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Acquisitions of Startups by Digital Firms and Merger Policy

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ABSTRACT

The rise of the digital economy has brought significant challenges to competition authorities around the world. When it comes to merger control, the authorities have realized that there is an increasing trend in acquisitions of startups by digital firms such as Google, Amazon, Facebook, Apple, and Microsoft (GAFAM). The latest research and reports on this area suggest that the main problem with the acquisition of startups in digital markets is that due to the low-turnover characteristic of the acquired companies, the transactions are not detected by competition authorities for a pre-merger assessment. As a result, it is challenging to distinguish anti-competitive from pro- or neutral competitive acquisitions. The purpose of this research is to contribute to the discussion of the challenges of merger control in the digital economy by addressing the following question: what are the factors that can be considered in the assessment of startup acquisitions by digital firms to identify anti-competitive acquisitions better? Through a literature research and descriptive analysis of the acquisitions of startups undertaken by GAFAM within the last decade, the present research considers that a better assessment of startup acquisitions should take into consideration the characteristics of the digital economy, the incentives of the startups and firms, as well as trends and characteristics of past acquisitions.

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1. INTRODUCTION

In the digital economy, two trends currently shape debates on competition and innovation policy: first, the increasing relevance of startups in the innovation process, and second, the challenges that the digital economy poses to competition policy. The combination of these trends begs the question of whether young innovative companies can effectively enter the market and compete to challenge the dominant position of digital market leaders. In looking at the acquisition strategy of online platforms, which mostly target startups, competition authorities are debating the necessity of modifying merger control regulations in the digital age.

The first trend reflects a growing interest in the central role that young innovative companies play in the innovation process of the 21st century. It is well known that through entrepreneurship, new ideas such as novel products, processes, or organizational methods are introduced (OECD, 2010). However, in recent years there has been a shift from the Managed Economy to the Entrepreneurial Economy (Audretsch & Thurik, 2001; OECD, 2010). The former took place in a post-war period and was dominated by large corporations focused on mass production (Audretsch & Thurik, 2004). The managed economy reflects a world "where economic performance is positively related to firm size, scale economies and routinized production and innovation" (Thurik, Stam, & Audretsch, 2013, p. 2). Thus, small firms were characterized by inefficiency, low rates of innovation, and low salaries for its employees (Audretsch & Thurik, 2004). This characterization of the small company changed in the late 1970s with the emergence of the entrepreneurial economy. Such an economy is one "where economic performance is related to distributed innovation and the emergence and growth of innovative ventures" (Thurik et al., 2013, p. 2). It was during this time when entrepreneurship started to play a greater role with the arrival of information and communication technologies (ICT) (Thurik et al., 2013) and a decrease in the demand for product standardization (OECD, 2010).

The arrival of the entrepreneurial economy has changed the innovation process. ICT and the internet allowed the creation of new industries due to the emergence of new technologies that have made entrepreneurship more efficient. In addition, the new innovation process

brings together more stakeholders which are involved in the formation of new businesses to foster ideas, products, and organizational methods— processes that were previously the sole domain of big corporations. In other words, the innovation ecosystem requires collaboration between research institutions, education institutions, government institutions, funding organizations (e.g., venture capitalist, angel investors, and banks), corporations, and other support organizations (e.g., incubators and accelerators) (Basso, Baltar, & Andonova, 2018; OECD, 2010). This startup innovation ecosystem has become increasingly relevant in Silicon Valley where new businesses have begun to emerge and scale at a rapid pace (OECD, 2010). The startup ecosystem has expanded worldwide, creating US$2.8 trillion in value between 2016 and 2018—excluding dominant tech-corporations such as Google, Amazon, Facebook, Apple, and Microsoft (collectively known as GAFAM)—a figure than it is similar to a "G7 economy and bigger than the annual GDP of the United Kingdom" (Startup Genome, 2019, p. 11)

The second trend concerns to the growing market power of GAFAM –mainly explained by the combination of the distinctive characteristic of the digital economy– because, with such rampant growth and increasing influence, the digital economy has created challenges for global competition policies. Recent reports from government commissions of the UK, the US, the European Commission, and Australia, as well as an independent committee from the University of Chicago Booth School of Business, argue that the rise of the digital economy in general, and online platforms in particular, have brought challenges for competition policy around the world. These institutions are in the middle of a debate as to how to adapt competition policy in the digital age.

Due to the rapid pace of breakthrough innovation coming from startups, offline and online market leaders are turning to them to maintain their competitive advantage in a world of disruption. One form of integrating such developments into the portfolios of market leaders is through acquisitions. In the case of online platforms, GAFAM has acquired more than 500 startups within the past decade, and none of these acquisitions have been blocked or challenged by antitrust authorities (Furman, Coyle, Fletcher, McAuley, & Marsden, 2019). Therefore, when it comes to merger control, the primary concern is undetected anti-competitive acquisitions, as for large digital platforms, the acquisition of new companies may

be motivated by a desire to eliminate potential competition from the market. The problem with startup acquisitions in the digital economy is that their low turnover characteristic, among other factors, creates a challenge for antitrust authorities in distinguishing between pro- and anti-competitive practices. As a result, academics and competition authorities are calling for stricter regulation in digital markets and suggesting specific modifications to implement in merger control. The purpose of this research is to contribute to the discussion of the challenges of merger control in the digital economy by addressing the following question: Which factors should be considered in the assessment of startup acquisitions by digital firms to better identify anti-competitive acquisitions?

The present research is based on the belief that a dutiful assessment of startup acquisitions considers the characteristics of the digital economy, the incentives of the acquirer and acquired, as well as trends and characteristics of past acquisitions. In this sense, an accurate analysis should identify how network effects, economies of scale, economies of scope, and the value of data change competition; and evaluates whether the market power of large digital platforms can be challenged by nascent startups (Chapter 2). The main findings suggest that competition is not impossible as the digital economy is characterized by fast-paced innovation, allowing young companies entry with disruptive ideas and forcing incumbents to engage in constant innovation. However, it is not an easy task for young innovative companies to enter the market to challenge the dominant position of large digital platforms, as startups encounter a market dominated by a handful of companies, barriers to entry, and active acquisition strategies.

An analysis of the trends and characteristics of startups that have been acquired should also be considered (Chapter 3). Thus, this study includes a compilation and descriptive analysis of a database that contains 594 acquisitions completed between 2004 and 2018 by GAFAM. The data reveals that GAFAM consistently targets startups, as 85% of transactions involve companies younger than 10 years at the time of the transaction. In comparing active and inactive startups, the data shows that about 10% of the acquired startups are currently inactive. Though this figure may suggest pre-emptive motives, it is difficult to indicate whether these acquisitions have been completed with the sole purpose of eliminating potential competition. However, press reports reveal that GAFAM usually argue that the inactive

startups are part of the acqui-hiring strategy, meaning that they acquired the company only because they were interested in the team behind the technology.

Understanding what makes startups and digital platforms engage in acquisitions is also an essential component of analyzing such transactions in the context of merger control. In this sense, this thesis identifies the main factors that influence the decision of entrepreneurs to sell their company and the factors behind the decision of digital incumbents to acquire low-turnover startups (Chapter 4). The literature suggests that dominant digital platforms acquire startups to gain access to the latest disruptive technologies, to acquire new talent, or to eliminate potential competition through "killer acquisitions." When it comes to the motives of startups, the main reasons to sell are related to the fact that acquisitions can be seen as a commercialization strategy, an exit strategy, or an opportunity to get a workplace in a top tech company.

Specific debates on merger control in the digital economy are examined in Chapter 5 which includes an explanation of the effects of startup acquisitions on competition and innovation. The chapter covers the debate of possible underenforcement of merger control for the case of acquisitions of startups and highlights the main motives that explain why competition authorities have been unable to challenge anti-competitive startup acquisitions. In addition, the chapter outlines the latest suggestions of academic and competition authorities to improve merger control in digital markets.

The previous chapters of the thesis are building blocks that support the main conclusion (Chapter 6). The thesis concludes that a better assessment of acquisitions of startups by digital firms involves looking beyond traditional variables like turnover and prices. It requires to include an analysis of the distinctive characteristics of the digital economy, the incentives of acquirers and acquired companies to engage in acquisitions, and a review of past acquisitions undertaken by GAFAM. In addition, Chapter 6 provides recommendations for further work related to merger control in the digital economy.

2. COMPETITION CHALLENGES IN THE DIGITAL ECONOMY

Competition is a crucial player in the market economy. A general definition indicates that competition is the process in which firms producing similar products engage in a rivalry relation to increase the number of customers and profits, focusing their strategy on offering products with lower prices or better quality (Crémer, De Montjoye, & Schweitzer, 2019; Furman et al., 2019; Kerber & Schwalbe, 2008). Through competition, markets can achieve an efficient allocation of resources, improve productivity, coordinate supply and demand, provide incentives for investment, develop new technologies, while limiting the power that arises from market dominance (Furman et al., 2019; Kerber & Schwalbe, 2008).

The positive impact of competition should be an incentive for all stakeholders in the economy to promote the entry of new players. However, the prospect of better functioning markets and higher consumer welfare are not sufficient incentives for companies to follow competitive practices. According to Kerber & Schwalbe (2008), some firms may seek to avoid competitive pressures through public restraints that come from the state or through private restraints that are imposed by companies. The authors explain that private restraints, which are those that concern this thesis, can take different forms (e.g., co-ordination of behavior that results in higher prices or worse quality of goods for consumers; merger and acquisitions that increase market concentration; or predatory behavior that seeks to exploit consumers or impede rivals). The anti-competitive conduct of firms is at the heart of competition policy which main objective is to "prevent today's market leaders from using their market power to disable disruptive threats, either by acquiring would-be rivals or by using anti-competitive tactics to exclude them" (Federico, Morton, & Shapiro, 2019, p. 2).

Academic experts and antitrust authorities argue that the traditional approach to competition is not possible in the digital economy as new challenges are emerging. A frequently discussed topic is that the combination of the distinctive characteristics of digital platforms leads to market concentration, increasing the market power of leading companies (Crémer et al., 2019; Stigler Committee on Digital Platforms, 2019). This chapter aims to assess whether startups in digital markets can compete and challenge the market power of large digital platforms. The following sections exposes the role the distinctive characteristics of the digital economy is playing on market concentration, barriers to entry and dynamic competition. This chapter

does not seek to provide a detailed analysis of how market concentration is defined in digital markets as it goes beyond the scope of this research. Instead, it takes as a starting point that even though the digital economy encompasses a wide range of markets, only a handful of companies have a leading and lasting presence in their respective core products. For example, Google has a market share of around 90% in the search market (StatCounter, 2019), Facebook –with 2,4 billion of active users– is ranked as the most popular social network worldwide (We Are Social, Hootsuite, & DataReportal, 2019), and Amazon is the leading market place in the US with a visitor market share of 56.1% (SimilarWeb, 2019).

2.1 DISTINCTIVE CHARACTERISTICS OF THE DIGITAL ECONOMY AND MARKET CONCENTRATION

The emergence of the digital revolution is explained by the remarkable improvement in the way humanity collects, processes and reproduces information. Digitization is defined as a process characterized by transforming any type of information and media into bits (Brynjolfsson & McAfee, 2016; Goldfarb & Tucker, 2017) and it was one of the first developments towards the digital economy. Technological improvements in the storage capacity of computers, software, and hardware made it possible to store and reproduce a vast amount of digitized information. However, the full potential of these improvements was not possible to exploit due to the limited communication between computers (Goldfarb & Tucker, 2017, p. 3). A fundamental step toward achieving this potential was the ability to aggregate the data collected by each computer. The reason is that the power of data does not come from individual sets of information but from the aggregation of all available sets of data (Martens, 2016).

According to Brynjolfsson & McAffee (2016), the Internet helped to overcome this barrier by connecting computers worldwide, allowing digital information to have two unique economic properties. First, digital information is a non-rival good, meaning that the consumption of a digital good, e.g., music listened by one user, does not restrain the possibility for any other user to listen to the same song. Second, digital information has a close to zero marginal cost which implies that copying digital information has a cost that is close to zero, and it can be replicated almost instantaneously (Brynjolfsson & McAfee, 2016). The digitization process and the two distinctive characteristics of data partly explains the rise of online platforms.

In a broad sense, offline and online platforms are companies that connect at least two different groups in a market (Evans, Schmalensee, Noel, Chang, & Garcia-Swartz, 2011). For example, Amazon (online platform) brings buyers and sellers together in a digital space, the same way that a local street market (offline platform) brings together neighbors and regional farmers. The economic value of platforms is that they provide benefits for all target groups by reducing the information and transaction costs of finding each other (Evans et al., 2011, p. 9). Retaking Amazon as an example, buyers can easily browse through a wide range of options to compare products and prices, while sellers can have access to buyers from almost anywhere in the world. A local street market fulfils the same functions with the difference that it faces constraints as usually they operate on specific dates, time, location and capacity. In this sense, online and offline platforms share the same characteristics, but what differentiate online from offline platforms is the role of data. The collection and aggregation of data in an unprecedented scale allows online companies to reinforce the characteristics of platform economics.

Online platforms have unlocked new business models, disrupting almost every industry around the world, giving rise to the digital revolution which has brought a wide range of benefits to society. People can easily communicate with anyone in the world, transaction and transportation costs for businesses have been reduced, the world's population has broad access to information, and consumers can enjoy a greater variety of choices in terms of quantity and price. However, the digital economy seems to have also created a set of problems that are a source of concern among different stakeholders of the global economy. For example, the tech backlash narrative (Techlash), which covers topics about the Big Tech breakup plan, the Antitrust Probe, and Data Privacy, is growing stronger in the United States and Europe (Atomico, Slush, & Orrick, 2019). As a result, competition authorities are debating about the changes in the dynamics of competition generated by online platforms (Crémer et al., 2019; Stigler Committee on Digital Platforms, 2019). By examining the specific features of online platforms, one can have a better understanding of their effect on the dynamics of competition.

In this thesis, digital platforms refer to GAFAM as these companies are the ones that have received most of the attention from antitrust agencies. However, it is essential to keep in mind

two general aspects when analyzing the digital economy. First, each platform has different business models, which means that "any antitrust analysis must be done company by company, based on that company's practices" (Shapiro, 2019, p. 82). Second, GAFAM are not the only dominant companies as one can also question anti-competitive conduct on companies like Oracle, IBM, Salesforce, Netflix, among others (Shapiro, 2019).

2.1.1 Network effects

One dilemma that platforms have to face is the so-called chicken and egg problem: side A and side B have to come on board at the same time (Evans, 2016). The right timing is necessary, as side A will not consider joining the platform if side B is not on board, and side A needs to be on board so that side B can also be willing to join (Evans, 2016). Thus, platforms will subsidize one side of the market by offering services at a zero monetary price while charging a fee to the other side (Evans, 2016). For example, Google users do not have to pay a monetary price to use any of the services offered by the platform such as Google Chrome, Gmail, Google Calendar, among others. These "free" services attract users, and once Google reaches a critical mass, advertisers will be more interested in using the platform to display ads.

After the platform has overcome the chicken-and-egg problem, network effects come into play. Network effects refer to the case when the value that consumers give to the platform increases with the number of consumers on the other side of the market (Evans et al., 2011). There are two types of network effects. Direct network effects occur when a user attributes more value to the platform; the more users of the same type are on board (Evans et al., 2011). Indirect network effects arise when the more users of one type that are on the platform, the more attractive or valuable are to the other type of users (Evans et al., 2011). Facebook is an excellent example to illustrate how both types of network effects work on online platforms. The social media platform is more attractive to users than other platforms; the more friends they can find there to interact with each other (direct network effects). At the same time, an increase in the user base of Facebook makes it more attractive to advertisers as their targeted audience increases (indirect network effects).

2.1.2 The role of data

As mentioned above, it is common for digital platforms to offer their service or product at a zero monetary price on one side of the market. According to Furman et al. (2019), the goal is to earn revenue, either by charging fees to the other side (e.g., Amazon charges a fee to the sellers that use the platform) or through ads (e.g., Facebook and Google obtain their revenues through digital advertisements). It is in this business model that data plays a significant role, as platforms use data not only to develop new products and services but also to place better-targeted ads.

It is vital to understand how data can be collected and its uses as data allows online platforms to enable data-driven innovation. Crémer et al. (2019) explain that online companies collect voluntary data provided by users (e.g., comments on social media or personal information of the registration forms), behavioral data (e.g., website visits or route follow on map services), and inferred data (transformation of voluntary or inferred data to generate insights). Thus, online platforms have incentives to look for new markets that will allow them to increase their database (Bourreau & de Streel, 2019). The need to expand the amount of data collected relates to the four categories of uses of data explained by Crémer et a. (2019): i) non-anonymous use of data at the individual level (i.e., data used to provide a service to the user) ii) anonymous use of individual-level data (i.e., data collected from users but used for a purpose different than providing a service, such as the creation of an algorithm). iii) aggregated data (i.e., aggregation of standardized data). iv) contextual data (i.e., data that does come from individual-level data, for example, mapping data).

Data-driven innovation brings an array of benefits to digital platforms (Furman et al., 2019). Access to a wide database allows a better understanding of customer's needs and preferences which results in higher quality products, it increases productivity which leads to efficient production and distribution, it improves product customization and it allows new business opportunities (Furman et al., 2019). In this sense, data becomes a significant competitive advantage for incumbents to consolidate their position through feedback loops: the more a platform collects data, the easier it will be to improve the service, target consumers and expand the business in current or adjacent markets (Furman et al., 2019). For example, through search queries, Google can identify which types of products have a high demand or

low supply (Bourreau & de Streel, 2019). However, having access to a large database must be complemented with a combination of other factors like engineers, computing power, and software (Bourreau & de Streel, 2019; Crémer et al., 2019).

2.1.3 Economies of scale and scope

Digital platforms have higher economies of scale and scope compared to offline platforms. Economies of scale occur when "the costs of developing, establishing, and maintaining these networks are somewhat independent of volume" (Evans et al., 2011, p. 15). Higher economies of scale in online platforms is explained by two main reasons. First, online platforms produce information goods that are non-rival and have close to zero marginal cost. Second, economies of scale in the digital economy are not limited by a geographic region because they use the internet to grow their businesses around the world (Stigler Committee on Digital Platforms, 2019).

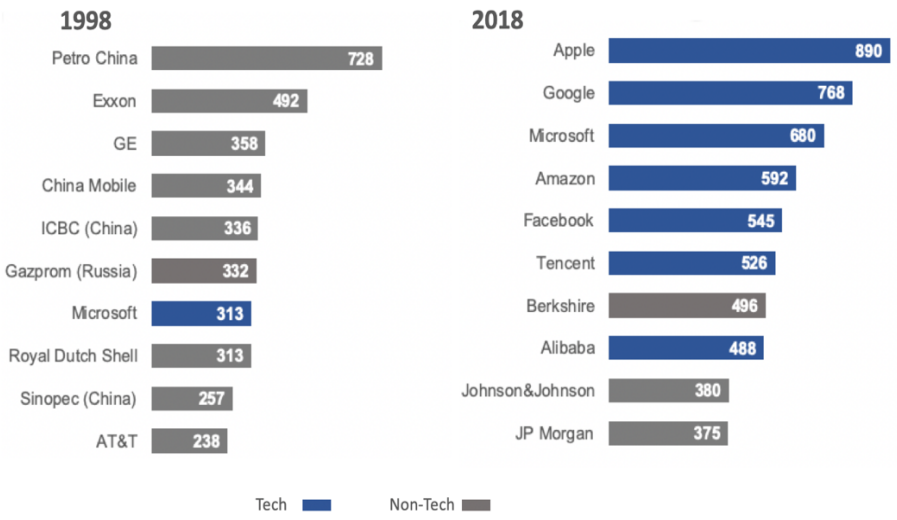
Economies of scope can take place in the product and development stage and are present when it is possible to use shared inputs to produce or create variations of the products or new ones (Bourreau & de Streel, 2019, p. 9). Thus, the marginal cost decreases due to the production of complementary goods and services. Digital platforms rely heavily on data analytics and machine learning, allowing them to improve their algorithms to increase the quality of their current products and create ecosystems in adjacent markets (Furman et al., 2019; Stigler Committee on Digital Platforms, 2019). In contrast, offline platforms also have economies of scope, but they are constrained by location and transportation costs while online platforms use the internet to have a global reach (Furman et al., 2019). The accumulated knowledge in artificial intelligence (AI) is an example of the different types of shared inputs. In this sense, AI can be used by Google in a wide range of projects to develop new products and services (Bourreau & de Streel, 2019).

2.1.4. Tipping markets

Online platforms have attracted attention in the last decade not only because they are disrupting almost every industry in the world, but also because of their rapid growth. The Global Startup Ecosystem Report 2019 shows that in 2008, only one online platform (Microsoft) was among the top ten most valuable companies in the world by market value

(See Figure 1), but in 2018 the picture was quite different. Seven online platforms were on the list, with five of them –Apple, Alphabet, Microsoft, Amazon, and Facebook–being American companies and two –Tencent and Alibaba – Chinese companies (Startup Genome, 2019).

