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Antitrust in Times of Information Technology:

An Analysis of Big Tech Monopoly Cases

A Thesis

Presented To

the Faculty of the College of Arts, Humanities and Social Sciences

University of Denver

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Shamayeta Rahman

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Abstract

The information technology industry is one of the most rapidly growing yet concentrated markets existing today. Big Tech monopolies and their increasingly anticompetitive behavior posits risks for competition, technological innovation and consumer welfare. This ranges from price discrimination, limiting consumer choices to the unethical use of data. The particular nature of information technology, with its network effects and negligible marginal costs, incentivizes and facilitates predatory market practices making antitrust analysis in this industry extremely complex. Certain schools of antitrust thought are more sensitive (namely the post-Chicago school) to these implications than others, though antitrust application is still lacking in both the European Union and the United States. This thesis thoroughly analyzed the landmark Microsoft and Google antitrust cases to find that it is imperative to increase antitrust oversight globally and identified the specific technological elements that antitrust bodies need to pay attention to in order to improve their antitrust applications in the information technology industry.

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Chapter 1: INTRODUCTION

It is often a commonly held notion that antitrust legislations curtail innovation. For most, this fear is based on partisan political beliefs, but for others it is their confidence in the abilities of the free markets to regulate themselves that lead them to believe that any hindrance to that process is subsequently harmful to innovation. Every day another industry in the world becomes integrated and dependent on information technology; everyone is reliant on the continued innovation in this field for continued growth in all other sectors of the economy. Given how important it is for everyone to foster an environment for innovation in the information technology industry, it is no surprise that many have spoken out specifically against antitrust legislations in this industry. However, this paper poses the opposite question, asking instead if the information technology industry is in dire need of more antitrust oversight. The leading antitrust bodies pursuing cases against information technology industries have simply not been sensitive enough to the extent of market abuses conducted by information technology monopolies. This thesis thoroughly analyzes two landmark antitrust cases to find if more regulation is needed and if it is, what the antitrust bodies need to pay attention to in order to increase oversight for improving competition and innovation in this industry.

The markets within the information technology industry are possibly some of the most concentrated industries¹ existing today. Most monopolies in this industry have not only made revenues comparable to those in the natural resources and automobiles industries² but are also growing constantly due to merging vertically and horizontally as newer information technology markets are created. Their dominance in the largest and smallest markets shows the extent to which they have made themselves omnipresent in all facets of consumer and industrial technology today. This has come alongside a global sphere of influence and increasingly blurring ethics regarding to their consumer conduct.³ While many have argued that they are deserving of their market dominance due to the superiority of their products and that the market would self-regulate any bad players in the long-term, the last 50 years of minimal oversight in this sector is proof that this is not the case.

While innovation is loosely invoked in most debates around this topic, competition is often sidelined. There are too many uncertainties in the real world to accomplish perfect competition, but that being said, both sides of the legislation debate should agree on striving to achieve a more competitive environment for firms to compete in, despite their disagreements on the methods of accomplishing this outcome.

¹Taschdjian Martin and Alleman James, "Antitrust Failures: The Internet Giants," in *29th European Regional Conference of the International Telecommunications Society (ITS): "Towards a Digital Future: Turning Technology into Markets?"*, 2018. <https://www.econstor.eu/bitstream/10419/184969/1/Taschdjian-Alleman.pdf>

² Clifton Leaf, "How the World's Biggest Companies Fight to Stay Ahead," *Fortune*, 2019, <https://fortune.com/2019/07/22/global-500-industry-dominance/>.

³ Kevin Granville, "Facebook and Cambridge Analytica: What You Need to Know as Fallout Widens," *The New York Times*, March 19, 2018, <https://www.nytimes.com/2018/03/19/technology/facebook-cambridge-analytica-explained.html>.

