019
Alphabet Inc	Fitbit Inc	1.11.2019
Alphabet Inc	Cloudsimple Inc	19.11.2019
Facebook Inc	Beat Games S.R.O.	26.11.2019
Alphabet Inc	Latent Logic Ltd	12.12.2019
Apple Inc	SPECTRAL EDGE LTD	12.12.2019
Facebook Inc	Papers With Code	14.12.2019
Amazon.com Inc	Net Insight AB's Sye Consumer Streaming Business	17.12.2019
Facebook Inc	PLAYGIGA SL	18.12.2019
Facebook Inc	Packagd Corp	19.12.2019

Alphabet Inc	Pomo Search Ltd	14.1.2020
Alphabet Inc	AppSheet Inc	14.1.2020
Apple Inc	Xnor.Ai Inc	15.1.2020
Facebook Inc	Scape Technologies Ltd	10.2.2020
Alphabet Inc	Cornerstone Technology BV	19.2.2020
Amazon.com Inc	DataRow	21.2.2020
Facebook Inc	Sanzaru Games Inc	26.2.2020
Amazon.com Inc	Fairway Group Holdings Corp's Store, NJ	25.3.2020
Microsoft Corp	Affirmed Networks Inc	26.3.2020
Apple Inc	Dark Sky Co LLC	31.3.2020
Apple Inc	Voysis Ltd	3.4.2020
Amazon.com Inc	Undisclosed Industrial Complex, Hanover, Maryland	22.4.2020
Microsoft Corp	CyberX Inc	5.5.2020
Apple Inc	NextVR Inc	14.5.2020
Microsoft Corp	Metaswitch Networks Ltd	14.5.2020
Facebook Inc	Giphy Inc	15.5.2020
Microsoft Corp	Softomotive Ltd	19.5.2020
Apple Inc	Inductiv Inc	27.5.2020
Facebook Inc	Mapillary AB	18.6.2020
Microsoft Corp	ADRM Software Inc	18.6.2020
Apple Inc	Fleetsmith Inc	24.6.2020
Amazon.com Inc	Zoox Inc	26.6.2020
Alphabet Inc	North Inc	30.6.2020
Amazon.com Inc	HR Cornucopia Pvt Ltd's Talent Acquisition & Staffing Business	1.7.2020
Amazon.com Inc	Servco Pacific Inc's Honolulu Industrial Property	15.7.2020
Apple Inc	Mobeewave Inc	5.8.2020
Apple Inc	Camerai Ltd	20.8.2020
Apple Inc	Spaces Inc	25.8.2020
Amazon.com Inc	Residence Inn by Marriott International Inc, Pentagon City, Virginia	17.9.2020
Microsoft Corp	ZeniMax Media Inc	21.9.2020
Amazon.com Inc	CBSI India Pvt Ltd	1.10.2020
Alphabet Inc	Actifio Inc	2.12.2020
Alphabet Inc	Tada Science Inc	8.12.2020
Alphabet Inc	Neverware Inc	11.12.2020
Alphabet Inc	StratoZone LLC	24.12.2020
Amazon.com Inc	Delta Air Lines Inc-Boeing 767-300 Aircraft	5.1.2021
Amazon.com Inc	WestJet Airlines Ltd-Boeing 767-300 Aircraft	5.1.2021
Amazon.com Inc	Selz.Com Pty Ltd	15.1.2021
Amazon.com Inc	Umbra Software Oy	22.1.2021
Microsoft Corp	The Marsden Group Inc	16.3.2021
Amazon.com Inc	Delvit Solutions Pvt Ltd	31.3.2021
Microsoft Corp	Nuance Communications Inc	12.4.2021
Facebook Inc	Downpour Interactive LLC	30.4.2021
Alphabet Inc	Provino Technologies Inc	13.5.2021
Amazon.com Inc	MGM Holdings Inc	26.5.2021
Microsoft Corp	ReFirm Labs Inc	2.6.2021
Facebook Inc	Unit 2 Games Ltd	4.6.2021
Facebook Inc	BigBox VR Inc	11.6.2021
Amazon.com Inc	Wickr Inc	25.6.2021
Amazon.com Inc	Art19 Inc	25.6.2021
Alphabet Inc	pring Inc	13.7.2021
Microsoft Corp	CloudKnox Security Inc	21.7.2021
Microsoft Corp	Suplari Inc	28.7.2021
Microsoft Corp	Peer5 Ltd	10.8.2021
Alphabet Inc	SignalPath LLC	17.8.2021
Apple Inc	Primephonic BV	30.8.2021
Alphabet Inc	RobotWits LLC	31.8.2021
Microsoft Corp	Clipchamp Pty Ltd	7.9.2021
Microsoft Corp	Ally Technologies Inc	7.10.2021
Microsoft Corp	Clear Software LLC	22.10.2021

Meta Platforms Inc	Within Unlimited Inc	29.10.2021
Microsoft Corp	Two Hat Security Ltd	29.10.2021
Amazon.com Inc	Veeqo Ltd	2.11.2021
Amazon.com Inc	Audiobooks Brasil Sa	3.12.2021
Meta Platforms Inc	BlinkAI Technologies Inc	4.12.2021
Meta Platforms Inc	ImagineOptix Corp	21.12.2021
Microsoft Corp	Xandr Inc	21.12.2021
Alphabet Inc	Siemplify Ltd	4.1.2022
Alphabet Inc	LGIM Real Assets Ltd's Central Saint Giles Office	13.1.2022
Amazon.com Inc	Rlabs Enterprise Services Ltd	7.2.2022
Amazon.com Inc	Paradise Food Court Pvt Ltd	9.2.2022
Meta Platforms Inc	Kustomer Inc	16.2.2022
Microsoft Corp	Oribi Ltd	28.2.2022
Alphabet Inc	Mandiant Inc	8.3.2022
Apple Inc	Credit Kudos Ltd	23.3.2022
Microsoft Corp	Paddle Inc	29.3.2022
Microsoft Corp	Minit jsa	31.3.2022
Alphabet Inc	Vicarious FPC Inc	22.4.2022
Alphabet Inc	Raxium Inc	4.5.2022
Alphabet Inc	Foreseeti AB	16.5.2022
Amazon.com Inc	1Life Healthcare Inc	21.7.2022
Meta Platforms Inc	Lofelt Gmbh	2.9.2022
Alphabet Inc	Gunner	4.10.2022
Alphabet Inc	BrightBytes Inc	11.10.2022
Meta Platforms Inc	Camouflaj	11.10.2022
Alphabet Inc	Alter	27.10.2022
Microsoft Corp	Lumenisity Ltd	9.12.2022
Alphabet Inc	Open Source Robotics Corp	15.12.2022
Alphabet Inc	Open Source Robotics Corp Singapore Pte Ltd	15.12.2022
Meta Platforms Inc	LUXeXceL Group BV	28.12.2022
Amazon.com Inc	Snackable.AI	31.12.2022
Microsoft Corp	Fungible Inc	9.1.2023
Alphabet Inc	Photomath doo	22.2.2023
Amazon.com Inc	Owens Corning Insulating Systems LLC's Industrial Site	6.3.2023