Figure 1 *- Top 10 largest global companies*



Source: Startup Genome (2019)

The distinctive features of online platforms are also present in offline platforms. The similarity might suggest that competition policy does not need to adapt or change in the context of digital markets. However, the Stigler Committee on Digital Platforms (2019) argues that the combination on an unprecedented scale of the distinctive characteristics leads to market tipping. Thus, it requires a different approach to the assessment of market power.

Some authors argue that network effects lead to market tipping. The reasoning is that dominant platforms have an incumbency advantage that "may prevent entrants from penetrating the market despite being endowed with better quality products" (Argentesi et al., 2019, p. 4). Furman et al. (2019) partly disagree with the argument. The authors emphasize that sometimes network effects do not lead to market concentration, as users and companies can always switch or use several platforms at the same time (multi-homing). However, this is not a smooth process because users not only have to be willing or able to multi-home (Furman et al., 2019) but also because they have to overcome the costs of switching. For example, they need to coordinate with each other to migrate at the same time (Crémer et al., 2019). The

report of the Stigler Committee on Digital Platforms (2019) contributes to the discussion by arguing that network effects facilitate market concentration as consumers would prefer to use a platform where there is a big mass of users rather than being the sole user. For example, a given user will give more value to a social networking app where all their friends are instead of a secondary app where they can only connect and interact with a handful of friends.

In this context, network effects, economies of scale and economies of scope are an incentive for platforms to invest primarily in product development, regardless of how high the initial fixed costs may be. Once this step is completed, the platform is attractive enough to bring more users together, reducing the marginal cost of platforms and, therefore, better price/quality ratio for consumers (Stigler Committee on Digital Platforms, 2019). When the platform reaches a dominant position, a nascent competitor may decide not to enter the market because it will be challenging to reach the same scale and scope to offer a high-quality product attractive enough for users to switch platforms (Stigler Committee on Digital Platforms, 2019).

If the market is concentrated during a specific moment, there will be no threat to competition as the problem could be the result of low competition *in* the market (Furman et al., 2019). However, the analysis is different when it is about tipping markets, which is the case of the digital economy. Tipping markets change the competitive process from competition *in* the market to competition *for* the market (Stigler Committee on Digital Platforms, 2019). This type of competition focuses on entering the market and replace the incumbent that holds a leading position in their product or service (Crémer et al., 2019). Such a market competition is known as “winner-takes-all-markets”, in which firms compete fiercely to be the winner of the race and appropriate the large economic profits it entails (Stigler Committee on Digital Platforms, 2019).

Furman et al. (2019) indicate that in the case of digital markets, competition is dominated by five digital platforms –GAFAM– for a relatively long period. In this sense, Google dominates online search, Facebook has a leading position in social media. Both share the lead in digital advertising, while Apple and Google have the majority of downloads for mobile apps. (Furman

et al., 2019, p. 31). Hence, the opportunity to capture monopoly profits after reaching the top of the race could be an incentive for new firms to compete.

Nevertheless, once the market has tipped, the winner will establish itself as the market leader and consolidate its positions due to significant economies of scale and network effects that will make the strong player stronger and the weak weaker (Stigler Committee on Digital Platforms, 2019). These feedback loops increase the difficulty for new entrants to compete. Even if new entrants offer an innovative and disruptive idea, it will be difficult for them to quickly obtain similar economies of scale and strong network effects (Stigler Committee on Digital Platforms, 2019). It is precisely on this feedback loop where it relies the crucial task of protecting existing and potential competitors (Stigler Committee on Digital Platforms, 2019).

2.2. BARRIERS TO ENTRY VS DYNAMIC COMPETITION: CAN NEW ENTRANTS CHALLENGE THE MARKET POWER OF DOMINANT PLATFORMS?

As mentioned in the previous section, the distinctive characteristics of digital markets make it difficult for new entrants to compete due to the presence of tipping markets. The argument that a "winner-takes-all" market leads to an "unstoppable winner" is rejected by Evans (2017). The author suggests that digital platforms are often attention-seekers. Thus, they compete in different markets for the attention of relatively the same number of users and also for the limited advertisement budget of companies. In this regard, "even if a category is winner-take-all, the so-called victor wins the opportunity to provide valuable services to consumers for free. The victor then has to compete for advertising dollars with all the other winners" (Evans, 2017, p. 17). Companies willing to spend a specific amount of money still have to choose which one is the best platform that offers them a broader reach to their preferred target audience. For example, if the goal of the company is to display ads to young people, is this audience more likely to use Snapchat, Facebook, Instagram or LinkedIn? According to a survey in the US, only 51% of teens are actively using Facebook and indicate YouTube, Instagram, or Snapchat as their preferred social media network (Anderson & Jiang, 2018).

Because of this scenario, academic experts and competition authorities of the European Union, UK, US, Germany, Austria, and Australia are debating whether small and young firms can challenge the market power of large digital online platforms. Leading to the argument

that competition policy in the digital economy should be re-assessed since entry barriers imposed by market leaders make it difficult for startups to enter the market. As a result, there will be less competition, harm to consumer welfare and to the pace of innovation. The counterarguments suggest that stricter regulation may not be necessary, as the intense dynamic competition of digital markets translates in a constant threat that pushes digital platforms to engage in continuous innovation. Thus, to maintain their market leadership position, digital platforms will continuously introduce new features, products, or services that benefit their users.

2.2.1. Barriers to entry

Barriers to entry posed by dominant online platforms may further strengthen their position, making it difficult for small firms to compete. An argument in favor of this approach takes network effects as a barrier to entry because they can be considered to be “an obvious source of concentration due to a ‘rich get richer’ dynamics, whereby more users enhance the dominant firm’s attractiveness leading to even more users” (Argentesi et al., 2019, p. 3). In a counterargument, Evans (2017) indicate that network effects do not necessarily lead to monopoly because the platform can reach a point where an additional user does not add much value. The author argues that network effects may even be reversed due to the possibility of users to do multihoming or switching altogether to another platform that adds more value to them. As a result, digital platforms will aim to continuously innovate, add new features, explore new markets so that they can still be relevant to consumers (Evans, 2017).

Another proposition suggests that data can also act as a barrier. The reason is that "an incumbent firm may have a significant advantage over entrants if it possesses a valuable database that would be difficult, costly, or time-consuming for a new firm to match or replicate" (McSweeny & O’dea, 2018, p. 2). Therefore, the entry of potential competitors will be unlikely if they do not have access to the same volume, velocity, and variety of data (Furman et al., 2019). Besides, large technological firms can also impede entry by denying their rivals access to the data collected even if it is technically possible to do so (Stigler Committee on Digital Platforms, 2019). As a counterargument, Evans (2017) states that:

> Although it is possible that data provides some online platforms with essential advantages, which could result in barriers to entry, the historical evidence

> refutes the proposition that data, as a general matter, provides online platforms with permanent advantages or places insurmountable obstacles before new firms (p.35)

The author presents two examples to illustrate how digital companies that initially do not have data can displace market leaders. The first example is related to Facebook and Orkut. In 2006, Orkut was the most popular social media platform in India. In that same year, Facebook entered the Indian market without a large user base because most users had Orkut as their first choice. However, it only took four years for Facebook to be ranked as the first social media app in the country. The second example is taken from the competition between Apple Music and Spotify. According to the author, Apple had a large amount of data from its more than 50 million iTunes users, while Spotify had none. By 2017, Spotify had "become the leading source of digital music in the world" (Evans, 2017, p. 36). The example of Apple and Spotify could indicate that "successful platforms are the ones that figured out the right combination of products, prices, design, and ignition strategies" (Evans, 2017, p. 34) and not that success or failure is a direct consequence of the abundance or lack of data.

What is more, "the prevalence of multihoming and switching between platforms, is inconsistent with the claim that data provides a substantial barrier to entry" (Evans, 2017, p. 13). The reason behind this argument is that users can download and use several applications without significant constraints. Multihoming and switching are also mentioned by D. Coyle (2018) and Furman et al. (2019) as barrier removers because they allow users to compare prices and products. However, the Stigler Committee on Digital Platforms (2019) states that there are barriers to entry created by consumer behavior that make it difficult for users to engage in multihoming or switch from platform to platform. These types of barriers are based on the field of Behavioral Economics. This stream of literature explains that the behavioral biases of consumers will change their decisions according to several factors. For example, how the information is presented (e.g., not changing default options on platforms), how consumers value more the present than the potential benefits of the future (e.g., users clicking only on the first page of a search engine's result or not comparing them with the results of another search engine), and how people look for immediate results (e.g., accepting privacy terms without first reading the terms and conditions document) (Stigler Committee on Digital Platforms, 2019).

Supporters of the barriers to entry argument indicate that startups are on a competitive disadvantage when comparing to dominant platforms. The winners of the race will have cost advantage because high economies of scale, economies of scope and network effects, will slow down competition, as it will be difficult for new entrants to offer a product with a higher quality and without a similar scale (Furman et al., 2019; Stigler Committee on Digital Platforms, 2019). Moreover, the claim is that it will also be more difficult for startups to raise funding, as venture capitalists will be reluctant to invest if they believe the startup will never be able to scale the business at the same level of a dominant digital platform(Stigler Committee on Digital Platforms, 2019).

D. Coyle (2018) argue that the forms of competition between platforms may also be considered as entry barriers for smaller platforms. The author indicates that a form of competition entails what is called as "envelopment", referring to the case of "adding another group of customers on one side and using those revenues to reduce the price charged to another side of the platform" (D. Coyle, 2018, p. 4). The other form of competition takes place with bundling or tying of services to "cross-subsidize between different groups of users when they are unable to set a negative price to subsidize one side directly" (D. Coyle, 2018, p. 4).

2.2.2. Dynamic competition

For Evans (2017), internet platforms face more dynamic competition than the major industries of the 20th century. The author argues that:

> Online platforms don't have to sink capital into providing physical facilities for providing services. They rely on the companies that have built regional, national, and global networks for carrying Internet traffic, mobile carriers and local broadband providers that enable users to access the Internet, and cloud companies that rent storage and computing capacity to companies that want to distribute their products and services over the internet (Evans, 2017, p. 6)

In addition, the main products or services are digital, and any modification entails an alteration of the software code, which then can be replicated to all the users of the product. Therefore, it is relatively more accessible for new incumbents to rapidly add new enhancements to make the product more appealing to the target audience (Evans, 2017). This process results in

continuous innovation as any new startup will continuously learn from their data and try to improve the product or expand to a new market (Evans, 2017).

The author also explains that competition today is more intense because the boundaries of competition are blurred, which means that platforms can compete with each other in several areas and not only in their core product (Evans, 2017). The problem with this argument is that the primary debate is not whether a titan can compete against another titan – competition between GAFAM –, the problem is that the easier it is for an incumbent to expand and take control of other markets, the more difficult would be for young innovative companies to compete effectively in any market.

When it comes to innovation, Evans (2017) disagrees with the statement that innovation will slow down. For the author, it is the rapid pace of disruptive innovation that is playing the central role because they "expand opportunities for entry and pose challenges to incumbents" (Evans, 2017, p. 18). Evans argues how, in a relatively short period, there have been at least three different waves of disruptive innovation that have challenged the status quo of platform leaders. The internet revolution brought the AOL final crash; the smartphone revolution led the collapse of Blackberry and to the struggle of Microsoft to change the business model from desktop to mobile; voice-activated devices such as Alexa by Amazon came just seven years after the introduction of iPhone (Evans, 2017). As a result, “a dominant platform can easily be overturned by an entrant or rival with better technology, higher quality, or a different business model” (D. Coyle, 2018, p. 10). Which, according to D. Coyle (2018) also leads to consider that:

> It is not just immediate entry that tempers behavior in high technology industries; it is also the threat of the next generation of products and services that is of concern to incumbents. Current leaders must succeed in each round of innovation or lose leadership (Pleatsikas & Teece, 2001) (D. Coyle, 2018, p. 6).

In summary, it is possible to say that the threat of upcoming disruptive innovative waves, novel technologies and new companies act as challengers for the market power of dominant platforms. However, the argument may lose strength when the growth strategy of online platforms is considered. An strategy where the company uses internal research and innovation to improve their current products or expand to new markets (i.e. organic growth)

(Geis, 2015) will not impose an extra challenge for startups to compete. However, when the dominant company seeks to grow by acquiring other companies (i.e. inorganic growth) (Geis, 2015), the implications for startups may be different as it may be more difficult for them to remain in the market. The vast amount of data gathered gives digital platforms a competitive advantage to identify upcoming trends on technologies and users preferences (Stigler Committee on Digital Platforms, 2019, p. 71) which improves their ability to know which startups they can acquire or block to maintain their leadership position (Furman et al., 2019; Stigler Committee on Digital Platforms, 2019). Therefore, if startups are in a disadvantage position to the market power of digital platforms, competition policy should focus on ensuring that the entry of these potential competitors is possible to guarantee consumer welfare (Stigler Committee on Digital Platforms, 2019, p. 35).

3. STYLIZED FACTS OF STARTUP ACQUISITIONS BY DIGITAL FIRMS

The acquisition strategy of GAFAM is a source of concern for competition authorities who are currently debating whether or not they should tighten merger control regulation in digital markets. This chapter provides insight into the trends and characteristics of startup acquisitions by GAFAM. The chapter begins with a comparison of GAFAM and non-GAFAM technological acquisitions; then, it provides an analysis of startup acquisitions by GAFAM (i.e., transactions where GAFAM companies are the acquirer and startups are the target).

3.1. ABOUT THE DATASET

The database used in the study compiles the technology acquisitions of GAFAM. As these tech companies were founded in different years – Google (1998), Amazon (1994), Facebook (2004), Apple (1976), and Microsoft (1975) – the study only includes acquisitions completed between 2004 and 2018 to ensure consistency in the analysis. The list of acquisitions is available in Appendix A.

The information on technology acquisitions, the value of deals, and the technology developed by the target company was collected manually through AcquiredBy, a database specializing in acquisitions in the technology industry. To ensure accuracy in the number of acquisitions, the information from AcquiredBy was compared to three other sources: Crunchbase (a platform

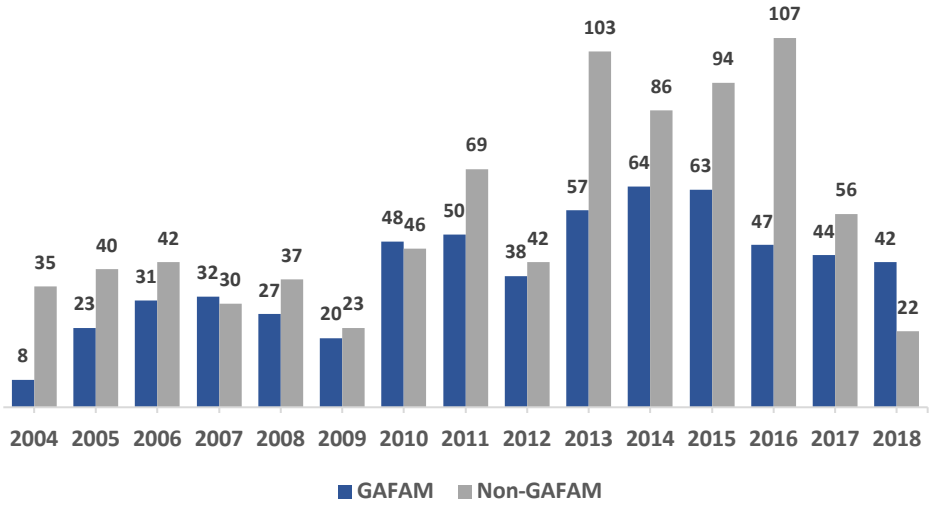
that compiles information on public and private companies), lists of acquisitions available on Wikipedia, and the investor relations website of Microsoft. After comparing all the sources, five acquisitions found on AcquiredBy were removed from the database. Three of them are not available in any of the other sources: Cloudo DIE, Gipsy Moth Studios, and Spectrum, which were acquired by Amazon, Apple, and Microsoft, respectively. One startup acquired by Amazon was registered under two different transactions: Stanza and Lexycle. The other transaction that was eliminated from the database is the acquisition of Trendalyzer by Google as it was an acquisition of software rather than a company (Chasmore, 2007). The characteristics of the startups (such as year of establishment, funding, and operating status) were compiled manually through Crunchbase.

The European Union Startup Monitor 2018 (EUSM) criteria were used as a reference to differentiate mature companies from startups. The EUSM 2018 uses three criteria to define a startup: i) the company is younger than ten years old; ii) the company creates innovative products or business models; and iii) the company aims to increase its number of employees and expand to new markets (Steigertahl, Mauer, & Say, 2018). This thesis does not consider the last two criteria due to the difficulty of quantifying the degree of innovation and the growth expectations of each startup company when they were acquired. However, one can assume that for a startup to differentiate itself and attract the attention of a large digital platform, the product, service or team should be rather innovative and promising. In this sense, it can be said that all acquired companies involve a certain degree of innovation. As a result, this thesis classifies a company as a startup if it meets the first criteria.

3.2. ALMOST HALF OF ALL TECHNOLOGICAL ACQUISITIONS HAVE BEEN MADE BY GAFAM

This section provides an overview of the acquisitions that targeted mature companies and startups and that were undertaken by GAFAM and non-GAFAM firms. According to the AcquiredBy database, 1,426 tech acquisitions were completed between 2004 and 2018 (AcquiredBy, 2019). Out of those acquisitions, 594 (42%) are transactions conducted by GAFAM, with Google being the most active acquirer (215 acquisitions), followed by Microsoft (150 acquisitions). Figure 2 presents the number of deals conducted by GAFAM and Non-GAFAM firms from 2004 to 2018. The data in this figure have two relevant characteristics: acquisitions of startups have occurred in waves and they present an upward trend.

Figure 2: Number of GAFAM and non-GAFAM acquisitions



Source: AcquiredBy (2019); Microsoft Investor Relations (2019), Wikipedia (2019a, 2019b, 2019d, 2019c, 2019e), *own calculations*

The chart shows that acquisitions have come in two waves for both groups. The first wave takes place between 2004 and 2008 with a peak in 2006; the second wave occurs in the period from 2012 until 2018 with a peak of 107 acquisitions in 2016 for non-GAFAM and 64 transactions in 2014 for GAFAM. Figure 2 reveals an upward trend as the peaks reached by GAFAM and non-GAFAM companies during the second wave are twice those reached during the first wave. Furthermore, the acquisition activity of non-GAFAM firms sharply decreased by 79% between 2016 and 2018, but GAFAM acquisitions remained stable (around 40 acquisitions each year). In addition, 2018 is the only year in the database where the number of GAFAM acquisitions (42) is higher than the number of non-GAFAM transactions (22).

It is possible that the acquisitions of startups by GAFAM companies could follow the same pattern in the next few years. If so, acquisitions of startups would continue to play an essential role in the acquisition strategy of the group. Half of the tech acquisitions belong to these five tech-firms; furthermore, the yearly quantity of acquired startups has remained at a stable level. In contrast, non-GAFAM transactions declined over the last two years of the period.

3.3. OVERVIEW OF STARTUP ACQUISITIONS BY GAFAM

This section provides an analysis of the acquisitions by GAFAM. First, it compares the volume of deals that targeted mature and startup companies. Afterward, the analysis focuses on startup acquisitions.

3.3.1. Acquisitions of mature companies vs. acquisitions of startups

As indicated in the previous section, GAFAM acquired 594 companies between 2004 and 2018. The data reveal that GAFAM companies have a strong preference for acquiring young targets as 503 acquisitions (85% of the total) were startups. The data show that there are differences within the group when it comes to how active their acquisition strategy is and the number of targeted startups. Google appears as the most active acquirer of the group with 215 tech-acquisitions, targeting startups in 88% of its transactions (190 transactions). Microsoft is the second most active company with 150 transactions, but only 75% of its acquisitions targeted startups, which is the lowest share among GAFAM companies and indicates a higher preference for acquiring more mature companies. Apple completed 83 tech-acquisitions during the period, with 71 of them being startups. Facebook acquired 78 companies and had a relatively strong focus on young companies as 92% of its acquisitions are startups. Finally, Amazon had the lowest number of acquisitions (68 transactions) registered in the database, and 84% (57 deals) are startups.

The rest of the analysis in this section focuses on the 503 deals that involve startups. It examines the characteristics of the acquisitions completed by each company to identify patterns related to the number of acquisitions per year, the value of the deals, activity status (i.e., active or inactive) and the technology developed by the targeted startups.