A competitive environment (along with a variety of factors) is conducive to fostering innovation.⁴ Monopolies, on the other hand, tend to engage in anticompetitive predatory behavior that not only reduces competition but also affects future innovation. It is also important to recognize that the technologies employed by the monopolies in this industry help facilitate even more market abuses than common monopolies. It is therefore, imperative for antitrust bodies to take on a more active role in implementing legislation in the information technology sector given how vital it is to the global economy, particularly as the current monopolies in this sector could pose detrimental effects to innovation and consumer welfare. For them to do this, they need to recognize the limitations in their current implementations, identify the unique nature of information technology industries and be flexible in their interpretations and applications of the law to fully enact the needed antitrust measures.

The information technology industry is not uncommon in how it can reach a global market, but it is unique because most software products that they make available have little to no distributional costs and can now reach a much larger consumer base than ever seen before. This makes the market concentration harder to unilaterally assess and regulate by any one antitrust body. For the purposes of this paper, the United States and the European Union have been chosen for having already built antitrust cases against two of the biggest monopolies in the information technology sector (i.e. Microsoft and Google). They also happen to be two of the most influential global governing bodies holding a large part of the world's population. Their successes and failures in being able

⁴Richard Gilbert, "Looking for Mr. Schumpeter: Where Are We in the Competition--Innovation Debate?," *Innovation Policy and the Economy* (The University of Chicago Press/The National Bureau of Economic Research, 2006), <https://doi.org/10.2307/25056183>.

to administer antitrust legislations are important to analyze for future decisions that could be made by other important legislative bodies with large populations and growing geopolitical influences (i.e. China and India). That being said, it is also important to fully grasp the schools of thought influencing the implementation of antitrust in the United States and the European Union before delving into the case studies, as these heavily dictated the outcomes of the cases they undertook and could also shed some light into which schools may be more sensitive to the misconducts in information technology specifically. The antitrust bodies in the United States are primarily influenced by the Chicago School thinkers who prioritize consumer welfare and efficiency over competition⁵, whereas their European counterparts are more influenced by Post-Chicago thinkers notable for their stricter interpretations of competitive fairness. This continental divide in ideas was thoroughly explored in Chapter 2 to inform the readers of how monopolies and their behaviors are harmful, but also how different interpretations can affect the degree to which certain behaviors are considered harmful to competition and welfare. This also helped to set the legal framework around competition economics needed to better analyze the case studies explored in the later chapters.

The two important elements tackled in this research paper were antitrust and information technology. It was imperative that the discussion and research asked how the current literature on technology and information technology could be used to better understand market abuses conducted by information technology monopolies. Though there had been plenty of writing around technology previously, much of it had portrayed

⁵ Richard A. Posner, "The Chicago School of Antitrust Analysis," *University of Pennsylvania Law Review* 127, no. 925 (1979), <https://doi.org/10.2307/3311787>.

it as an exogenous variable to the production process.⁶ Joseph Schumpeter was one of the earliest writers to present the alternative of a more dynamic view of technology and identified it as an essential driving force behind capitalist economies rather than just being a byproduct.⁷ This helped set the foundation for some of the more nuanced theories present regarding technology and information technology today. Chapter 3, explored these ideas and elaborated how the nature of information technology facilitated anticompetitive behavior like price discrimination, illegal bundling and the creation of other artificial barriers to entry. This chapter also remarked on how the limitations in the current literature surrounding certain topics in information technology like the lack of consensus in regard to the economic value of data and multiple levels of vertical market integrations within software platforms inhibited antitrust evaluations. It was vital to this research to have fully examined how information technology monopolies could theoretically be harmful to competition in order to proceed with the evaluation of the case studies to see if it was applicable in actuality, across two different settings and under two different antitrust schools of thought.

The Microsoft case from the 1980s in the United States and the Google cases from 2010s in the European Union were selected due to their sheer scale⁸ at the time of the cases and the similarity in the patterns of market abuses exhibited by both of these information technology monopolies. The technical details of the landmark cases and their

⁶ Nathan Rosenberg, *Exploring the Black Box, Exploring the Black Box*, 1994, <https://doi.org/10.1017/cbo9780511582554>. Rosenberg, Nathan. "Exploring the Black Box : Technology, Economics, and History." Cambridge University Press (Cambridge, England: 1994), 11.