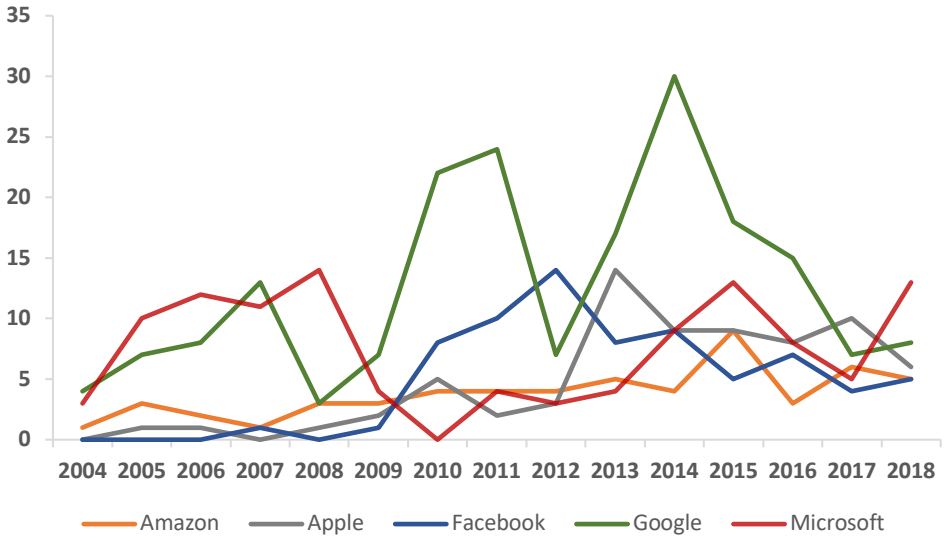
3.3.2. Number of startups acquired per year

On average, GAFAM acquired 33 startups per year. The general pattern described in section 3.2 – two waves with an upward trend – is also present when only startups are considered as targets. The data reveal that the waves occur over the same periods; the first wave occurred between 2004 and 2008, and the second one occurred between 2011 and 2017. However, the upward trend for the startup acquisitions seems to be higher as the yearly average percentage change is 21% instead of 11%. The year where the most startup acquisitions were registered

is 2014, with 61 transactions. Between 2014 and 2017, there was a steady decrease in the total number of deals. However, in 2018, there was a slight year-over-year increase of 16%.

The trends for all companies except Google are different than the overall trend (see Figure 3). Amazon had a stable upward trend over the period (average annual percentage change of 35%) with a sudden increase in 2015 when it reached a peak by doubling the number of acquisitions in comparison to the previous year. During the first six years of the period, Facebook was not actively engaged in acquisitions. However, in 2010, the social media platform changed its strategy abruptly by acquiring for the first time several startups in one year. By the end of 2014, the company had already bought 49 startups, which represents 66% of its total startup acquisitions during the years covered in this study. Apple also had a low level of activity during the first nine years of the period but had an aggressive acquisition strategy between 2013 and 2018, the period where the company acquired 56 young companies (79% of its total startup acquisitions). Similar to Google, Microsoft actively pursued an acquisition strategy with two waves. During the first wave from 2005 until 2008, it acquired a total of 47 startups (42% of its total startup acquisitions), and during the second wave from 2014 to 2018, it acquired 48 more with a peak in 2015.

Figure 3: Number of acquisitions by Google, Amazon, Facebook, and Amazon over time



Source: AcquiredBy (2019); Microsoft Investor Relations (2019), Wikipedia (2019a, 2019b, 2019d, 2019c, 2019e)*, own calculations*

The dataset reveals two characteristics about the number of acquisitions by GAFAM. First, it seems that Google, Amazon, Facebook, Apple, and Microsoft preferred to acquire young innovative companies over more mature ones as the highest proportion of acquisitions for each company are startups rather than mature firms. Second, the trend – though erratic for some companies – is positive, which suggests that startup acquisitions could keep increasing over the next few years.

3.3.3. Value of acquisitions and new value thresholds

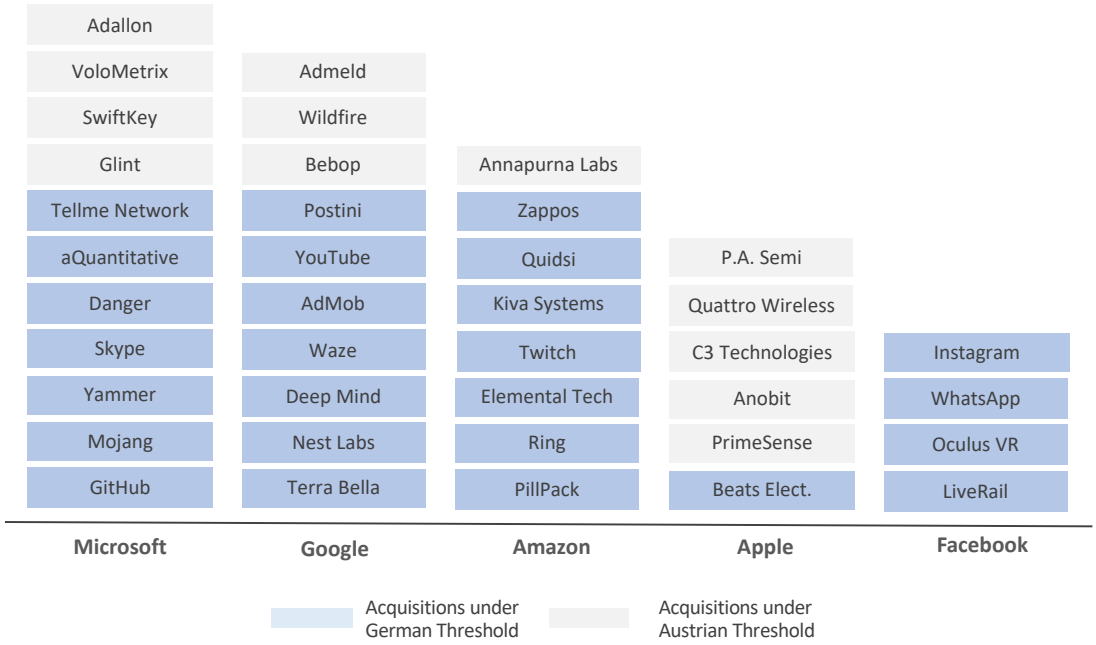
The majority of acquisitions do not have disclosed values, which makes it challenging to provide a detailed analysis of the value of the deals. Therefore, this section is based only on the 22% of the transactions for which deal values are available.

In total, GAFAM paid $76.5 billion for 111 acquisitions, with an average value of $689 million per acquisition. Microsoft was responsible for 39% ($30.1 billion) of the total value. Although the number of acquisition of startups by Google is almost three times that of Facebook (33 vs. 13, respectively), the latter spent twice as much ($23 billion) as Google paid for its acquisitions ($11.1 billion). The highest bidders were Facebook and Microsoft, as the data reveals that, on average, both platforms paid $1.7 billion and $1.2 billion per startup, respectively. Facebook's and Microsoft's average is four times higher than that of Amazon (around $400 million per acquisition) which is the platform that occupies the third place in the ranking with $6.8 billion paid in total for 17 transactions. The yearly data show that 2014 was the year with the highest disclosed value of deals – $33 billion distributed among 15 transactions – followed by 2018, where Google, Amazon, and Microsoft spent almost $10 billion in 7 acquisitions. The highest deal value disclosed, the acquisition of WhatsApp by Facebook, was $19 billion and contributed to the peak in 2014.

As Chapter 5 explains, Germany and Austria have established a transaction value threshold for merger control of EUR 400 million and EUR 200 million, respectively. In addition, the European Commission is awaiting the outcomes of these policies to consider the possibility of including such a policy at the European level (Crémer et al., 2019). Given this new regulation, it is worth considering how many startup acquisitions would have reached both thresholds. Figure 4 depicts the startups that would have fall under German and Austrian transaction

value threshold. With Germany's value threshold of EUR 400 million, 26 transactions would have been under scrutiny – as it is represented by the blue blocks in the figure. When considering the Austrian EUR 200 million threshold, 13 acquisitions–depicted by the grey blocks– are added to the list, reaching a total of 39 transactions.

Figure 4: Acquisitions of Startups that exceed the German and Austrian value threshold



Source: AcquiredBy

3.3.4. Inactive startups after the acquisition

One concern of competition authorities have is that the main motivation behind startup acquisitions could be to eliminate potential competition (i.e., killer acquisitions). A further discussion of killer acquisitions and their implications for competition policy is provided in Chapters 4 and 5, respectively. Due to the lack of available information, it is not possible to provide an exhaustive analysis of killer acquisitions. However, the study provides an approximation by checking whether each startup is still active after the acquisition and by gathering information from news reports regarding the acquirer's reason to shut down the startup after the acquisition.

This approximation involves an examination of the statuses of the startups, which are available on Crunchbase, and found that 40 of them (8% of the total) are inactive. The results show that Facebook and Apple appear to have the largest shares of inactive startups (11%

each). Amazon and Google have shut down 9% and 7% of their acquired startups, respectively. Microsoft appears to be the company with the lowest number of inactive startups, as only 4% of the acquired startups are inactive. Through desk research, it was possible to identify that at least twelve other startups were also shut down according to press reports. With those companies added, the approximation above, the number of startups shut down by Facebook, jumps from 11 to 19; for Amazon and Google, the numbers jump from 5 to 7 and from 14 to 17, respectively. These results can be viewed as a low bound as it was not possible to conduct exhaustive desk research of press reports about the 503 startup acquisitions. However, gathering such information could be a starting point for future work related to startup acquisitions in digital markets.

In the dataset, only 13 out of the 52 inactive startups have disclosed values. Furthermore, only 12% of all startups with disclosed values appear to be inactive, and the aggregate value of these acquisitions is US$1.5 billion, which represents only 2% of the total disclosed amount. Moreover, only two acquisitions (Facebook's acquisition of LiveRail and Apple's acquisition of PrimeSense) would have met the Austrian value threshold (see section 5.4.1).

It is difficult to conduct an exhaustive analysis of the reasons why startups are inactive since no database collects all the required information. Undertaking desk research for every acquired startup would require more time and resources than the ones that were available for the present study. Nonetheless, the database indicates that nearly 30% of the inactive startups were acquired to recruit the founders or employees (i.e., acquihires) to integrate them into different projects or products developed by the acquirer. In general, in an acquihire, the acquirer is interested in integrating the team behind the product and not in acquiring the technology developed by the target (a further explanation is available in Section 4.1.2). For example, a press report indicates that when Facebook acquired Eyegrooves – a video and music selfie app – it was only interested in the Eyegrooves team as it did not acquire the technology nor intellectual property (Perez, 2016). However, there are some cases where a large digital platform acquires not only the team but also the technology. In January 2018, Facebook completed the acquisition of the ID document identification startup Confirm.io. After the acquisition, the startup announced that it would shut down its projects to join Facebook, while Facebook indicated that the company would use the technology developed

by Confirm.io and the expertise of the team to improve the safety of Facebook's community (Constine, 2018)

Moreover, there are a few startup acquisitions that could require closer attention because the arguments for closing down the acquired companies could suggest pre-emptive motives — for example, the acquisition of tbh by Facebook. The startup tbh was founded in 2013, acquired in 2017, and closed in 2018. By the time of the acquisition, tbh, which was a social network app allowing its users to send anonymous compliments, was becoming popular among teenagers. Facebook claims that the reason behind the decision to shut down the app was low usage. However, by the time tbh was taken out of the market, it had been downloaded 6.4 million times (Lunden, 2013). At the same time, two other apps (Moves and Hello) were also shut down for the same reason, even though the former had 570 thousand downloads and the latter 13 million (Lunden, 2013). The large range in the number of downloads of these apps does not provide a clear definition of what exactly "low usage" means for Facebook.

Another example is Facebook's acquisition of the supply-side video advertising platform LiveRail. The company, which was founded in 2007, was shut down in 2016, only two years after the acquisition took place. In 2014, Facebook paid $500 million for the startup and argued that "LiveRail's excellent product – known in the industry as a supply-side video platform or SSP – and Facebook's expertise with relevancy, delivery, and measurement will help us make video advertising much better for everyone" (Boland, 2014). However, in 2016 Facebook discontinued LiveRail "to focus on finding better ways for publishers to sell their ad space directly to advertisers, as well as expanding our video offering via Audience Network" (D'Onfro, 2016).

The third suspicious transaction was the acquisition of Softcard by Google. Softcard was a mobile app that allowed its users to make payments with their smartphones. In January 2015, Google acquired the startup for an undisclosed amount. Three months after the acquisition, Google announced that it was shutting down the app because it was going to be replaced by Google Wallet (Welch, 2015). Thus, one could argue that the acquisition was made to reduce

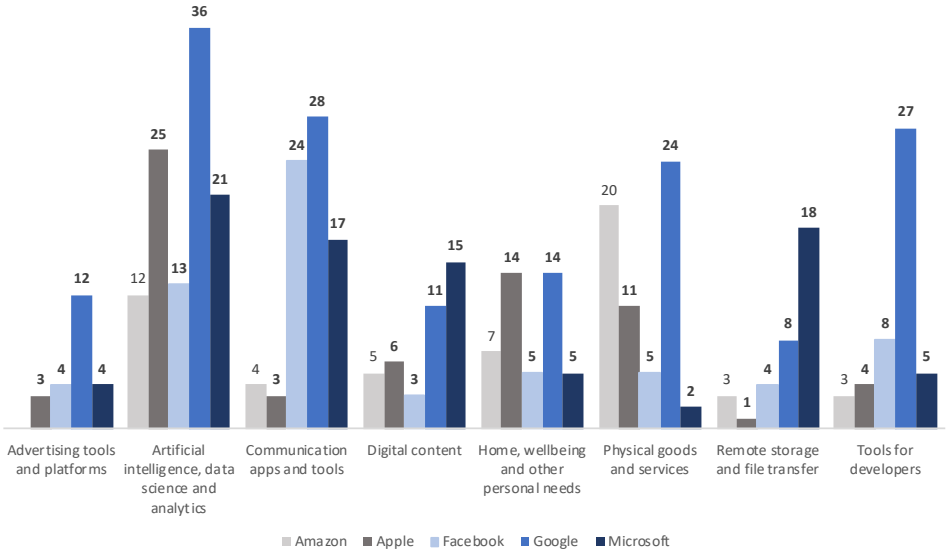
competition with one of Google's products. However, further analysis is required to confirm such a hypothesis.

3.3.5. Types of technology developed by the startups

Information regarding the types of technology developed by the startups was collected through the tags assigned by AcquiredBy. There are 144 tags assigned to the 503 acquisitions. A wide range of tags would have prevented the identification of specific patterns. However, Argentesi et al. (2019) conducted an analysis of the acquisitions of Google, Amazon and Facebook from 2008 to 2018, and they grouped the tags into nine clusters: 1) Communication apps and tools; 2) tools for developers; 3) physical goods and services; 4) digital content; 5) remote storage and file transfer; 6) advertising tools and platforms; 7) artificial intelligence, data science, and analytics; 8) home, wellbeing, and other personal needs; and 9) other. One weakness of using this method is that "it requires [one] to make a judgment, catching only one dimension of what the target did at the time of the merger" (Argentesi et al., 2019, p. 10). However, the authors explain that the method can give a good approximation as it requires additional desk research per transaction (Argentesi et al., 2019). This thesis uses these clusters as references to identify patterns in the acquisitions of startups by GAFAM (the definition of each cluster is available in Appendix B).

Figure 4 below shows the distribution of the startups that GAFAM acquired from each cluster. The data show that 21% of the acquired startups are in the fields of artificial intelligence, data science, and analytics. All of the acquirers show a preference for this type of technology. The results for Amazon, Facebook, and Google are similar to those found by Argentesi et al. Furthermore, Amazon and Facebook tended to acquire startups from clusters that are related to their main core product. Amazon had a focus on acquiring startups that work in the field of physical goods and services, and Facebook seems to focus its acquisition strategy on startups that are working on the field of communication apps and tools. The data shows that, although Google focuses on certain clusters, its acquisition strategy is more versatile than that of the other companies in the group. In the figure below it is possible to see that Google has been mostly focused on four clusters (AI, data science and analytics; communication apps and tools; physical goods and services; and tools for developers). However, in the rest of the clusters, Google remains the main acquirer.

Figure 5: Purpose of the technology developed by the acquired startups



Source: AcquiredBy

In this thesis, I also cover the acquisitions of Microsoft and Apple, companies that are not covered in Argentesi et al (2019). The data reveal that Microsoft seems to target startups in three specific fields: artificial intelligence, data science, and analytics; remote storage and file transfer; and communication apps and tools. Their acquisition strategy seems to go in line with the business goals in their annual report; the company states that they are focusing on reinventing productivity and business processes, building an intelligent cloud, and creating new forms of personal computing (Microsoft Corporation, 2019). The main focus of Apple is on artificial intelligence, data science and analytics and on home wellbeing and other personal needs. Both clusters also have a close relation to Apple's core products. For example, the former helps the company develop new technologies to enhance current products or develop new ones. In 2018, Apple "introduced a new framework called CreateML that app makers can use to train AI models on Macs" (Novet, 2018).

4. THE MAIN FACTORS BEHIND STARTUP ACQUISITIONS BY LARGE DIGITAL FIRMS

Mergers and acquisitions (M&A) contracts involve two parties – buyer and seller – who must be included in the analysis as M&A represent "a substantial investment for the buyer, a change

of control and ownership (or even the 'end of corporate life') for the target, and a significant transformation in the assets of the seller"(Coates, 2015, p. 3). When it comes to M&A in digital markets, online platforms in general and GAFAM in particular "are willing to pay extremely high prices for startups that are losing money and which face a high uncertainty with respect to their future revenues and profits" (Becker, Clement, & Nöth, 2016, p. 5925). Thus, when assessing whether or not large digital platforms pursue anti-competitive strategies by actively acquiring startups, competition authorities should also consider what the incentives behind the decision of large digital platforms to acquire such startups are. In this respect, they should take into account not only the perspective of the incumbent but also the different factors that drive startups to sell the company to an established platform. In other words, for a leading online platform to be able to buy the startup, founders must be willing to sell it, and this dynamic should be taken into account. Therefore, the purpose of this chapter is to identify what makes startups and digital platforms to engage in acquisitions by taking both startups and incumbents' perspective. Later on, the main findings will help to explain the effects on competition and innovation.

4.1. WHY ARE LARGE DIGITAL PLATFORMS ACQUIRING STARTUPS?

4.1.1. To acquire new technologies and accelerate growth

As explained in Chapter 2, digital platforms face dynamic competition with disrupting innovation coming from different industries and sources, which leads them to engage in constant innovation. In other words, in a world where disruption is the rule, keeping up with fast-paced innovation is necessary to remain competitive. In this sense, "a firm's capabilities to sustain its competitiveness in a dynamic environment with rapid technological change (dynamic capabilities) are consequently linked to its ability to create, modify, and extend its technological resources" (Andersson & Xiao, 2016, p. 274). It is in this need that it relies upon the importance for established companies to integrate the innovation developed by the startups. As the literature suggests, startups are better at developing breakthrough innovations and are then likely to join an established firm to engage in incremental innovation to improve the product (Baumol, 2002).

The main question that arises is why large digital companies, which have disrupted almost every industry worldwide with their technologies, need to acquire startups to re-invent

themselves? The answer relies on one of the most common challenges in any large corporation: the bigger a business is, the more difficult it will be to develop radical innovation within the company as their internal processes and procedures will try to reduce risk (Sheppard, Mabbott, Fogarty, McCarron, & Gelb, 2015). As a result, digital acquisitions emerges as the primary strategy for digital and non-digital acquirers to include the latest technological capabilities into the firm (Shacklady, Neely, & Dawson, 2018). The Mergers and Acquisitions 2018 report by Deloitte shows that:

> Nearly a third of the S&P 1,200 constituent companies have engaged in disruptive M&A deals or venture investments. Such deals are done with the purpose of acquiring capabilities or technologies across key disruptive innovation categories such as FinTech, AI, Robotics, Cyber Security and others" (Iain Macmillan & Sriram Prakash, 2018, p. 15)

A study from McKinsey found that a successful acquisition strategy for software and online-services companies requires to develop a high-volume acquisitions program (i.e., more than one acquisition per year) that can complement organic growth while aligning with the company's overall growth strategy (Brian Dinneen, Eric Kutcher, Mitra Mahdavian, & Kara Sprague, 2015). In particular, the acquisition of tech-startups attracts the attention of established firms due to "their technology profiles, resources or the high performance that could complement an incumbent firm" (Andersson & Xiao, 2016, p. 274).

4.1.2. To acquire new talent

Section 3.1.3 included a review of the startups that are inactive after the acquisition. Research of several press reports indicates that one common reason behind this pattern is that founders and their employees join the team of the incumbent to help them improve existent products or to develop new ones. These results are supported by the Acqui-Hiring literature which explains that using acquisitions as a hiring method seems to be "a novel – and increasingly common – tool by which the most successful technology companies satisfy their intense demand for engineering talent" (J. F. Coyle & Polsky, 2013, p. 284). As the name suggests, acquihire transaction means that the acquirer is not interested in using the technology developed by the target company nor in their tangible assets, but in hiring the founder team or employees. (J. F. Coyle & Polsky, 2013; Selby & Mayer, 2013)

Engineer talent is a crucial asset for any online platform. As explained in chapter 2, data is a valuable resource in the digital economy. Thus, digital platforms rely heavily on data analytics and programming to develop and maintain their business model, products, and services. Therefore, such skills are in high demand among digital platforms since a fast-paced, innovative environment, increases the need to continuously invest in tangible and intangible resources. According to J.F. Coyle & Polsky (2013), the competition to attract and hire engineer talent is highly intensive in Silicon Valley because established companies have to compete not only with other incumbents but also with startups. The relevant question is, why would a particular prospective employee be willing to work in a small company rather than for one of the established online platforms? J.F. Coyle & Polsky (2013) argue that the preferences to work or found a startup is higher because nowadays, it is easier than before to start a new venture. The authors explain that the ease of establishing a new company is explain by three primary reasons. First, the costs of founding a startup are lower than before (i.e., digital companies do not need to incur in high capital investments). Second, startups nowadays have access to more financing sources (e.g., venture capitalists, incubators, accelerators, angel investors, among others). Third, the combination of the previous two factors allows startups to pay more competitive salaries and bonuses.

The increase in the difficulty of recruiting new talent has led digital platforms to hire them via acquisitions. What is more, digital platforms might use acquihiring as a strategy because it allows them to hire a whole team that has proven to work well together and which the incumbent can use to work in the acquirer's current or future products. (J. F. Coyle & Polsky, 2013; Selby & Mayer, 2013). When it comes to this type of hiring method, the acquirer may incur higher costs as they need to take into account what J.F. Coyle & Polsky (2013) call deal consideration and compensation pool. Deal consideration “consist of cash or buyer stock and is used, depending on the specific deal structure, to pay for the covenant not to sue, to buy all or some of the startup’s assets, to acquire the startup company’s stock, or to serve as the merger consideration” (J. F. Coyle & Polsky, 2013, p. 297). Compensation pool “is used to compensate the startup’s founders and employees for their future services in favor of the buyer” (J. F. Coyle & Polsky, 2013, p. 297) and it can be vested according to performance (e.g., when the acquired employees reach certain benchmark) or according to time (e.g., after the acquired employees have spent an specific amount of time working for the incumbent).

If buying startups is more costly in terms of money than following a traditional recruiting method, why acquirers opt for an acquihiring strategy rather? On the one hand, acquihiring buyers can offer different pay packages to the acquired engineers which they could not do if they are hired via regular channels as it "could disrupt the buyer's existing salary structure, leading potentially to resentment among existing employees" (J. F. Coyle & Polsky, 2013, p. 323). On the other hand, J.F. Coyle & Polsky (2013) argues that it is related to competition. In this sense, it is common for incumbents to established as part of the contract that the acquired engineers cannot compete after a determined amount of years of leaving the company. Acquihiring is not a rare recruiting method anymore, nowadays it is considered as a "necessary part of the firm's human resources acquisition strategy" (Selby & Mayer, 2013, p. 3)

4.1.3. To eliminate competition

Cunningham, Ederer, & Ma (2018) argue that an acquirer may decide to buy another company with the sole purpose of eliminating current or potential competition. The authors called this kind of transaction "killer acquisitions" and explain that it can occur when "an incumbent firm may acquire an innovative target and terminate development of the target's innovations to preempt future competition" (p. 1). To prove the existence of such acquisitions, the authors analyzed drug development projects before and after acquisitions in the pharmaceutical industry which is an industry the resembles until a certain point the technology industry because it is characterized by "innovative activity, and M&A transactions" (Cunningham, Ederer, & Ma, 2018, p. 16). The authors do not suggest that all acquisitions take the form of "killer acquisitions," but their empirical results indicate that at least 6% of acquisitions can be considered to be done to eliminate competition. Even though acquisitions with preemptive motive seems to represent only a small fraction of the transactions, they are the ones that bring a high level of concern to competition authorities, especially when it comes to the digital economy. Therefore, it is important to consider under which conditions can "killer acquisitions" happen

Cunningham et al. (2018) explain that it can be related to three factors: i) product overlap, ii) market conditions and iii) merger control. When it comes to product overlap, the authors argue that a necessary condition for this type of acquisition to happen is that there has to be a "positive acquirer-target product overlap" (p.2). The reason behind their argument is that

"if the target project overlaps with projects or products marketed by the acquirer, the acquirer has weaker incentives to continue development" (Cunningham et al., 2018, pp. 20–21) which will result in the incumbent shutting down the startup's project. Their empirical results suggest that 29% of overlapping projects are less likely to be developed after the acquisitions (Cunningham et al., 2018). The study also suggests that killer acquisitions are more likely to occur in less-competitive markets as the results indicate that "the decreased likelihood of development of overlapping projects during the post-acquisition period concentrates in product markets with relatively low competition" (Cunningham et al., 2018, p. 28). The authors continue their analysis by indicating that killer acquisitions are more likely to happen when acquisitions deals cannot be captured by the Federal Trade Commission (FTC) pre-merger review.

The incorporation of these three factors in the analysis of digital platforms makes it possible to find common points that suggest that killer acquisitions may act as a reason for large digital platforms to buy startups. In particular, it can be said that the second factor (i.e., less-competitive market) and third factor (i.e., underenforcement on merger control) are similar to the situation presented in the digital industry. As explained in Chapter 2, even though digital markets present a high dynamic competition, the distinctive characteristics of online platforms lead to market concentration, raising doubts about the competitiveness of digital markets. Moreover, the main debate around merger control considers the possibility of underenforcement in merger control as none acquisition has been blocked so far (see Chapter 5). When it comes to the first factor mentioned by Cunningham et al. (2018) (i.e., product overlap), which refers to the overlap of products, may suggest that killer acquisitions are not likely in digital platforms as usually the product of the startup is integrated to improve or expand the ecosystem built by the incumbent.

4.2. WHY DO STARTUPS CHOOSE TO BE ACQUIRED BY AN INCUMBENT?

In the previous section, the analysis was focused on the incentives of the acquirers. However, it is not possible to close a deal if entrepreneurs are not willing to sell their venture. In this context, it is relevant to ask what drives the decision of founders to engage in an acquisition? Entrepreneurs can have a wide range of incentives to sell their startup to an established digital platform, and the literature suggests that the three main reasons why acquisitions might be

an attractive option are because they are considered to be a commercialization strategy, an exit strategy or a way to be part of the team of the acquirer company. What is more, the incentives of venture capitalists also come into place when deciding to sell.

4.2.1. Acquisitions as a commercialization strategy

In the commercialization stage – fundamental for entrepreneurs to define the startup strategy and positioning – the founders of startups have in principle two options to choose from: to commercialize in the market product or to sell it to an incumbent in the market for ideas (Gans & Stern, 2003; Norbäck & Persson, 2014).

Gans & Stern (2003) explain that if the startup decides to commercialize in the product market, founders need to overcome challenges such as aggressive investments, uncertainty, and limited organizational resources. At the same time, the startup needs to find a way of attracting a critical mass of consumers while also avoiding an imitation strategy from established firms. If a startup decides not to enter the product market, then it will turn to the second possible commercialization strategy, which is to go through the market for ideas (Gans & Stern, 2003). In this market, the startup will look to set up a collaboration strategy with established firms where "negotiations take place in the shadow of potential product market competition. That is, the value derived from cooperation increases with the threat posed by the startup innovator to the product market position of the established firms" (Gans & Stern, 2003, p. 337). One form of establishing a cooperation strategy with incumbents is through acquisitions under which the startup will lose both commercialization and organizational independence. Another form is through licensing the intellectual property of the ideas, which will allow the startup to commercialize the idea while remaining organizationally independent (Gans & Stern, 2003).

When facing both types of commercialization strategies, what makes a startup to choose one over the other one? Gans & Stern (2003) explain that the answer will depend on two drivers: excludability and specialized complementary assets. The former concerns to the possibility that startups may prevent incumbent from engaging in imitation strategies when the new technology is disclosed (e.g., the startup can make use of intellectual property protection or a technology design challenging to copy) while the latter refers to complementary resources or

assets that established firms have, but that are difficult for startups to build or obtain. Such complementary assets can take the form of "distribution networks, marketing channels, financial resources, manufacturing know-how, and brand names" (Norbäck & Persson, 2014, p. 672). The startup will have to balance both drivers to choose the optimal commercialization strategy. According to Gans & Stern (2003), the combination of the two factors generates four different scenarios: the attacker's advantage, greenfield competition; reputation-based ideas trading; and ideas factories.

In the attacker's advantage scenario, the startups are not able to exclude incumbents nor need complementary resources from them. Startups will most likely choose the product market, which will lead to an intense level of competition "with continual entry challenges by startups aimed at undermining the value of existing market leadership positions" (Gans & Stern, 2003, p. 340). The ideas factories scenario is the extreme opposite, meaning that startups can make use of excludability strategies and also need to have access to complementary resources. In this case, there will be a strong collaboration strategy between incumbents and startups, which will guide them to choose a commercialization strategy in the market for ideas. Norbäck and Persson (2014) support this view by indicating that startups will prefer to sell the business to an acquirer when markets are partly integrated as incumbents will be more willing to pay a higher price to retain their market power.

Empirical findings support the previous theoretical arguments. In a study about Swedish startup acquisitions by incumbents, Andersson and Xiao (2016) identified the type of startups and established firms that have undertaken acquisitions. Among the results, the authors found that "acquisitions primarily occur in high-technology contexts where entry costs are high, access to finance is important, and incumbents have valuable complementary resources" (Andersson & Xiao, 2016, p. 274). A situation that is not so distant from the one that startups have to face as entry costs may still be high even though it is relatively easier to establish a startup. For example, young innovative ventures may find it difficult to compete with large digital platforms because of limited network effects or because the app can be replicated by one of the incumbents. What is more, incumbents can offer not only monetary resources to develop the company further but also engineer talent, computer capacity, among others.

4.2.2. Acquisitions as an exit strategy for entrepreneurs and investors

In the startup journey, it can happen that at a particular moment, the decision entrepreneurs have to make is not about whether to compete or to sell. The decision that both entrepreneurs and investors might face is related to the objective to "diversify their equity holdings in the firm and exit (at least partially), while simultaneously allowing the firm to raise external financing for new investment" (Bayar & Chemmanur, 2011). This decision involves not only the incentives of entrepreneurs but also of their investors. In this sense, Bayar & Chemmanur (2011) explain that in those startups where investors' holdings are small, the entrepreneur will be the primary stakeholder deciding whether to sell or not the startup. On the other hand, when venture capitalists "has veto power over any exit choice" (p. 4), the decision will be negotiated between entrepreneurs and venture capitalists.

In this scenario, Bayar and Chemmanur (2011) explain that acquisitions –strategy where the entrepreneur gives the control of the firm to the acquitting firm– and Initial Public Offering (IPO) –strategy where the entrepreneur retains control of the firm, but they sell some of their equity holdings to raise capital– are two exit mechanisms used by entrepreneurs and investors to achieve their objectives. The former not only seems to be the most common exit strategy chosen by entrepreneurs (Arora, Fosfuri, & Roende, 2018; Bayar & Chemmanur, 2011) but also there is an increasing trend on "the proportion of firms withdrawing their offerings after filing to make IPOs and choosing to be acquired instead" (Bayar & Chemmanur, 2011, p. 2). Considering that according to empirical findings, IPOs offer a higher payoff for entrepreneurs and investors, why do founders and investors prefer acquisitions as an exit strategy? The answer is related to product market conditions and how, when combined with other features, it can lead entrepreneurs to sell the business.

According to Bayar & Chemmanur (2011), entrepreneurs with an early-stage venture would prefer acquisitions because it might be difficult for them to compete against an incumbent when the product is not yet fully developed. Also, if the analysis of market investors indicates that the startup does not have a viable product to compete, the market valuation will be low, increasing the likelihood of acquisition. Bayar & Chemmanur (2011) found that when the startup has a viable product according to market investors, they will receive a higher valuation through an IPO. However, entrepreneurs might still prefer acquisitions due to the perception

that their product is not able to compete in the market product against an incumbent. Another reason to choose acquisitions over IPO is related to the nature of the industry. A capital-intensive industry would favor an exit strategy through IPO, but an industry where there is already a dominant firm would lead entrepreneurs to choose acquisitions.

Venture capitalists (VC) also play an important role in the decision-making process of selling the startup as in venture-backed firms where the VC has a long-term investment horizon, acquisitions are more likely to happen (Bayar & Chemmanur, 2011). Even though IPO might yield higher returns for the firm because it can continue developing the product, investors might perceive it as a riskier strategy as it is frequent that they lose more money when the startup fails and gain less when the startup succeed as a standalone firm (Fried & Ganor, 2006). The founder of the startup Zappos, Tony Hsieh, explains that the decision to sell the company to Amazon came from pressures of the Board of Directors of Zappos which included investors from Sequoia Capital (Hsieh, 2010). However, the pressure was not directed towards selling the company but rather towards changing the company culture by cutting costs in light of the recession. To this respect, Hsieh indicates that:

> As with all VCs, Sequoia expected a substantial return on its investment –most likely through an IPO. It might have been happy to wait a few more years if the economy had been thriving, but the recession and the credit crisis had put Zappos –and our investors– in a very precarious position (Hsieh, 2010).

For Hsieh, changing the company culture was not an option, so it decided to follow an alternative option: buy out the board of directors by selling the company to Amazon. The deal with amazon involved not only a valuation of US$1.2 billion but also an understanding of the company culture and a relatively independent operation (Hsieh, 2010).

Sometimes "being acquired by a competitor may indeed constitute the last resort of a failing firm to prevent impeding bankruptcy. However, in many cases, acquisitions reflect success rather than failure" (Buenstorf, 2016, p. 830). This argument takes particular relevance because "if venture capital markets are weak and an initial public offering (IPO) unfeasible, then being acquired is one of the few available options to secure financing and continue developing the technology or product idea the startup is based on" (Andersson & Xiao, 2016, p. 274). In this same order of ideas, J.F. Coyle & Polsky (2013) explain that this type of

acquisition usually occurs because the startup cannot secure another funding round and take the acquisition as the best alternative to liquidating the company.

4.2.3. Acquisitions as a strategy to work for a leading technological company

Founders may decide to sell the company to a large technological firm as a strategy to have a workplace in one of the leading tech companies. The question is, why founders choose acquihiring over a traditional recruiting process? The answer to this question relies on a set of costs and benefits arising from social norms.

Acquihiring can derive in reputational and economic benefits to founders. As it is common that these transactions occur “because the startup was unable to develop a product and successfully bring it to market before it ran out of money” (J. F. Coyle & Polsky, 2013, p. 295), selling the startup to a leading technology company is perceived as a better option than quitting or shutting down the startup to join a tech-firm. Therefore, it seems that "the social status that entrepreneurs derive from being able to claim that they sold their company could be the primary factor behind the acquihiring phenomenon" (J. F. Coyle & Polsky, 2013, p. 320). The same reputational benefit might also apply for investors as "it is better to say that a portfolio company was acquired by Google than to say that it failed, even if the economics between the two outcomes are not materially different" (J. F. Coyle & Polsky, 2013, p. 322).

From a financial point of view, founders might also choose acquihires because this type of transaction reduces the tax burden as the money received is registered as capital gains rather than ordinary income (J. F. Coyle & Polsky, 2013). The authors explain that in Silicon Valley when founders are hired via traditional methods, their signing bonuses and equity-compensation plan will count as ordinary income and therefore taxed at 46 percent. However, if the company is acquired, the deal will be counted as capital gains, which is taxed at 23 percent.

When it comes to the costs derived from the sale of the startup, J.F. Coyle & Polsky (2013) explain that social norms play a role in the relationship between founders and their investors. In this sense, the authors argue that if founders decide to shut down the company to join an incumbent, investors could refuse to back any other future project of those founders or even make it difficult for them to find new investors. In general, founders have the incentive to end

in good terms with their investors as it is common for founders to see their contract in a tech-firm as an intermediate step to start a new venture after a few years. According to J.F. Coyle and Polsky (2013):

> The standard employee retention package in Silicon Valley contains equity incentives that vest over a period of three or four years. Interviewees explained that it would not be unusual for an acqui-hired entrepreneur to leave the buyer at the end of the vesting period, if not sooner, to launch another startup (p. 315)

Argument that is supported by the study of Ng & Stuart (2019) which reveals that acquihired employees show a higher turnover rate in comparison to employees that were hired via traditional methods. More specifically, “the average length of tenure of a employee hired through organic channels is about 1145 days, or 3.1 years. This is in stark contrast to acquihires: the average A-hired employee retains their position for about 600 days, or 1.75 years”(Ng & Stuart, 2019, p. 27). The authors indicate that the difference in tenure increases when the results are divided by other characteristics such as job rank and education as the founding team and C-level roles stay for a shorter period of time and frequently return to the startup scene. The good reputation will help founders to leverage their position with future investors and customers when starting another venture in the future. A sense of loyalty is also related to social norms, and it can lead founders to choose acquisitions over defection because sometimes for founders, "the investor is much more than a source of capital. The investor is also a trusted counselor, a valued source of industry contacts, and a partner in a shared undertaking" (J. F. Coyle & Polsky, 2013, p. 317)

5. MERGER CONTROL IN THE DIGITAL ECONOMY

Competition authorities have two main goals concerning merger control that they try to achieve simultaneously. First, they try to avoid that mergers reinforce market concentration (i.e., anti-competitive mergers) because they can lead to higher prices and lower quality of products and services. Second, they aim to avoid the prevention of acquisitions that are beneficial to consumer welfare (i.e., pro-competitive mergers) (Furman et al., 2019). Therefore, merger control covers horizontal, vertical, and conglomerate mergers, which are

transactions between competitors, along the added-value chain, and between companies in adjacent markets, respectively (Monopolkommission, 2015).

In the digital economy, it is becoming a challenge for competition authorities to differentiate pro- from anti-competitive acquisitions when the targets are "small, but successful start-ups with a quickly-growing user base and significant competitive potential" (Crémer et al., 2019, p. 110). This chapter covers the current discussion on the effects of startup acquisitions, possible underenforcement of merger control in digital markets, and suggestions for how to better identify anti-competitive transactions. It provides a critical analysis of the four main reports that have addressed the topic of competition policy in the digital economy: i) the report of the Digital Competition Expert Panel of the UK, ii) Competition Policy in the Digital Era by the European Commission, iii) the report of the Stigler Committee on Digital Platforms, and iv) the latest Digital Platforms Inquiry by the Australian Competition and Consumer Commission (ACCC).

5.1. THE EFFECTS OF STARTUPS ACQUISITIONS BY DIGITAL PLATFORMS

Startups are a central component of the innovation and competition process of the 21st century. The shift in the 1970s from the managed economy – characterized by large corporations focusing on mass production– to the entrepreneurial economy has placed startups at the center of the innovation process (Audretsch & Thurik, 2001; OECD, 2010). However, startups need an ecosystem that supports them as they scale up. Such an ecosystem includes the collaboration of different stakeholders such as academic institutions, venture capitalists, government institutions, and large corporations (Basso et al., 2018; OECD, 2010). Even though early-stage startups may not represent actual competition in the market, successful startups with high traction (e.g., an increasing number of users and media coverage) may be perceived as potential competitors. Additionally, online platforms are also key players in the innovation process as they compete with each other to find new processes, products, or services that can improve consumer welfare (Crémer et al., 2019). Therefore, when evaluating startup acquisitions in the context of digital markets, it is important to assess the effects of acquisitions not only on competition but also on innovation.

5.1.1. Effects on competition

There seems to be a general agreement regarding the competitive effects of startup acquisitions by large digital firms. The general belief is that most of the startup acquisitions have likely been pro-competitive or neutral. However, there seems to be a possibility that a handful of acquisitions have been anti-competitive (Australian Competition and Consumer Commission, 2018; Buenstorf, 2016; Crémer et al., 2019; Furman et al., 2019). This possibility is increasing the level of concern among authorities involved in merger control.

Authorities believe that some acquisitions have been undertaken to impede future competition so that large online platforms can maintain their dominant positions. However, even though this may be the case, a suggestion is not to analyze with a focus on the so-called "killer acquisitions" (i.e., acquiring startups with the main objective of discontinuing the product or service) (see Section 4.1.3). As was indicated in Chapter 4, established companies may acquire young, nascent companies in order to render them inactive (i.e., killer acquisitions). Nonetheless, in the case of digital markets, that is not the usual case for large digital platforms. GAFAM frequently integrate startups' projects into their current products, or they may use the acquired project to expand their ecosystem, which, in turns, help them to cement their market dominance (Crémer et al., 2019). For example, Google did not replace YouTube; it integrated it into its range of products. Facebook did not shut down Instagram or Whatsapp; it further developed and scaled up both apps. In addition, both acquisitions provided them with "access to data that can be used to improve the quality of [their] ad targeting services" (Australian Competition and Consumer Commission, 2018, p. 75).