⁷ Ibid.

⁸ Statista, "Search Engine Market Share Worldwide," 2019, <https://www.statista.com/statistics/216573/worldwide-market-share-of-search-engines/>.

counterparts (if there were any) in the other jurisdiction were explored in-depth in Chapter 4. It should be noted that the case studies presented in this paper are extensively detailed to help illustrate all the technical elements of anticompetitive behaviors exhibited by information technology monopolies. This understanding of all the technical details along with the context from the previous chapters regarding antitrust and information technology allows for the analysis in Chapter 5, which helps confirm the hypothesis of this paper. The economic discourse and the limitations in antitrust applications in both cases are evaluated to conclude that the implementation of antitrust is lacking in the information technology sector. The paper also used its findings from the literature and the case studies to note what the antitrust bodies need to be sensitive and flexible about in the future in order to improve the implementation of antitrust laws. It is imperative that they increase their oversight with a full understanding of the economics behind the technology they are regulating to ensure better competition, welfare and innovation in the future.

Chapter 2: ANTITRUST LAWS: A RETROSPECTIVE

2.1. Introduction

The United States had a 70-year head start compared to its neighbors across the Atlantic when it came to shaping the legal environment around competition and the rules that regulated it. Though it served as the foundation for the competition laws written in Europe, the nature of antitrust legislation and enforcement is notably different from those in the United States today due to the specific historical, socio-political and economic demands of each setting. For a better understanding of antitrust history, from its conception to the many reforms that it has faced, it is imperative to look at the history of antitrust laws in the United States given how the formative ideas on antitrust laws were implemented here first. The first half of this chapter goes into depth regarding the historical and economic variables that led to the changes in antitrust legislation in the United States and makes a note of its introduction in the European continent. The second half of this chapter then analyzes the theoretical influences in both the United States and the European Union over the latter years and is a deeper examination into the ideological divide that led to the differences in the enforcement of the laws we see today. It should be noted that these two legislative bodies have been chosen for because of the level of influence that they wield on global commerce and also because they have already taken on cases regarding information technology. While other countries like China and India

with their large populations will become integral to global antitrust enforcement in the future, due to the limited scope of this paper, only the United States and the European Union have been chosen for this analysis. This chapter should provide a substantial understanding of the history and theoretical influences behind antitrust laws to better comprehend the continental divide in the current state of competition law today.

2.2. Historical Background of Antitrust Laws

While the history of antitrust laws in the United States and the many interesting cases that accompany it can be analyzed in seemingly endless ways, a narrower focus has been adopted for this paper. The intersection of many political, social, institutional and economic circumstances led to the conception and the reformations in antitrust laws and that a single causal relationship cannot be established with any variable in isolation. That being said, historically, the evolution of technological change and distribution⁹ was one of the many interesting economic phenomena that preceded reforms in antitrust law. Taking the “technology” lens to look at antitrust history is by no means a suggestion that any of the other economic variables are any less significant, but the perspective provides insight into the specific stages of technological and distributional changes that influenced antitrust laws in certain historical contexts. This section will examine these patterns in technology and distribution in a generalized way, but where data is available, it will also attempt to refer to how Duménil et al. (1997) intended, which is through the use of long-run trends in labor productivity, real wages, capital-labor ratio, capital productivity and

⁹ Gerard Duménil, Mark Glick, and Dominique Levy, “The History of Competition Policy as Economic History,” *Antitrust Bulletin* 42, no. 2 (1997): 373–416, <https://doi.org/10.1177/0003603X9704200203>.

the rate of profit on fixed assets.¹⁰ It should add an interesting dimension to the historical context behind these laws.