An alternative approach could take into consideration the role of data and the development of stronger ecosystems through the acquisition of technologies and talent as possible foreclosure strategy of large digital platforms. In this sense, Crémer et al. (2019) argue that the role of data can bring about anti-competitive effects as the large digital platforms may acquire low-turnover startups because they want to have access to the growing user bases the startups have. As result, the acquisitions will either reinforce the market position of large digital platforms or prevent other rivals from having access to those resources. A recent example is the announced acquisition of the smart tracker company Fitbit by Google. Press releases indicate that users and politicians are concerned about such acquisition because

Google will have control over the sensitive health data collected by Fitbit (e.g., data on sleep quality, physical activity, heart rates, and eating habits) (Hern, 2019; Paul, 2019). Tom Watson – the UK Shadow Secretary of State for Digital, Culture, Media and Sport – requested authorities to stop the acquisition until an investigation of the competitive effects is completed (Paul, 2019).

An alternative argument indicates that better access to a particular dataset can have pro-competitive effects because it gives digital platforms the ability to improve their current range of products or bring new ones to market, which, in turn, can increase consumer welfare (Crémer et al., 2019). Therefore, acquisitions of startups by digital firms can result in synergies that allow startups to create disruptive ideas and new technologies while the firms acquiring these startups can provide the necessary capabilities to market the products or services (Crémer et al., 2019). These views are also in line with the arguments outlined in Chapter 4. There, it was indicated that one of the reasons why startups decide to sell their businesses is to be able to develop more robustly and market their products more effectively. From the acquirer's perspective, having access to new technologies is one of their main motives to acquire disruptive startups as they will allow these large digital platforms to keep up with the rapid pace of the innovation environment. However, some authors argue that acquisitions that look like they are undertaken to market new ideas or technologies may have been undertaken to strengthen the market dominance of digital platforms through the development of stronger ecosystems (Furman et al., 2019) or the elimination of potential threats and barriers to entry (Crémer et al., 2019).

In general, buying startups to capture their technologies should not be considered as anti-competitive conduct. As explained in Chapter 2, the dynamic competition that takes place in digital markets forces companies to continuously innovate and disrupt to be able to maintain their competitive advantages. However, competition is undermined when an acquisition seeks to prevent "the acquirer's rivals from obtaining access to a promising new technology developed by the startup" (Bryan & Hovenkamp, 2019, p. 11). Such an acquisition will eliminate future competition because the acquirer will be preventing its rivals from accessing the new technology, reducing competitors' possibilities for improving their products, and increasing the market power of the acquirer (Bryan & Hovenkamp, 2019). Moreover,

consumers would be worse off because the acquirer did not use the technology and the rivals would not have access to it (Bryan & Hovenkamp, 2019).

Another pro-competitive effect of startup acquisition is that they stimulate a higher level of investment from venture capitalists. Mandel and Carew (2011) note the existence of a "virtuous circle" that reinforces competition by increasing incentives for startups to enter the market. As the authors explain, a higher number of acquisitions will also increase the willingness of venture capitalists to invest. The reason for this argument is that the return expected by investors increases with the probability that a startup will be acquired. As a result, more money invested into startups will also be an incentive for more entrepreneurs to start a business, which will accelerate innovation, inducing incumbents to increase the number of acquisitions to maintain their competitive advantage (Mandel & Carew, 2011). In other words, the acquisition of startups is one of the main exit strategies of venture capitalists and founders (see section 4.2.2).

Nonetheless, some arguments suggest the opposite situation when startups are developing products or services in markets similar to those where the core products of large digital platforms are. According to views collected by Furman et al. (2019), there could be weaker incentives to enter and compete in the market because investors may be reluctant to support "a new product or service in a similar space to an existing large incumbent due to the perceived risk that the incumbent might seek to replicate it or kill it off" (Furman et al., 2019, p. 37). This scenario is known as "kill zone" and appears to be a source of concern for business analysts (Crémer et al., 2019; Stigler Committee on Digital Platforms, 2019). A recent study evaluated whether venture capitalists are likely to reduce their financial support to startups that offer products in markets that are similar to the markets of startups that were acquired recently at a high-value (Krishna Kamepalli Raghuram Rajan Luigi Zingales, 2019). The authors evaluated acquisitions made by Google and Facebook and found out that within the first three years of a major acquisition, venture capitalist reduced both the amount they invested in startups by 46% and the number of deals they engaged in by 42%.

From the above discussion, it seems that, in general, the line that divides pro- from anti-competitive effects is not entirely clear. The reasons why the majority of acquisitions are

considered to be pro-competitive are also challenged by counterarguments; these counterarguments suggest that even what looks like a positive consequence can be interpreted as an adverse effect that leads to pre-emptive motives. The main problem arising from this discussion is that it is difficult to know in advance what the exact motives of an acquirer are.

5.1.2. Effects on innovation

Before discussing the effects that startups acquisitions have on innovation, it is essential to understand how innovation takes place in the digital economy. Unlike innovation in traditional firms, innovation in digital markets involves a constant re-arrangement of new features, processes, and technologies to adapt them to a product that quite often is implemented and tested at the same time (Crémer et al., 2019). The rapid pace of innovation not only changes market boundaries but also makes it difficult to predict where the next innovation will come from (Crémer et al., 2019).

Two different points of view are central in the discussion around innovation. One argument is that innovation will increase as platforms try to absorb the innovation of startups to be able to compete in the market; another argument is that innovation will decrease or be distorted due to pre-emptive motives (Furman et al., 2019). According to the first argument, the acquisition strategy of large digital platforms can have a positive impact on innovation "when acquisitions allow companies to bring new products to market efficiently and those companies can afford modifications to continue innovating to keep the products dynamic, acquisitions have successfully facilitated innovation" (Mandel & Carew, 2011, p. 7). Thus, acquisition strategies can generate synergies and efficiencies, bring innovative products and services to market more rapidly, and increase innovation by strengthening founders' and venture capitalists' incentives to enter and invest in the market (Crémer et al., 2019; Furman et al., 2019). In other words, the acquisition of a startup that does not operate in the same market of the acquirer may not reduce competition as there could efficiency gains such as "consolidation of fixed costs and aggregation of data" (Hylton, 2019, p. 12).

A counterargument is that acquisition strategies can reduce innovation directly and indirectly. A direct slowdown in the pace of innovation could occur because digital platforms may lack

incentives to further improve their products for the benefit of consumers (Stigler Committee on Digital Platforms, 2019) as their leading market positions are not threatened by a conventional rival or a disruptive competitor (Federico et al., 2019). An indirect decrease in the rate of innovation occurs when venture capitalists do not want to invest in a startup that develops a technology that competes directly with large digital platforms; instead, they prefer to invest in startups that complement the products offered by these large firms (Stigler Committee on Digital Platforms, 2019). Therefore, startups will develop innovative ideas or products to strengthen the dominant position of market leaders rather than challenge them. For this reason, the focus of competition policy should be on ensuring that startups can compete in the digital economy in general and in the core market of incumbents in particular. Otherwise, startups will be more willing to develop technologies that either improve or complement the products of dominant digital platforms, which gives them more advantages over current competitors (Bryan & Hovenkamp, 2019, p. 13). Thus, innovation will benefit the companies that have a dominant position rather than creating disruptions that can generate competition against them.

5.2 WHY HAVE COMPETITION AUTHORITIES BEEN UNABLE TO CHALLENGE ANTICOMPETITIVE STARTUP ACQUISITIONS?

When enforcing merger control, one of two types of errors may occur: false positives and false negatives. The first concerns cases where a merger that should have been allowed is blocked, while the second occurs when a merger that should have been blocked is allowed. On the one hand, competition authorities will try to avoid false positives as mergers can bring benefits to consumers. On the other hand, they will also try to avoid false negatives as anti-competitive mergers "can result in strengthening of dominance and thereby a significant impediment of effective competition, e.g., by elimination of a competitive threat and/or by raising barriers to entry for other (potential) competitors" (Crémer et al., 2019, p. 111). Considering that GAFAM has acquired 503 startups in the past ten years and that none of them were blocked, one can conclude that there have been no false positives in digital markets. Thus, it is natural to ask about false negatives. Has there been underenforcement of merger control in the digital economy?

A growing concern is that there has indeed been underenforcement of merger control. Bryan and Hovenkamp (2019) argue that antitrust agencies follow a policy of inaction when it comes to merger control in digital markets. The author claim that such behavior derived from the Chicago School's principle that "antitrust should err on the side of nonintervention (false negatives) because erroneous condemnation (false positives) are seen as more socially costly" (Bryan & Hovenkamp, 2019, p. 3). This approach needs to be changed because, on the one hand, the likelihood of false positives is lower as there are new methods that reduce the probability of an incorrect assessment (Stigler Committee on Digital Platforms, 2019). On the other hand, false negatives are now believed to be more harmful than false positives; this is because "most competitive threats to incumbent firms are likely to come from new entrants that might be vulnerable to exclusionary conduct or anti-competitive acquisitions when their competitive prospects are uncertain" (Stigler Committee on Digital Platforms, 2019, p. 94).

Another argument comes from the quantitative evidence gathered by the Expert Panel in the UK, which highlights that over the last five years, none of the acquisitions undertaken by digital firms have been challenged by the UK Competition and Markets Authority (CMA). The CMA was not notified of any of the acquisitions during this time-frame, and it did not call for any investigations at the phase 1 (i.e., review to assess if a substantial lessening of competition is expected) or phase 2 (i.e., application of balance of harm probability test) levels (Furman et al., 2019). The expert panel writes that even though the Intelligence Committee of the CMA considered reviewing around 30 acquisitions, they did not follow through with the procedure as they felt there was no need to do so (Furman et al., 2019, p. 91). According to the authors, 2013 was the last year where an acquisition was subject to investigation. This investigation concerned the acquisition of Waze by Google, which was cleared at the phase 1 level. The European Union has also investigated some acquisitions. Even though the number of acquisitions under investigation by the EU is larger than that by the UK, none of them have been blocked either (Furman et al., 2019).

Given that there is increasing trend of acquisitions of nascent companies by large digital platforms and no transaction have been blocked in at least a decade, should competition authorities assume that tech giants do not have any incentive to be anti-competitive? It is difficult to argue that large digital platforms that have a dominant position in their core

products do not impose barriers to competition. Two points from Chapter 2 support such an argument. The first one is that, in general, firms have incentives to set private constraints to competition; the second one is that the digital economy is a winner-takes-all market because the combination of its distinctive characteristics (network effects, the role of data, and economies of scope and scale) leads to market concentration. This claim does not imply that all mergers from digital firms are anti-competitive. As explained in the previous section, the general agreement is that most of these acquisitions are benign, which reflects the nature of non-digital mergers and acquisitions activity. As Furman et al. (2019) argue, even in non-digital markets, the majority of mergers are allowed as well. For example, in the United States, about 15,000 mergers and acquisitions were announced in 2017; out of those announcements, competition authorities were only notified of 2,052, while 51 were investigated and 21 were blocked (Shapiro, 2019).

The natural question that follows is, why have competition authorities been unable to challenge acquisitions of startups by digital firms? The answer to this question involves the combination of at least three factors: static competition assessment with price as the main variable, low turnover as a consequence of the value of data, and the non-horizontal merger approach.

5.2.1. Static competition assessment with price as the main variable

Traditional competition methods are static and take prices as the main variable in their estimations (Bryan & Hovenkamp, 2019). This approach is problematic because it means that to assess competition, antitrust agencies only consider the immediate effects, underestimating the possible effects on potential competition (Bryan & Hovenkamp, 2019).

Including in the analysis what could happen in the future is of particular relevance when the target is a young low-turnover company. The reason is that these types of companies do not have significant market shares, and their products might not even be well defined at the time of the acquisition. Thus, in the present, they might not look like competitors, but there is a possibility that, in the future, they will be if they have the chance to remain independent. Moreover, prices are not a suitable indicator in the digital economy because. As outlined in

Chapter 2, the business model of digital platform is known for their "zero monetary price" and for the importance of data in their business model.

5.2.2. The low turnover characteristic of startups

As explained in Chapter 2, digital companies have a strong focus on data analytics to develop and improve their products. As a result, it is normal for young digital companies to focus primarily on increasing their user database and not on increasing their revenues (Crémer et al., 2019; Furman et al., 2019). The low-turnover characteristic of startups makes it difficult for authorities that rely on turnover thresholds to detect which acquisitions should be subject to review (Crémer et al., 2019; Furman et al., 2019).

For example, Article 1 of the European Union Merger Regulation sets the threshold that determines when transactions can be subject to review. More specifically, Article 1 indicates that the regulation will apply if the combined worldwide turnover of the acquired and acquirer is more than EUR 5,000 million or when at least one of them have a Community-wide turnover that exceeds EUR 250 million (Council Regulation (EC), 2004). The reason behind both criteria is that the "competitive significance for the internal market, is roughly related to the turnover of both the acquired and the target" (Crémer et al., 2019, p. 111). However, in the case of startups in the digital economy, the “turnover-based thresholds do not appear to be a good proxy of the competitive significance of such transactions” (Crémer et al., 2019, p. 113). For large digital platforms and startups, the data gathered by the startup, the technology or product they are developing, or the talent that is behind the new venture might be more valuable features than revenues.

Consulting firms support such arguments regarding digital acquisitions. Boote et al. (2019) indicate that for a merger and acquisition to be successful, any acquirer (i.e., digital or nondigital firms) must identify the synergies that the transaction will create, such as improvements to costs and revenues. For digital acquisitions, acquirers should look beyond these synergies and also consider less tangible sources of value because there relies the argument to justify paying a high price for digital assets (Boote, 2019). The authors explain that there are three intangible sources of value that acquirers should take into account. The first one is first-party data, which is the data collected by the target that can be used by the

acquirer to make decisions, build new products, or strengthen the current portfolio of products. The second one is related to stakeholder influence, which refers to the target's ability to establish strong connections, cross-selling, and an expansion of its customer base. The last one refers to capabilities and specialist knowledge that the acquirer can use to "accelerate its own growth."

From the arguments outlined in section 2.1, it is possible to find similarities between the less tangible sources of value considered by Boote et al. (2019) and the distinctive characteristics of digital platforms. In this sense, it is possible that first-party data is connected to the explanation of the role of data in the digital economy; stakeholder influence leads to important network effects, and the acquisition of capabilities to accelerate growth is related to economies of scale and scope.

5.2.3. Non-horizontal approach

Even in the cases where a merger meets the turnover threshold condition, it will be challenging to forecast which transactions might be anti-competitive or pro-competitive when startups are still in a very early stage (Crémer et al., 2019). In other words, "at the time of the acquisition, there may not yet be a substantial horizontal overlap between the "core" market dominated by the acquirer and the separate (but typically related) market served by the startup" (Crémer et al., 2019, p. 112). The type of merger – horizontal or vertical – is fundamental in the assessment process. A transaction is considered to be a horizontal merger when the target company is "a new or potential competitor of the acquiring incumbent" (Bryan & Hovenkamp, 2019, p. 9), meaning that the transaction will reduce competition. On the other hand, a vertical merger "involves parties located at different levels of a supply chain (and who thus do not directly compete)" (Bryan & Hovenkamp, 2019, p. 9)

In digital markets, most startup acquisitions are not considered as horizontal because the product is either a complementary product or because the horizontal overlap between the product of the acquirer and that of the startup is small; in these cases, the startup it is not considered to be a competitor (Bryan & Hovenkamp, 2019; Crémer et al., 2019). In addition, the problem with determining if an acquisition is anti-competitive is that it is difficult to assess whether a startup is indeed a nascent competitor of the acquirer because they might target

different markets. For example, in the case of Facebook's acquisition of Instagram, it was considered that both companies target different markets. Facebook operates as a social media network, while Instagram was considered to be operating only as a photo-sharing app.

5.3. A REVIEW OF STRATEGIC ACQUISITIONS AND POST-MERGER ASSESSMENT

The central question addressed in this section is, which acquisitions are believed to have been anti-competitive? A review of the available reports indicates that 24 transactions have raised concerns among authorities because they are classified either as strategic acquisitions by the ACCC report or as high-value acquisitions by the Digital Competition Expert Panel of the UK (See Appendix C). One point to consider is that Google and Facebook are responsible for around 80% of the acquisitions that are a source of concern. Among the 215 acquisitions of Google, there are six that are mentioned in the reports (i.e., Nestlabs, Waze, Admeld, AdMob, YouTube, and Deepmind Technologies). As for the 78 acquisitions of Facebook, the reports highlight twelve transactions (i.e., WhatsApp, Instagram, Sharegrove, Hot Potato, Gowalla, Glancee Glance, Tbh, Friend.ly, Divvyshot, Lightbox, FriendFeed, and Oculus). Furthermore, out of the 24 potentially anti-competitive acquisitions, at least two (Google's acquisition of Waze and Facebook's acquisition of Instagram) have been subject to review by authorities.

Argentesi et al. (2019) assessed the UK competition authority decisions in merger control cases, including Google's acquisition of Waze and Facebook's acquisition of Instagram. In the assessment, the authors found "gaps in the way these cases were analyzed, which in some cases may have resulted in the realization of market conditions less conducive to a competitive outcome" (p. 117). However, the authors recognize that such gaps "are only perceivable today thanks to a better understanding of how digital markets work and to the possibility to observe the actual evolution of some market players that were highly uncertain at the time the mergers were investigated" (p. 117)

Taking the transactions of Google as an example, the ACCC report argues that the acquisition of DoubleClick "represented a source of competition to Google's intermediary service that sold advertising inventory on websites part of Google Display Network through Adwords" (Australian Competition and Consumer Commission, 2018, p. 75). Through the acquisition, Google achieved higher economies of scope as the company "used DoubleClick cookies to

improve the quality of the ad targeting on Google's AdSense network" (Australian Competition and Consumer Commission, 2018, p. 75). Furthermore, Google's acquisition of YouTube enabled data accumulation that improved the company's services and products, thereby increasing their economies of scope (Australian Competition and Consumer Commission, 2018).

In their ex-post-assessment of the acquisition of Waze by Google, Argentesi et al. (2019) found that the Office of Fair Trading (OFT) did not correctly evaluate whether Waze was a close competitor of Google Maps. The authors explain that the main reason why authorities may not have made an accurate assessment is that they did not correctly consider the competitive constraints of Apple Maps; as a result, by the time of the acquisition, the authorities indicated that Apple Maps represented a stronger competitive constraint on Google Maps than Waze did. However, if the quality of Google Maps decreases, users of Android are not able to easily switch to iOS devices, as their decision to use a device is affected by several factors and not only the navigation services (Argentesi et al., 2019). Therefore, the authors argue that Apple Maps can only be considered a close competitor to Google Maps on iOS devices. The authors also indicate that the authorities focused "solely on the effect that the merger could have had on the user's side of the market. However, turn-by-turn navigation apps are provided to users for free and are monetized elsewhere" (Argentesi et al., 2019, p. 76). Thus, accurate analysis of the different monetization strategies (e.g., different forms of advertising, such as local search ads) could have provided insight into the network effects and anti-competitive consequences of the acquisition.

As for the acquisitions conducted by Facebook, the ACCC focuses its attention on Instagram. The report argues that the transaction could have been anti-competitive because it can be argued that "Facebook eliminated a potential competitor" (Australian Competition and Consumer Commission, 2018, p. 80). The ACCC argues that Instagram was similar to Facebook in the sense that it was "a platform facilitating the development of social networks of users, and it attracted consumer attention that was ripe for monetizing with advertising" (p. 80). However, the ACCC admits that by the time of the acquisition, it was not possible to forecast if the startup was capable of scaling up and becoming a competitor of Facebook.

Similarly, Argentesi et al. (2019) explain that the OFT cleared the merger Facebook and Instagram because they did not find evidence of the following: (1) the competitive constraint was going to disappear as Instagram had other stronger competitors; (2) Instagram was not attractive for advertisers; (3) Instagram was not able to compete against Facebook; (4) there were no economic incentives to eliminate other social networks that were competing with Facebook; and (5) Facebook did not have incentives to impede users to upload pictures from other apps. The evidence gathered by the authorities indicated that stronger competition was coming from other apps such as Camera Awesome, Hipstamatic, and Camera+ (Argentesi et al., 2019). They based their conclusion on the number of downloads, which, as highlighted by Argentesi et al. (2019), does not reflect app usage. Thus, the report argues that a better approach could have taken into account usage data to capture user engagement (i.e., how many users are actively using the app). With this metric, authorities could have noticed that Instagram already had a "loyal user base spending considerable amounts of time on the app" (Argentesi et al., 2019, p. 53). High user engagement makes apps more attractive for advertisers, which would have made Instagram able to compete with Facebook. In addition, the acquisition gave Facebook a competitive advantage because the merged entity is able now to sell the advertisement space at a higher price due to user base exclusivity; the platform is bigger, and they can better target advertising (e.g., avoid double targeting) (Argentesi et al., 2019)

Even though Amazon is mentioned only once by the reports (i.e., the acquisition of Ring), Lina Khan (2019) provides insight into the conditions under which the fast-growing e-commerce startup Quidsi was acquired. According to her research, Amazon wanted to acquire the startup in 2009, but Quidsi rejected the offer. As a consequence, Amazon used predatory pricing and psychological intimidation to force Quidsi to agree to the merger instead of competing in the marketplace (Khan, 2016). The author, therefore, suggests that both practices should be taken into account by courts when assessing these types of acquisitions.

5.4. IDENTIFYING ANTI-COMPETITIVE STARTUP ACQUISITIONS

The UK's Expert Panel on Digital Competition argues that competition and consumer welfare will be affected if competition authorities continue to struggle to capture anti-competitive transactions at the pre-merger level, while dominant platforms continue to strengthen their

acquisition strategy (Furman et al., 2019, p. 49). In light of the discussion of possible underenforcement of merger control, some academics and competition authorities are considering the possibility of modifying merger policy. For example, the Furman report suggests that the CMA should develop a "clearer framework for looking beyond current market conditions to examine how [a] transaction might affect future innovation and consumer welfare" (Furman et al., 2019, p. 93)

However, there is concern that this restrictive regulation may harm the pace of innovation, as it may not take into account "the importance and uniqueness of the technology sector" (Mandel & Carew, 2011, p. 2). As was explained in chapter 3 and as Furman et al. (2019) indicate, the possibility of being acquired is considered to one of the main exit strategies for venture capitalists and founders of startups. The goal of this section is to review and analyze the main suggestions that have been made so far by expert panels, academics, and competition authorities.

5.4.1. Transaction value threshold

Since one of the reasons why it is difficult to distinguish pro- from anti-competitive acquisitions is the low turnover characteristic of the startups, some have suggested changing the turnover thresholds for the assessment of mergers. The European Commission believes that there is currently no need to change the turnover thresholds in the European Merger Regulation (Crémer et al., 2019). Authorities and experts are considering instead to implement a transaction value threshold. For the European Commission, setting such threshold at the European level requires finding the optimal threshold. On the one hand, if the value is low, then there is the risk that too many acquisitions will require a review, increasing the burden on competition authorities. On the other hand, if the value threshold is too high, then the regulation will not be efficient as it will not capture enough acquisitions (Crémer et al., 2019)

Two countries that also rely on turnover thresholds – Germany and Austria – have already included thresholds in their merger guidelines. In Germany, the Act against Restraints of Competition establishes in Section 35(1a) that the regulation will apply to transactions with a value of more than EUR 400 million (Competition Act - GWB, 2018). Austria set a lower threshold of EUR 200 million in Section 9 (4) (Cartel Act 2005-KartG, 2017). According to the

competition authorities of both countries, the rationale behind these policies is that "the high purchase price [of low turnover startups] in such takeovers is often an indication of innovative business ideas with great competitive market potential" (Bundeskartellamt & Bundeswettbewerbsbehörde, 2018, p. 1). Crémer et al. (2019) does not rule out the option to include this modification in the European Merger Regulation but recommends the European Commission first to monitor how these thresholds set by Germany and Austria work. The Furman report, however, argues that the CMA has the tools (e.g., the share of supply test) to investigate any mergers, but it recommends adding a transaction value threshold if the CMA finds difficulties determining anti-competitive mergers in the future.

The data analysis in chapter 3 reveals that with the value threshold, a total of 26 and 39 acquisitions in the dataset would have been subject to review in Germany and Austria, respectively. Only one of these thirty-nine startups appear to be inactive in Crunchbase. Thus, the value of the deal may not be an indicator of killer acquisitions. Such argument are supported by Marco Arment, founder of the startup Instapapers, who claims that tech firms will not pay a large amount of money for a startup or app they are already planning to shut down (Arment, 2012). Furthermore, only 35% of the acquisitions with a deal value of over EUR 200 million are in the list of transactions that the recent reports classified as strategic acquisitions (See Table 1) and, thus, have the potential to be anti-competitive. In this sense, new regulation could increase the burden for antitrust authorities without necessarily capturing anti-competitive acquisitions. Moreover, considering that acquisitions are one of the main exit strategies for founders, such regulation could reduce the incentives for entrepreneurs to start new ventures, thereby reducing innovation. Nonetheless, the value threshold may still be an indicator of the value that an acquirer assigns to the other types of assets a startup possesses, such as its user base, data, and team.

5.4.2. Evaluation of the likelihood of an anti-competitive acquisition and the significance of assets

The ACCC suggests adding two more factors to merger law in Australia. The first one concerns "the likelihood that an acquisition would result in the removal from the market of a potential competitor" (Australian Competition and Consumer Commission, 2018, p. 105); this recommendation seeks to address the concern regarding digital platforms acquiring potential

competitors. However, in the case of startup acquisitions, it is problematic to estimate whether the target will become a competitor. As it was explained above, not only startups do not have a well-defined business model, but also is difficult to predict the direction of future disruptions. Therefore, there are many variables that affect whether or not a startup becomes a success or a failure.

The second factor recommended by the ACCC involves “the nature and significance of assets, including data and technology, being acquired directly or through the body corporate” (Australian Competition and Consumer Commission, 2018, p. 105). This recommendation highlights the role that data plays in market concentration. As discussed in section 5.2, an essential source of value in digital acquisitions are less tangible assets such as data and economies of scale and scope. Thus, antitrust authorities should consider how the distinctive characteristics of the digital economy shape acquisitions.

The previous two recommendations are somewhat related to the suggestions provided by Furman et al. (2019); they advise the CMA to review and update the Merger Assessment Guidelines. The changes should incorporate an emphasis on the importance of data in digital markets, the loss of potential competition, the introduction of "explicit references to loss of future innovation" (p. 96), and discussion of the competitive effects of multi-sided platforms and zero monetary prices to consumers, among other topics.

5.4.3. The importance of increasing attention to acquisitions by GAFAM

Instead of changing the turnover threshold, Furman et al. (2019) suggest realizing a more detailed examination of acquisitions related to digital markets by prioritizing mergers in this field. According to the authors:

> In each case, the CMA assured the Panel that it could have asserted jurisdiction through the share of supply test, which is characterized by a considerable degree of flexibility. Instead, it chose not to call in these mergers on the basis that they were not, at that time, considered to raise potential concerns” (p. 94).

Policies that increase scrutiny of potentially anti-competitive digital acquisitions may be beneficial as long as they are complemented with specific recommendations on how exactly

anti-competitive acquisitions can be assessed. As was mentioned previously, not been able to distinguish such anti-competitive acquisitions ex ante is part of the central problem.

Similar recommendations are provided by Shapiro (2019), who argues that more resources should be granted to the Department of Justice and the Federal Trade Commission of the US to “look more closely at more suspected mergers” (p.78). He also argues that these institutions should “investigate more *consummated* mergers to see whether they have harmed competition or likely to do so, including mergers that were below the size-of-transaction reporting threshold, which [was] $90 million in 2019” (p.78). A closer examination of past acquisitions may provide relevant insights that can be used for further merger assessments. For example, with the data in Chapter 3, it was possible to identify that of the five companies that are part of GAFAM, Facebook is the platform with the highest preference for startups. Moreover, the results highlight the fact that almost all the platforms seem to target startups that develop technologies closely related to their core market. Furthermore, desk research on the inactive startups indicated that acquihires are a common reason for closing a recently acquired company.

Another proposition suggested by the ACCC is to require digital firms to notify authorities of their potential mergers. In this sense, the Australian competition authority recommends that dominant firms be asked “to agree to a notification protocol, to provide advance notice to the ACCC of any proposed acquisitions potentially impacting competition in Australia" (Australian Competition and Consumer Commission, 2018, p. 109). The competition authority further explains that each platform should agree to the protocol of notification regarding the type of acquisition and minimum advance notification period. Furman et al. (2019) also recommend a similar approach and state that “digital companies that have been designated with a strategic market status should be required to make the CMA aware of all intended acquisitions” (p.95). However, given that most transactions are most likely pro-competitive, requesting some companies to notify authorities of all their future acquisitions may be inefficient. It may also harm innovation as these companies may be reluctant to acquire more startups and instead rely only on their in-house innovation. This change can, in turn, alter the startup ecosystem as sometimes founders and investors have an incentive to sell their company to an incumbent.

5.4.4. Other recommendations

Another set of recommendations includes a balance of harms approach "to weigh up both the likelihood and the magnitude of the impact of the merger" (Furman et al., 2019, p. 99). This recommendation is provided by the Digital Competition Expert Panel UK and the report of the European Commission. Furthermore, Crémer et al. (2019) highlight the need to re-examine theories of harm. However, Furman et al. (2019) suggest that the CMA should be allowed to use of a balance of harms approach as this will take "into account the scale as well as the likelihood of harm in merger cases involving potential competition and harm to innovation" (Furman et al., 2019, p. 100). Academic experts also suggest that a different focus could be to change the burden of proof. This adjustment would require digital platforms to prove that their acquisitions would not have anti-competitive effects (Furman et al., 2019). In the Stigler report, this adjustment would mean that competition authorities could assume as anti-competitive any merger involving a dominant firm and future competitor so that the parties with "the best access to relevant information" (p.98) can refute that the merger does not cause such harms.

6. CONCLUSIONS

The rapid increase in the market power of online platforms such as Google, Amazon, Facebook, Apple, and Microsoft (collectively known as GAFAM) raises concerns among antitrust authorities. Thus, regulators are debating about how to adapt competition policy to the new digital economy. When it comes to merger control, the authorities have realized that there is an increasing trend in acquisitions of startups by these digital firms. The main problem with it is that due to the low-turnover characteristic of the startups, the transactions are not detected by competition authorities, which makes it challenging to separate anti-competitive from pro- or neutral competitive acquisitions. The relevance of this issue lies in the fact that technological innovation and entrepreneurship are at the heart of the Entrepreneurial Economy. As a result, antitrust authorities must ensure that market conditions are adequate for startups to compete effectively, which includes reviewing that the acquisition strategy of dominant large platforms does not harm startups. Building on the latest work, this thesis aimed to analyze the factors that can be considered on merger control to better identify anti-competitive acquisitions.

The methodology of the thesis was based on literature review and on a descriptive analysis of the 503 startup acquisitions that have been undertaken by GAFAM between 2004 and 2018. Thus, this thesis considers that an accurate antitrust analysis of startup acquisitions by digital firms requires to look beyond the traditional approach of competition and merger control such as turnover and prices. The analysis should involve a sound understanding of the distinctive characteristics of the digital economy, a comprehension of the factors that motivate startups and digital platforms to sell and buy the company, and a review of the past acquisitions done by each platform. Each of the previous points will provide insights to better understand the dynamics of acquisitions in digital markets.

As far as competition policy is concerned, the fact that the specific characteristics of digital market lead to tipping markets is widely discussed. Nonetheless, what is particularly valuable in any analysis of merger control is to understand the relevance of data over turnover. Data allows not only to develop or create new products but also to boost economies of scale, scope, and network effects. Such advantages will reflect in the decision of startups on improving the product or service to attract more users as building a stronger userbase will allow them to scale the business. Also, it will reflect on the decision of dominant digital platforms as they rely heavily on data to improve their products, expand to adjacent markets, or to defend their current position. Meaning that more often than not, digital platforms will acquire startups with a growing user base even though these targets are not currently generating revenue.

The latest reports of government commissions about competition challenges in the digital economy have widely discussed the possible incentives of digital firms to acquire startups but they have left aside the perspective of startups and investors. In addition, the reports are mostly focus in only a handful of previous acquisitions, missing the overview of the global acquisition strategy of GAFAM. Therefore, this thesis considers that having a broad knowledge of the incentives of both parties –acquirers and acquired– as well of past trend of startup acquisitions could be useful when debating about future transactions.

The focus should not be only on the acquisition strategy of digital firms but also on the target and investors. After all, for the incumbent to be able to buy the startup, founders must be willing to sell it. The incentives for startups will sometimes be related to the dynamics of the

market product. In this sense, if the startup perceives they are not able to compete successfully in the market due to, for example, imitation strategies of the incumbent, then it will be likely that they will sell the company. It is also related to the exit strategy of founders and investors or the motivation to have a workplace in one of the large digital firms. The incentives that drive startups to sell the company provide insights on how the startup ecosystem works and how a change in the approach of merger control in digital markets could affect the pace of innovation. When it comes to the incentives of the acquirers, one reason for acquiring startups could indeed be to eliminate potential competitors. However, a more plausible explanation is that startups are providers of the latest disruptive technologies that large firms use to maintain their competitive advantage in an industry where fast-paced innovation is the norm.

An exhaustive analysis of past deals will reveal insights regarding the acquisition strategy of digital platforms. In this sense, it may reveal not only the increasing trend in the number of deals but also the age range that interests them most. For example, the descriptive analysis of the database revealed that 92% of the acquisitions of Facebook are young startups that are around three years old, while Microsoft targets more mature ventures. It can also indicate in which technology fields is the incumbent more interested. For instance, the analysis of the database shows that almost all the platforms that make up GAFAM target startups that develop technologies closely related to their core market. It could also track the activity status of the startup after the acquisition to provide insights regarding what incumbents are doing with the startups they are acquiring (e.g., maintaining them as a standalone division or shutting down the startup to integrate the team in the company). Such factors can be used as a starting point to predict in which direction the next acquisitions could take place.

The latest reports of expert panels and competition authorities of the European Commission, the UK, the US, and Australia provide some suggestions to improve merger control in the digital economy. For example, the implementation of a transaction value threshold, consideration of significant assets and past acquisitions, and change in the burden of proof. Such recommendations seem to point in the right direction. However, the transaction value threshold and the mandatory notification of planned acquisitions may bring about inefficiencies in the system and a slowdown in the pace of innovation.

One of the limitations of the research was that it was not possible to provide an exhaustive analysis of the reasons why the startups that appear as inactive in Crunchbase were shut down. The time and resources that require to collect the information are outside of the scope of this research. However, future work in this area can focus on identifying such factors because it may provide insights regarding how frequent GAFAM has acquired small, young companies to shut down the technology (i.e., killer acquisitions). In addition, further work could also focus on identifying what are the factors explaining the wave trend observed in Chapter 3. One hypothesis could be that the peaks in the waves might be explained by the emergence of new technologies as digital platforms might be using startups to quickly include and develop products on this area.

Including in the analysis the incentives of acquired and acquirers, the importance of data over turnover and a clearer understanding of past transactions may not provide a final answer on how to address merger control challenges. However, valuable insights will arise that will improve the debate on the topic and will allow to have a broader and more specific approach in the digital economy.

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APPENDIX A

Table A1 *- List of Acquisitions by Google, Amazon, Facebook, Apple, & Microsoft between 2004-2018*

ACQUIRER	ACQUIRED	ACQUISITION YEAR	FOUNDED YEAR	DEAL VALUE (US$Million)	CLUSTER	STATUS
Facebook	Bloomsbury AI	2018	2015	-	AI, data science and analytics	Active
Facebook	Refdash	2018	2016	-	Other	Active
Facebook	Vidpresso	2018	2012	-	Communication apps and tools	Active
Facebook	Redkix	2018	2014	-	Communication apps and tools	Active
Facebook	Confirm.io	2018	2015	-	AI, data science and analytics	Closed
Facebook	tbh	2017	2013	-	Communication apps and tools	Closed
Facebook	Fayteq AG	2017	2011	-	Other	Active
Facebook	Ozlo	2017	2013	-	AI, data science and analytics	Active
Facebook	Source3	2017	2014	-	Other	Active
Facebook	InfiniLED	2016	2010	-	Physical goods and services	Active
Facebook	FacioMetrics	2016	2015	-	AI, data science and analytics	Active
Facebook	CrowdTangle	2016	2012	-	AI, data science and analytics	Active
Facebook	Nascent Objects	2016	2014	-	Physical goods and services	Active
Facebook	Eyegroove	2016	2013	-	Communication apps and tools	Closed
Facebook	Two Big Ears	2016	2013	-	Physical goods and services	Active
Facebook	MSQRD	2016	2015	-	Communication apps and tools	Active
Facebook	Pebbles Interfaces	2015	2010	60,00	Tools for developers	Active
Facebook	Endaga	2015	2014	-	Other	Closed
Facebook	Tugboat Yards	2015	2012	-	Digital content	Active
Facebook	TheFind, Inc.	2015	2004	-	Physical goods and services	Active
Facebook	Teehan+Lax	2015	2002	-		Active
Facebook	QuickFire Networks	2015	2012	-	Remote storage and file transfer	Active
Facebook	Wit.ai	2015	2013	-	Tools for developers	Closed
Facebook	Private Core	2014	2011	-	Remote storage and file transfer	Active
Facebook	LiveRail	2014	2007	500,00	Advertising tools and platforms	Active
Facebook	Little Eye Labs	2014	2012	-	Tools for developers	Active
Facebook	Pryte	2014	2013	-	Home, wellbeing and other personal needs	
Facebook	ProtoGeo	2014	2012	-	Home, wellbeing and other personal needs	Active
Facebook	Ascenta (UK)	2014	2010	-	Physical goods and services	Active
Facebook	Oculus VR	2014	2012	2.000,00	Physical goods and services	Active
Facebook	WhatsApp	2014	2009	19.000,00	Communication apps and tools	Active
Facebook	Branch	2014	2011	15,00	Communication apps and tools	Closed
Facebook	SportStream	2013	2012	-	AI, data science and analytics	Active
Facebook	Onavo	2013	2010	150,00	AI, data science and analytics	Active
Facebook	Jibbigo	2013	2009	-	AI, data science and analytics	Active
Facebook	Monoidics	2013	2009	-	AI, data science and analytics	Active
Facebook	Parse	2013	2011	90,00	Tools for developers	Closed
Facebook	Spaceport.io	2013	2007	-	Tools for developers	Active
Facebook	Osmeta	2013	2011	-	Other	Active
Facebook	Hot Studio	2013	1997	-	Tools for developers	Active
Facebook	Storylane	2013	2012	-	Advertising tools and platforms	Active
Facebook	Atlas Solutions	2013	2001	-	Advertising tools and platforms	Active
Facebook	threadsy	2012	2008	-	Communication apps and tools	Active
Facebook	Acrylic Software	2012	2008	-	Other	Active
Facebook	Spool	2012	2010	-	Home, wellbeing and other personal needs	Active
Facebook	Bolt | Peters	2012	2002	-	AI, data science and analytics	Active
Facebook	Face.com	2012	2005	100,00	AI, data science and analytics	Active
Facebook	Pieceable	2012	2010	-	Tools for developers	Active
Facebook	Karma	2012	2011	-	Home, wellbeing and other personal needs	Active
Facebook	Lightbox	2012	2010	-	Communication apps and tools	Active

Facebook	Glancee	2012	2010	-	Communication apps and tools	Active
Facebook	Tagtile	2012	2011	-	Advertising tools and platforms	Active
Facebook	Instagram	2012	2010	1.000,00	Communication apps and tools	Active
Facebook	GazeHawk	2012	2009	-	AI, data science and analytics	Active
Facebook	Friend.ly	2012	2009	-	Communication apps and tools	Active
Facebook	Sendoid	2012	2011	-	Remote storage and file transfer	Active
Facebook	Gowalla	2011	2007	3,00	Communication apps and tools	Closed
Facebook	WhoGlue	2011	2000	-		Active
Facebook	MailRank	2011	2010	-	Communication apps and tools	Active
Facebook	Strobe	2011	2010	-	Tools for developers	Active
Facebook	Digital Staircase	2011	2008	-	Digital content	Active
Facebook	Push Pop Press	2011	2010	-	Digital content	Active
Facebook	Sofa	2011	2006	-	Tools for developers	Active
Facebook	Daytum	2011	2011	-	Home, wellbeing and other personal needs	Active
Facebook	Snaptu	2011	1994	70,00	Tools for developers	Active
Facebook	Beluga	2011	2010	-	Communication apps and tools	Active
Facebook	Pursuit	2011	2001	-	Communication apps and tools	Active
Facebook	Rel8tion	2011	2010	-	Advertising tools and platforms	Active
Facebook	Zenbe	2010	2006	-	Communication apps and tools	Active
Facebook	drop.io	2010	2007	-	Remote storage and file transfer	Active
Facebook	Nextstop	2010	2009	-	Communication apps and tools	Active
Facebook	Chai Labs	2010	2007	10,00	AI, data science and analytics	Active
Facebook	Hot Potato	2010	2009	10,00	Communication apps and tools	Active
Facebook	ShareGrove	2010	2008	-	Communication apps and tools	Active
Facebook	Divvyshot	2010	2009	-	Communication apps and tools	Active
Facebook	Octazen Solutions	2010	2006	-	Communication apps and tools	Active
Facebook	FriendFeed	2009	2007	50,00	Communication apps and tools	Active
Facebook	Parakey	2007	2005	-	Communication apps and tools	Active
Amazon	PillPack	2018	2013	1.000,00	Home, wellbeing and other personal needs	Active
Amazon	Ring	2018	2012	1.000,00	Physical goods and services	Active
Amazon	GameSparks	2018	2013	10,00	Tools for developers	Active
Amazon	Sqrrl	2018	2012	-	AI, data science and analytics	Active
Amazon	Tapzo	2018	2010	40,00	Home, wellbeing and other personal needs	Active
Amazon	Blink	2017	2009	-	Physical goods and services	Active
Amazon	Immedia	2017	2009	-	Physical goods and services	Active
Amazon	Thinkbox Software	2017	2010	-	Tools for developers	Active
Amazon	Body Labs	2017	2013	50,00	AI, data science and analytics	Active
Amazon	Graphiq	2017	2009	-	AI, data science and analytics	Active
Amazon	Whole Foods Market	2017	1978	13.700,00	Physical goods and services	Active
Amazon	Souq.com	2017	2005	650,00	Physical goods and services	Active
Amazon	Harvest.ai	2017	2014	20,00	AI, data science and analytics	Active
Amazon	NICE	2016	1995	-	Remote storage and file transfer	Active
Amazon	Biba	2016	2012	-	Communication apps and tools	Closed
Amazon	Angel.ai	2016	2015	-	AI, data science and analytics	Active
Amazon	Cloud9 IDE	2016	0	-	Tools for developers	Active
Amazon	EMVANTAGE Payments	2016	2012	-	Other	Active
Amazon	Orbeus	2015	2012	-	AI, data science and analytics	Active
Amazon	Safaba Translation Solutions	2015	2009	-	AI, data science and analytics	Active
Amazon	Elemental Technologies	2015	2006	500,00	Remote storage and file transfer	Active
Amazon	Clusterk	2015	2013	-	Remote storage and file transfer	Active
Amazon	Amiato	2015	2011	-	AI, data science and analytics	Closed
Amazon	Shoefitr	2015	2010	-	Home, wellbeing and other personal needs	Closed
Amazon	2lemetry	2015	2011	-	Tools for developers	Active
Amazon	Annapurna Labs	2015	2011	370,00	Remote storage and file transfer	Active
Amazon	AppThwack	2015	2012	-	Physical goods and services	Active
Amazon	Rooftop Media	2014	2006	-	Digital content	Active
Amazon	Twitch	2014	2007	970,00	Communication apps and tools	Active
Amazon	Comixology	2014	2007	-	Digital content	Active
Amazon	Double Helix Games	2014	2007	-	Digital content	Active

Amazon	TenMarks Education	2013	2009	-	Home, wellbeing and other personal needs	Active
Amazon	Screentech	2013	1991	-	Physical goods and services	Active
Amazon	Liquavista	2013	2006	-	Physical goods and services	Active
Amazon	Evi	2013	2005	26,00	AI, data science and analytics	Active
Amazon	Goodreads	2013	2007	150,00	Communication apps and tools	Active
Amazon	IVONA Text-To-Speech	2013	2005	-	AI, data science and analytics	Active
Amazon	UpNext	2012	2007	-	Home, wellbeing and other personal needs	Active
Amazon	LOVEFiLM	2012	2002	2,50	Physical goods and services	Active
Amazon	Avalon Books	2012	1950	-	Physical goods and services	Active
Amazon	Kiva Systems	2012	2003	775,00	physical goods and services	Active
Amazon	TeachStreet	2012	2007	-	Home, wellbeing and other personal needs	Active
Amazon	Quorus	2011	2007	-	Physical goods and services	Active
Amazon	Yap	2011	2006	-	AI, data science and analytics	Closed
Amazon	Pushbutton	2011	2002	-	Digital content	Closed
Amazon	The Book Depository	2011	2004	-	Physical goods and services	Active
Amazon	Quidsi	2010	2005	545,00	Physical goods and services	Active
Amazon	BuyVIP	2010	2006	-	Physical goods and services	Active
Amazon	Amie Street	2010	1982	-	Digital content	Closed
Amazon	Woot	2010	2004	110,00	Physical goods and services	Active
Amazon	Touchco	2010	2009	-	Other	Active
Amazon	Zappos	2009	1999	1.200,00	Physical goods and services	Active
Amazon	SnapTell	2009	2006	-	AI, data science and analytics	Active
Amazon	Lexcycle	2009	2007	-	Digital content	Active
Amazon	Reflexive Entertainment	2008	1997	-	Digital content	Active
Amazon	Shelfari	2008	2006	-	Communication apps and tools	Active
Amazon	AbeBooks	2008	1996	-	Physical goods and services	Active
Amazon	Fabric.com	2008	1999	-	Physical goods and services	Active
Amazon	Audible	2008	1995	300,00	Digital content	Active
Amazon	Without A Box	2008	1999	-	Other	Active
Amazon	Brilliance Audio	2007	1984	-	Physical goods and services	Active
Amazon	dpreview	2007	1998	-	Physical goods and services	Active
Amazon	TextPayMe	2006	2005	-	Physical goods and services	Active
Amazon	Shopbop	2006	2000	-	Physical goods and services	Active
Amazon	CustomFlix	2005	2002	-	Physical goods and services	
Amazon	Mobipocket.com	2005	2000	-	Home, wellbeing and other personal needs	Active
Amazon	BookSurge	2005	2000	-	Physical goods and services	Active
Amazon	Joyo.com	2004	1998	75,00	Physical goods and services	Active
Google	Where is my Train	2018	2013	28,00	Home, wellbeing and other personal needs	Active
Google	Workbench Platform	2018	2013	-	Home, wellbeing and other personal needs	Active
Google	Onward	2018	2015	-	AI, data science and analytics	Active
Google	GraphicsFuzz	2018	2017	-	Tools for developers	Active
Google	Cask	2018	2011	-	Tools for developers	Active
Google	Velostrata	2018	2014	-	Remote storage and file transfer	Active
Google	Redux ST	2018	2013	-	Physical goods and services	Active
Google	Senosis Health	2018	2016	-	Home, wellbeing and other personal needs	Active
Google	Bitium	2017	2012	-	Remote storage and file transfer	Active
Google	HTC Mobile	2017	0	1.100,00	Physical goods and services	Active
Google	AIMatter	2017	2006	-	AI, data science and analytics	Active
Google	Halli Labs	2017	2017	-	AI, data science and analytics	Active
Google	Owlchemy Labs	2017	2010	-	Digital content	Active
Google	AppBridge	2017	2014	-	Remote storage and file transfer	Active
Google	Kaggle	2017	2010	-	AI, data science and analytics	Active
Google	Crashlytics/Fabrics	2017	2011	-	Tools for developers	Active
Google	Limes Audio	2017	2007	-	Communication apps and tools	Active
Google	Cronologics Corporation	2016	2014	-	Physical goods and services	Active
Google	Qwiklabs	2016	2012	-	Tools for developers	Active
Google	LeapDroid	2016	2015	-	Tools for developers	Active
Google	Eyefluence	2016	2013	-	Physical goods and services	Active
Google	Undecidable Labs	2016	2015	-	AI, data science and analytics	Active

Google	FameBit	2016	2013	-	Advertising tools and platforms	Active
Google	Dialogflow (Api.ai)	2016	2010	-	AI, data science and analytics	Active
Google	Urban Engines	2016	2014	-	AI, data science and analytics	Active
Google	Apigee	2016	2004	625,00	Tools for developers	Active
Google	Orbitera, Inc.	2016	2011	-	Remote storage and file transfer	Active
Google	LaunchKit	2016	2015	-	Tools for developers	Closed
Google	Kifi	2016	2012	-	AI, data science and analytics	Closed
Google	Anvato	2016	2007	-	Tools for developers	Active
Google	Moodstocks	2016	2008	-	Tools for developers	Active
Google	Webpass	2016	2003	-	Physical goods and services	Active
Google	Synergyse	2016	2013	-	Other	Active
Google	Pie	2016	2013	-	Communication apps and tools	Active
Google	Bebop	2015	2012	380,20	Remote storage and file transfer	Active
Google	Fly Labs	2015	2012	-	Digital content	Active
Google	Digisfera	2015	2011	-	Other	Active
Google	Divshot	2015	2012	-	Tools for developers	Closed
Google	Jibe Mobile	2015	2006	-	Communication apps and tools	Active
Google	Oyster	2015	2012	30,00	Digital content	Closed
Google	Pixate	2015	2012	-	Tools for developers	Closed
Google	Agawi Inc	2015	2010	-	Digital content	Active
Google	Pulse.io	2015	2011	-	Tools for developers	Active
Google	Timeful	2015	2012	-	Home, wellbeing and other personal needs	Closed
Google	Skillman & Hackett	2015	2014	-	Tools for developers	Active
Google	Thrive Audio	2015	2012	-	Tools for developers	Active
Google	Softcard	2015	2011	-	Other	Active
Google	Apportable	2015	2011	-	Tools for developers	Active
Google	Toro	2015	2012	-	AI, data science and analytics	Active
Google	Odysee	2015	2011	-	Communication apps and tools	Closed
Google	Launchpad Toys	2015	2010	-	Home, wellbeing and other personal needs	Active
Google	Granata Decision Systems	2015	2012	-	AI, data science and analytics	Active
Google	RelativeWave	2014	2012	-	Tools for developers	Active
Google	Vision Factory	2014	2014	-	AI, data science and analytics	Active
Google	Dark Blue Labs	2014	2014	-	AI, data science and analytics	Active
Google	Firebase	2014	2011	-	Tools for developers	Active
Google	Lift Labs	2014	2010	-	Physical goods and services	Active
Google	Polar	2014	2013	-	Communication apps and tools	Active
Google	Zync Render	2014	2010	-	Other	Active
Google	Gecko Design Inc	2014	1996	-	Other	Active
Google	Jetpac	2014	2011	-	Communication apps and tools	Active
Google	Emu Messenger	2014	2012	-	Communication apps and tools	Active
Google	Directr	2014	2012	-	Advertising tools and platforms	Active
Google	drawElements	2014	2008	-	Tools for developers	Active
Google	CiiNOW	2014	2010	-	Home, wellbeing and other personal needs	Active
Google	Songza	2014	2007	-	Digital content	Active
Google	Appurify	2014	2012	-	Tools for developers	Active
Google	Alpental Technologies	2014	2012	-	Physical goods and services	Active
Google	mDialog	2014	2005	-	Advertising tools and platforms	Active
Google	Terra Bella	2014	2009	500,00	AI, data science and analytics	Active
Google	Divide	2014	2010	120,00	Home, wellbeing and other personal needs	Active
Google	Quest Visual	2014	2009	-	AI, data science and analytics	Active
Google	Stackdriver	2014	2012	-	Remote storage and file transfer	Active
Google	Appetas	2014	2012	-	Other	Active
Google	Adometry by Google	2014	2005	-	Advertising tools and platforms	Active
Google	Rangespan	2014	2011	-	AI, data science and analytics	Active
Google	Titan Aerospace	2014	2012	-	Physical goods and services	Active
Google	Green Throttle Games	2014	2012	-	Digital content	Active
Google	Spider.io	2014	2011	-	Other	Active
Google	SlickLogin	2014	2013	-	Other	Active
Google	Impermium	2014	2010	-	Other	Active

Google	Nest Labs	2014	2010	3.200,00	Home, wellbeing and other personal needs	Active
Google	DeepMind	2014	2010	625,00	AI, data science and analytics	Active
Google	Boston Dynamics	2013	1992	-		Active
Google	Autofuss	2013	2008	-	Advertising tools and platforms	Active
Google	Bot & Dolly	2013	2007	-	Physical goods and services	Active
Google	Holomni	2013	2010	-	Physical goods and services	Active
Google	Meka Robotics	2013	2007	-	Physical goods and services	Active
Google	Redwood Robotics	2013	2012	-	Physical goods and services	Active
Google	Industrial Perepception Inc	2013	2012	-	AI, data science and analytics	Active
Google	Schaft	2013	2012	20,00	Physical goods and services	Active
Google	FlexyCore	2013	2008	23,00	Tools for developers	Active
Google	Flutter	2013	2010	40,00	AI, data science and analytics	Active
Google	Bump Technologies	2013	2008	30,00	Tools for developers	Active
Google	WIMM Labs	2013	2010	-	Physical goods and services	Active
Google	Waze	2013	2007	1.300,00	Home, wellbeing and other personal needs	Active
Google	Makani Power	2013	2006	-	Physical goods and services	Active
Google	Wavii	2013	2009	-	Digital content	Active
Google	Behavio	2013	2012	-	AI, data science and analytics	Active
Google	Talaria	2013	2011	-	Tools for developers	Active
Google	DNNresearch	2013	2012	-	AI, data science and analytics	Active
Google	Channel Intelligence	2013	1999	125,00	Physical goods and services	Active
Google	TxVia	2012	2006	-	Other	Active
Google	Meebo	2012	2005	100,00	Communication apps and tools	Active
Google	Quickoffice	2012	1980	-	Other	Active
Google	Sparrow	2012	2010	-	Communication apps and tools	Closed
Google	Wildfire	2012	2008	350,00	Advertising tools and platforms	Active
Google	VirusTotal	2012	2004	-	Other	Active
Google	Nik Software	2012	1995	-	Other	Active
Google	Incentive Targeting	2012	2007	-	Advertising tools and platforms	Active
Google	Buffer Box	2012	2011	-	Physical goods and services	Active
Google	Clever Sense	2011	2008	-	Home, wellbeing and other personal needs	Active
Google	RightsFlow	2011	2007	-	Other	Active
Google	Katango	2011	2010	-	Communication apps and tools	Active
Google	Apture	2011	2007	-	Home, wellbeing and other personal needs	Active
Google	Zagat	2011	1979	151,00	Home, wellbeing and other personal needs	Active
Google	SocialGrapple	2011	2010	-	AI, data science and analytics	Active
Google	DailyDeal	2011	2009	-	Physical goods and services	Active
Google	Zave Networks	2011	2006	-	Physical goods and services	Active
Google	The Dealmap	2011	2010	30,00	Physical goods and services	Active
Google	PittPatt	2011	2004	-	AI, data science and analytics	Active
Google	Fridge	2011	0	-	Communication apps and tools	Active
Google	JustSpotted	2011	2008	-	AI, data science and analytics	Active
Google	Punchd	2011	2010	-	Physical goods and services	Active
Google	SageTV	2011	2002	-	Digital content	Active
Google	PostRank	2011	2007	-	AI, data science and analytics	Active
Google	Admeld	2011	2007	400,00	Advertising tools and platforms	Active
Google	Sparkbuy	2011	2010	-	Physical goods and services	Active
Google	modu	2011	2007	4,90	Physical goods and services	Closed
Google	TalkBin	2011	2010	-	Communication apps and tools	Closed
Google	Numovis	2011	2010	-	AI, data science and analytics	Active
Google	ITA Software	2011	1996	700,00	Physical goods and services	Active
Google	PushLife	2011	2008	-	Remote storage and file transfer	Active
Google	Green Parrot Pictures	2011	2004	-	Other	Active
Google	Next New Networks	2011	2006	-	Digital content	Active
Google	BeatThatQuote.com	2011	2005	37,70	Physical goods and services	Active
Google	zynamics	2011	2004	-	Other	Active
Google	fflick	2011	2010	-	Communication apps and tools	Active
Google	eBook Technologies	2011	1998	-	Other	Active
Google	Widevine Technologies	2010	1998	160,00	Other	Active

Google	Phonetic Arts	2010	2006	-	AI, data science and analytics	Active
Google	BlindType	2010	2009	-	Home, wellbeing and other personal needs	Active
Google	Plannr	2010	0	-	Communication apps and tools	Active
Google	Quiksee	2010	2004	-	Other	Active
Google	Mentor Wave Technologies	2010	2002	12,00	Other	Active
Google	SocialDeck	2010	2008	-	Advertising tools and platforms	Active
Google	Angstro	2010	2007	-	Communication apps and tools	Active
Google	Like.com	2010	1986	-	AI, data science and analytics	Closed
Google	Zetawire	2010	2007	-	Other	Active
Google	Jambool	2010	2006	70,00	Other	Active
Google	Slide	2010	2005	182,00	Communication apps and tools	Active
Google	Instantiations	2010	1988	-	Tools for developers	Active
Google	Metaweb Technologies	2010	2010	-	Other	Closed
Google	Invite Media	2010	2007	81,00	Advertising tools and platforms	Active
Google	Ruba	2010	2008	-	Home, wellbeing and other personal needs	Active
Google	Simplify Media	2010	2005	-	Remote storage and file transfer	Active
Google	Global IP Solutions	2010	1999	68,20	Communication apps and tools	Active
Google	Bump Top	2010	2007	-	Home, wellbeing and other personal needs	Active
Google	LabPixies	2010	2006	25,00	Other	Active
Google	Agnilux	2010	2009	-	Physical goods and services	Active
Google	Plink Search	2010	2009	-	AI, data science and analytics	Active
Google	Episodic	2010	2008	-	Digital content	Active
Google	Picnik	2010	2006	-	Communication apps and tools	Active
Google	reMail	2010	2008	-	Communication apps and tools	Active
Google	Aardvark	2010	2007	50,00	Communication apps and tools	Closed
Google	SayNow	2010	2005	-	Communication apps and tools	Active
Google	DocVerse	2009	2007	25,00	Other	Active
Google	AppJet	2009	2007	-	Tools for developers	Active
Google	Teracent	2009	2003	-	Advertising tools and platforms	Active
Google	Gizmofive	2009	2003	30,00	Communication apps and tools	Active
Google	AdMob	2009	2008	750,00	Advertising tools and platforms	Active
Google	YouTube	2009	2005	1.600,00	Digital content	Active
Google	reCAPTCHA	2009	2007	-	AI, data science and analytics	Active
Google	On2 Technologies	2009	1992	130,00	Tools for developers	Active
Google	TNC	2008	2004	-	Communication apps and tools	Active
Google	Omnisio	2008	2007	15,00	Communication apps and tools	Active
Google	ZAO Begun	2008	2002	140,00	AI, data science and analytics	Active
Google	Jaiku	2007	2006	12,00	Communication apps and tools	Active
Google	Zingku	2007	2005	-	Communication apps and tools	Active
Google	Tianya.cn	2007	1999	-	Communication apps and tools	Active
Google	Image America, Inc.	2007	1989	-		Active
Google	Postini	2007	1999	625,00	Other	Active
Google	GrandCentral	2007	2006	60,00	Communication apps and tools	Active
Google	Zenter	2007	2007	-	Physical goods and services	Active
Google	PeakStream	2007	2005	20,30	Tools for developers	Active
Google	Panoramio	2007	2003	-	Communication apps and tools	Active
Google	GreenBorder	2007	2001	-	Other	Active
Google	FeedBurner	2007	2004	100,00	Tools for developers	Active
Google	Marratech	2007	1998	-	Communication apps and tools	Active
Google	Tonic Systems	2007	1999	-	Other	Active
Google	DoubleClick	2007	1995	3.100,00	Advertising tools and platforms	Active
Google	Trendalyzer	2007	0	-	AI, data science and analytics	Active
Google	Adscape	2007	2006	-	AI, data science and analytics	Active
Google	Endoxon	2006	1988	28,00		Active
Google	JotSpot	2006	2004	-	Other	Active
Google	Neven Vision	2006	2003	-	AI, data science and analytics	Active
Google	2Web Technologies	2006	2003	-	Other	Active
Google	Orion	2006	2004	-	Other	Active
Google	"@LastSoftware"	2006	1999	-	Other	Active

Google	Upstartle	2006	2004	-	Other	Active
Google	Measure Map	2006	2001	-	AI, data science and analytics	Active
Google	dMarc Broadcasting	2006	2002	102,00	AI, data science and analytics	Active
Google	bruNET	2005	1855	-		Active
Google	allPAY	2005	1994	-		Active
Google	Phatbits	2005	2004	-	Other	Active
Google	Akwan IT	2005	2000	-	AI, data science and analytics	Closed
Google	Skia	2005	1996	-	Tools for developers	Active
Google	Android	2005	2003	-	Tools for developers	Active
Google	Dodgeball	2005	2000	-	Communication apps and tools	Active
Google	Urchin Software	2005	1995	-	AI, data science and analytics	Closed
Google	Reqwireless	2005	2001	-	AI, data science and analytics	Active
Google	Keyhole Inc	2004	2001	-	AI, data science and analytics	Active
Google	Where2	2004	2004	-	Other	Active
Google	ZipDash	2004	2003	-	Physical goods and services	Active
Google	Ignite Logic	2004	2003	-	Tools for developers	Active
Apple	Platoon	2018	2016	-	Other	Active
Apple	Silk Labs	2018	2015	-	AI, data science and analytics	Active
Apple	Asaii	2018	2016	-	AI, data science and analytics	Active
Apple	Dialog (announced)	2018	1981	600,00		Active
Apple	Akonia Holographics	2018	2012	-	Other	Active
Apple	Texture	2018	2009	-	Digital content	Active
Apple	Laserlike	2018	2015	-	AI, data science and analytics	Active
Apple	Shazam	2017	2000	400,00		Active
Apple	Pop Up Archive	2017	2012	-	Digital content	Closed
Apple	Spektral	2017	2014	30,00	AI, data science and analytics	Active
Apple	Vrvana	2017	2005	30,00		Active
Apple	InVisage Technologies	2017	2006	-		Active
Apple	PowerbyProxi	2017	2007	-	Remote storage and file transfer	Active
Apple	Init.ai	2017	2015	-	AI, data science and analytics	Closed
Apple	Regaind	2017	2015	-	AI, data science and analytics	Active
Apple	SensoMotoric	2017	1991	-		Active
Apple	Lattice	2017	2015	200,00	AI, data science and analytics	Active
Apple	Beddit	2017	2007	-	Physical goods and services	Active
Apple	Schemasoft	2017	1987	-		Active
Apple	Workflow	2017	2012	-	Home, wellbeing and other personal needs	Active
Apple	RealFace	2017	2014	2,00	AI, data science and analytics	Active
Apple	Buddybuild	2017	2015	-	Tools for developers	Active
Apple	Indoor.io	2016	2007	-	Home, wellbeing and other personal needs	Active
Apple	Tuplejump	2016	2013	-	AI, data science and analytics	Active
Apple	Turi	2016	2013	200,00	AI, data science and analytics	Active
Apple	Gliimpse	2016	2013	-	Home, wellbeing and other personal needs	Active
Apple	LegbaCore	2016	2015	-	Other	Active
Apple	Emotient	2016	2012	-	AI, data science and analytics	Active
Apple	LearnSprout	2016	2012	-	Home, wellbeing and other personal needs	Closed
Apple	Flyby Media	2016	2010	-	Communication apps and tools	Active
Apple	Faceshift	2015	2012	-	AI, data science and analytics	Active
Apple	Mapsense	2015	2013	25,00	Home, wellbeing and other personal needs	Closed
Apple	VocallQ	2015	2011	-	AI, data science and analytics	Active
Apple	Perceptio	2015	2014	-	AI, data science and analytics	Active
Apple	Privaris	2015	2011	-	AI, data science and analytics	Active
Apple	Coherent Navigation	2015	2008	-	Home, wellbeing and other personal needs	Active
Apple	Metaio	2015	2003	-		Active
Apple	Linx Imaging	2015	2014	20,00	Physical goods and services	Active
Apple	FoundationDB	2015	2009	-	AI, data science and analytics	Active
Apple	Camel Audio	2015	2000	-		Active
Apple	Semetric	2015	2008	50,00	AI, data science and analytics	Active
Apple	Prss	2014	2013	-	Digital content	Active
Apple	Dryft	2014	2013	-	Physical goods and services	Active

Apple	Beats Electronics	2014	2006	3.000,00	Physical goods and services	Active
Apple	Concept.io	2014	2012	30,00	Digital content	Active
Apple	BookLamp	2014	2007	-	AI, data science and analytics	Active
Apple	Spotsetter	2014	2011	-	Communication apps and tools	Active
Apple	Luxvue Technology	2014	2009	-	Physical goods and services	Active
Apple	Burstly	2014	2009	-	Tools for developers	Active
Apple	SnappyLabs	2014	2011	-	AI, data science and analytics	Active
Apple	BroadMap	2013	2008	-	Home, wellbeing and other personal needs	Active
Apple	Catch.com	2013	2008	-	Physical goods and services	Closed
Apple	Acunu	2013	2009	-	AI, data science and analytics	Active
Apple	Topsy Labs	2013	2007	200,00	AI, data science and analytics	Closed
Apple	PrimeSense	2013	2005	345,00	Physical goods and services	Closed
Apple	Cue	2013	2010	50,00	AI, data science and analytics	Active
Apple	AlgoTrim	2013	2005	-	Tools for developers	Active
Apple	Embark	2013	2011	-	Home, wellbeing and other personal needs	Active
Apple	Matcha	2013	2011	-	Communication apps and tools	Active
Apple	Passif Semiconductor	2013	2007	-	Physical goods and services	Active
Apple	Locationary	2013	2009	-	Home, wellbeing and other personal needs	Active
Apple	HopStop.com	2013	2005	-	Home, wellbeing and other personal needs	Active
Apple	WiFiSlam	2013	2011	20,00	Home, wellbeing and other personal needs	Active
Apple	OttoCat	2013	2012	-	Advertising tools and platforms	Closed
Apple	Novauris	2013	2002	-		Active
Apple	Particle	2012	2008	-	Tools for developers	Active
Apple	AuthenTec	2012	1998	356,00		Active
Apple	Redmatica	2012	2003	-	Digital content	Active
Apple	Chomp	2012	2009	50,00	Advertising tools and platforms	Active
Apple	Anobit	2011	2006	390,00	Physical goods and services	Active
Apple	C3 Technologies	2011	2007	267,00	Home, wellbeing and other personal needs	Active
Apple	Polar Rose	2010	2004	29,00	AI, data science and analytics	Active
Apple	IMSense	2010	2007	-	AI, data science and analytics	Active
Apple	Poly9	2010	2005	-	Home, wellbeing and other personal needs	Active
Apple	Intrinsity	2010	1997	-		Active
Apple	Siri	2010	2007	-	AI, data science and analytics	Active
Apple	Quattro Wireless	2010	2006	275,00	Advertising tools and platforms	Active
Apple	Lala	2009	2005	17,00	Digital content	Active
Apple	Placebase	2009	2001	-	Home, wellbeing and other personal needs	Active
Apple	P.A. Semi	2008	2003	278,00	Physical goods and services	Active
Apple	Proximity	2006	0	-		Active
Apple	Silicon Color	2006	2003	-	Other	Active
Apple	FingerWorks	2005	1998	-	Physical goods and services	Active
Microsoft	Spectrum	2018	0	-		Active
Microsoft	FSLogix	2018	2013	-	Other	Active
Microsoft	XOXCO	2018	2009	-	AI, data science and analytics	Active
Microsoft	inXile Entertainment	2018	2003	-		Active
Microsoft	Obsidian Entertainment	2018	2013	-	Digital content	Active
Microsoft	Glint	2018	2013	400,00	Communication apps and tools	Active
Microsoft	Lobe	2018	2016	-	AI, data science and analytics	Active
Microsoft	Bonsai	2018	2018	-	AI, data science and analytics	Active
Microsoft	Flipgrid	2018	2014	-	Communication apps and tools	Active
Microsoft	Ninja Theory	2018	2004	-	Digital content	Active
Microsoft	Playground Games	2018	2010	-	Digital content	Active
Microsoft	Undead Labs	2018	1999	-	Digital content	Active
Microsoft	Compulsion Games	2018	2009	-	Digital content	Active
Microsoft	Github	2018	2008	7.500,00	Tools for developers	Active
Microsoft	Semantic Machines	2018	2014	-	AI, data science and analytics	Active
Microsoft	PlayFab	2018	2014	-	Remote storage and file transfer	Active
Microsoft	Avere Systems	2018	2008	-	Remote storage and file transfer	Active
Microsoft	AltspaceVR	2017	2013	-	Digital content	Active
Microsoft	Cycle Computing	2017	2005	-		Closed

Microsoft	Cloudyn	2017	2012	50,00	Remote storage and file transfer	Active
Microsoft	Hexadite	2017	2014	100,00	Other	Active
Microsoft	Intentional Software	2017	2002	-		Active
Microsoft	Deis.com	2017	2015	-	Tools for developers	Active
Microsoft	Donya Labs	2017	2006	-		Active
Microsoft	Maluuba	2017	2011	-	AI, data science and analytics	Active
Microsoft	LinkedIn	2016	2003	26.200,00		Active
Microsoft	Genee	2016	2014	-	AI, data science and analytics	Active
Microsoft	Mixer	2016	2014	-	Digital content	Active
Microsoft	Wand Labs	2016	2013	-	Communication apps and tools	Active
Microsoft	Solair	2016	2011	-	Remote storage and file transfer	Active
Microsoft	Xamarin	2016	2011	-	Tools for developers	Active
Microsoft	Groove (dba Zikera)	2016	2009	-	Digital content	Active
Microsoft	SwiftKey	2016	2008	250,00	AI, data science and analytics	Active
Microsoft	MinecraftEdu	2016	2011	-	Home, wellbeing and other personal needs	Active
Microsoft	Event Zero	2016	1998	-		Active
Microsoft	Talko	2015	2012	-	Communication apps and tools	Active
Microsoft	Metanautix	2015	2012	-	AI, data science and analytics	Active
Microsoft	Secure Islands Technologies	2015	2006	77,50	Other	Active
Microsoft	Mobile Data Labs	2015	2012	-	AI, data science and analytics	Active
Microsoft	Havok	2015	1998	-	Digital content	Active
Microsoft	Adxstudio	2015	1998	-		Active
Microsoft	Double Labs	2015	2011	-	Other	Active
Microsoft	VoloMetrix	2015	2011	250,00	AI, data science and analytics	Active
Microsoft	FantasySales Team	2015	2012	-	Digital content	Active
Microsoft	Adallon	2015	2012	320,00	Remote storage and file transfer	Active
Microsoft	FieldOne Systems	2015	2001	-		Active
Microsoft	BlueStripe	2015	2007	-	Tools for developers	Active
Microsoft	Wunderlist	2015	2010	-	Home, wellbeing and other personal needs	Active
Microsoft	Datazen Software	2015	2002	-		Active
Microsoft	LiveLoop	2015	2010	-	Remote storage and file transfer	Active
Microsoft	N-Trig	2015	1999	-		Active
Microsoft	Sunrise	2015	2012	100,00	Communication apps and tools	Closed
Microsoft	Revolution Analytics	2015	2007	-	AI, data science and analytics	Active
Microsoft	HockeyApp	2014	2011	-	Tools for developers	Closed
Microsoft	Bit Stadium GmbH	2014	2012	-	Other	Active
Microsoft	Acompli	2014	2013	200,00	Communication apps and tools	Active
Microsoft	Aorato	2014	2012	200,00	Other	Active
Microsoft	Mojang	2014	2010	2.500,00	Digital content	Active
Microsoft	Equivio	2014	2004	200,00	AI, data science and analytics	Active
Microsoft	InMage Systems	2014	2001	-		Active
Microsoft	SyntaxTree	2014	2011	-	Digital content	Active
Microsoft	Capptain	2014	2008	-	AI, data science and analytics	Active
Microsoft	GreenButton	2014	2006	-	Remote storage and file transfer	Active
Microsoft	Parature	2014	2000	100,00		Active
Microsoft	Apiphany	2013	2012	-	Remote storage and file transfer	Active
Microsoft	Nokia Mobile	2013	1865	7.200,00	Physical goods and services	Active
Microsoft	InRelease	2013	2002	-		Active
Microsoft	Netbreeze	2013	1998	-	AI, data science and analytics	Active
Microsoft	MetricsHub	2013	2012	-	Remote storage and file transfer	Active
Microsoft	Pando Networks	2013	2004	-	Remote storage and file transfer	Active
Microsoft	id8 Group R2 Studios	2013	2011	-	Home, wellbeing and other personal needs	Active
Microsoft	R2 Studios	2012	2001	-		Active
Microsoft	MarketingPilot	2012	2001	-		Active
Microsoft	StorSimple	2012	2009	-	Remote storage and file transfer	Active
Microsoft	PhoneFactor	2012	2001	-		Active
Microsoft	Perceptive Pixel	2012	2006	-	Digital content	Active
Microsoft	Yammer	2012	2008	1.200,00	Communication apps and tools	Active
Microsoft	VideoSurf	2011	2006	100,00	Communication apps and tools	Active

Microsoft	Twisted Pixel Games	2011	2006	-	Digital content	Active
Microsoft	Prodiance Corporation	2011	2005	-	Other	Active
Microsoft	Skype	2011	2003	8.500,00	Communication apps and tools	Active
Microsoft	Canesta	2010	1999	-		Active
Microsoft	AVIcode	2010	1998	-		Active
Microsoft	Opalis Software	2009	1999	-	Other	Active
Microsoft	Sentillion	2009	1998	-		Active
Microsoft	Interactive Supercomputing	2009	2004	-	Remote storage and file transfer	Closed
Microsoft	ClickStream Technologies	2009	2003	-	AI, data science and analytics	Active
Microsoft	Rosetta Biosoftware	2009	1997	-		Active
Microsoft	BigPark	2009	2007	-	Digital content	Active
Microsoft	Greenfield Online	2008	1994	486,00		Active
Microsoft	DATAllegro	2008	2003	-	Remote storage and file transfer	Active
Microsoft	Zoomix	2008	2000	-	Remote storage and file transfer	Active
Microsoft	Powerset	2008	2005	100,00	AI, data science and analytics	Active
Microsoft	MobiComp	2008	2000	-	Communication apps and tools	Active
Microsoft	Navic Networks	2008	2000	-	AI, data science and analytics	Active
Microsoft	Navic Systems	2008	1999	-	Advertising tools and platforms	Active
Microsoft	Farecast	2008	2003	115,00	Home, wellbeing and other personal needs	Active
Microsoft	Komoku	2008	2004	-	Other	Active
Microsoft	Rapt	2008	1998	-	Advertising tools and platforms	Active
Microsoft	Kidaro	2008	2004	-	Other	Active
Microsoft	Credentica	2008	2002	-	Other	Active
Microsoft	YaData	2008	2005	-	AI, data science and analytics	Active
Microsoft	Danger	2008	1999	500,00	Physical goods and services	Active
Microsoft	Caligari Corporation	2008	1986	-		Active
Microsoft	Calista Technologies	2008	2006	-	Other	Active
Microsoft	Fast Search & Transfer	2008	1997	1.200,00		Active
Microsoft	MultiMap	2007	1995	-		Active
Microsoft	Musiwave	2007	2000	46,00	Digital content	Active
Microsoft	Global Care Solutions	2007	1984	-		Active
Microsoft	jellyfish	2007	2005	50,00	Advertising tools and platforms	Active
Microsoft	Parlano	2007	2000	-	Communication apps and tools	Active
Microsoft	AdECN	2007	2003	50,00	Physical goods and services	Active
Microsoft	Stratature	2007	2001	-	Remote storage and file transfer	Active
Microsoft	Engyro	2007	2000	-	Other	Active
Microsoft	aQuantive	2007	1997	6.400,00	Advertising tools and platforms	Active
Microsoft	Screen Tonic	2007	2001	-	AI, data science and analytics	Active
Microsoft	devBiz Business Solutions	2007	2001	-	Remote storage and file transfer	Active
Microsoft	Tellme Network	2007	1999	800,00	AI, data science and analytics	Active
Microsoft	Medstory	2007	1998	-	Home, wellbeing and other personal needs	Active
Microsoft	Colloquis	2006	2000	-	Communication apps and tools	Active
Microsoft	DesktopStandard	2006	1997	-	Other	Active
Microsoft	Gteko	2006	1992	-		Active
Microsoft	Azyxxi	2006	0	-		Active
Microsoft	Winternals	2006	1996	-	Other	Active
Microsoft	Softricity	2006	1999	-	Other	Active
Microsoft	iView Multimedia	2006	1996	-	Other	Active
Microsoft	Whale Communications	2006	1998	75,00	Other	Active
Microsoft	Vexcel	2006	1985	-		Active
Microsoft	DeepMetrix	2006	1992	-	AI, data science and analytics	Active
Microsoft	Massive	2006	1995	200,00	Digital content	Active
Microsoft	AssetMetrix Corporation	2006	2000	-	Other	Active
Microsoft	Lionhead Srtudios	2006	1997	-	Digital content	Active
Microsoft	ProClarity	2006	1995	-	Digital content	Active
Microsoft	Apptimum	2006	1998	-	AI, data science and analytics	Active
Microsoft	Onfolio	2006	2002	-	Other	Active
Microsoft	Motion Bridge	2006	2000	-	Communication apps and tools	Active
Microsoft	SeaDragon Software	2006	2003	-	Digital content	Active

Microsoft	5th Finger	2005	2005	-	Other	Closed
Microsoft	FolderShare	2005	2002	-	Remote storage and file transfer	Closed
Microsoft	Media-Streams.com	2005	2001	-	Communication apps and tools	Active
Microsoft	Unveil Technologies	2005	2000	-	Other	Active
Microsoft	Alacris	2005	2000	-	Other	Active
Microsoft	Teleo	2005	2004	-	Communication apps and tools	Active
Microsoft	Frontbridge Technologies	2005	1999	-	Communication apps and tools	Active
Microsoft	MessageCast	2005	2002	-	Communication apps and tools	Active
Microsoft	Groove Networks	2005	1997	-	Remote storage and file transfer	Active
Microsoft	Sybari	2005	1995	-	Other	Active
Microsoft	GIANT Company Software	2004	2000	-	Other	Active
Microsoft	Lookout Software	2004	2003	-	Other	Active
Microsoft	ActiveViews	2004	2001	-	AI, data science and analytics	Active

Source: Crunchbase, Acquiredby

APPENDIX B

Table A2 *- Clusters for analysis of past acquisitions by Google, Amazon, Facebook, Apple, and Microsoft*

CLUSTER	DESCRIPTION
Communication apps and tools	Companies active in the supply of platforms that create or simplify ways of interaction between individuals and/or within organizations. Such ways of interaction include direct communication, such as messaging and emailing, and sharing content and personal information
Tools for developers	Companies that provide tools and solutions for software developers to create and optimize their digital products. This excludes products and services supplied to final consumers
Physical goods and services	Companies that manufacture, distribute or sell physical goods of any kind or facilitate through services and software such activities, including price comparison websites, marketplaces and online retailers
Digital content	Companies that deliver, create or facilitate the fruition of digital content such as movies, games, digital text and other digital media
Remote storage and file transfer	Companies that provide file storage, cloud, file sharing and related services
Advertising tools and platforms	Companies active in the advertising industry as provider of advertising content, advertising platforms or active as intermediaries between advertisers and consumers or advertisers and suppliers
Artificial Intelligence, data science and analytics	Companies active in the creation, distribution or enhancement of self-learning software, image, speech or text recognition software, virtual assistants, analytics and machine learning services for big data
Home, wellbeing and other personal needs	Companies active in the provision of software and applications designed to simplify and/or improve experience for different aspects of daily life such as: transportation, health, learning, entertainment, wellbeing, and home automation
Other	

Source: Argentesi et. al (2019)

APPENDIX C

Table A3 *- List of strategic acquisitions according to selected reports and papers*

ACQUIRER	ACQUIRED	SOURCE
Google	Nestlabs	ACCC
Google	Waze	ACCC Expert Panel of the UK
Google	Admeld	ACCC
Google	AdMob	ACCC
Google	YouTube	ACCC Expert Panel of the UK Shapiro
Google	Nest Labs	Expert Panel of the UK
Google	Deepmind Technologies	Expert Panel of the UK
Facebook	WhatsApp	ACCC Expert Panel of the UK
Facebook	Instagram	ACCC Expert Panel of the UK Shapiro
Facebook	Sharegrove	ACCC
Facebook	Hot Potato	ACCC
Facebook	Gowalla	ACCC
Facebook	Glancee Glance	ACCC
Facebook	Tbh	ACCC
Facebook	Friend.ly	ACCC
Facebook	Divvyshot	ACCC
Facebook	Lightbox	ACCC
Facebook	FriendFeed	ACCC
Facebook	Oculus	ACCC Expert Panel of the UKShapiro
Amazon	Quidsi	Khan
Amazon	Ring	Expert Panel of the UK
Apple	Beats	Expert Panel of the UK
Microsoft	Skype	Expert Panel of the UK
Microsoft	Yammer	Expert Panel of the UK

Source: Australian Competition and Consumer Commission (2019), Furman et al. (2019); Khan (2017); Shapiro (2019)

DECLARATION OF AUTHORSHIP

By signing this declaration, I confirm that I have completed the present thesis independently, without help from others and without using resources other than indicated and named. All phrases that are taken directly or indirectly from other sources (incl. electronic resources), quoted verbatim or paraphrased are indicated accordingly. I am aware that any violation of this declaration will result in the work being graded as “failed” (0 grade points, ECTS-Grade F)

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