2.2.1 Sherman Act (1890)

The late 19th century saw a boom in big industries in the United States; the “Second Industrial Revolution” had led to a big surge in innovation and growth in agriculture, industries, transportation networks and other sectors around the country.¹¹ This led to a fall in prices and a rise in real wages, but the sudden rise in the number of big businesses led to some skepticism from many people.¹² The rise in the number of big businesses threatened the traditional sector of the economy as they could not keep up with the cutthroat competition and falling profits that the bigger firms could keep up with.¹³ The big firms formed cartels and trusts that further disempowered small entrepreneurs and the people feared that this would have adverse democratic effects as well.¹⁴ The Populist movement played a significant role in building the “antimonopoly sentiments” during that time, especially with their push towards reforming the railroad companies.¹⁵ Overall, competition was in crisis and tensions were running high around the country with the big “us and them” narrative at play which ultimately led Congress to use its constitutional power to create the Sherman Antitrust Act in 1890. The Sherman Act prohibited the restraints of trade like trusts and cartels, and also prohibited attempts of monopolization. Though the purpose of the bill was to protect the traditional side of

¹⁰ Ibid., 375.

¹¹ Laura Phillips Sawyer, “US Antitrust Law and Policy in Historical Perspective,” *Harvard Business School Working Paper* 19–110 (2019), [https://www.hbs.edu/faculty/Publication Files/19-110_e21447ad-d98a-451f-8ef0-ba42209018e6.pdf](https://www.hbs.edu/faculty/Publication%20Files/19-110_e21447ad-d98a-451f-8ef0-ba42209018e6.pdf).

¹² Ibid.,4.

¹³ Duménil, Glick, and Levy, “The History of Competition Policy as Economic History.”383.

¹⁴ Sawyer, “US Antitrust Law and Policy in Historical Perspective.” 4.

¹⁵ Ibid.,4.

the economy, it was evident in the purposefully ambiguous legislative language that it did not want to harm the corporations too directly, this can be seen in the removal of the requirement of “free competition” and its replacement with “restraints of trade” which is significantly harder to get charged for.¹⁶ The responses to the Sherman Act were positive within the government, though many questioned it and viewed it as punishing the winners of competition.

It is interesting to make a note of the technological and distributional patterns during this era, especially given how it was a period of rapid innovation and growth in all sectors leading to the application of goods and services like railroads, telegraphs, telephones¹⁷ and other inventions which significantly changed the ways of life and commerce. Duménil et al. (1997) noted that during this period, both labor productivity and labor costs were rising (though slower compared to later years) but capital-labor ratio rose super quickly.¹⁸ This period saw surprisingly low numbers for return on fixed assets and capital productivity, but this is perhaps due to the instability of the macroeconomy at the time than the state of technology.¹⁹ It can be seen that the technology did have some impact in improving labor productivity since both labor productivity and capital-labor ratio rose. While these patterns can help to reassert the fact that the Sherman Act was clearly enacted at a period of notable technological change, it is evident just from the inventions of the era that the technology from that time changed the geographical scope of businesses within America. Advances made in transportation and communication

¹⁶ Duménil, Glick, and Levy, “The History of Competition Policy as Economic History.”386.

¹⁷ Sawyer, “US Antitrust Law and Policy in Historical Perspective.” 26.

¹⁸ Duménil, Glick, and Levy, “The History of Competition Policy as Economic History.”375.

¹⁹ *Ibid.*, 377.

technology opened up the possibility for much bigger companies to conduct interstate commerce. This was a period where competition was changing and a period where it needed to be regulated.

2.2.2 Clayton Act and the Federal Trade Commission Act (1914)

Under President Woodrow Wilson, two important amendments were made to the Sherman Act, the Clayton Act and the Federal Trade Commission Act. The latter led to the creation of its namesake organization which was set up to “prevent unfair methods of competition,” help unfairly injured competitors and help consumers get their due compensation and run investigations to make legislative recommendations about business practices.²⁰ The Federal Trade Commission was set up as sort of a regulatory institution to govern business practices and competition as a whole. The Clayton Act was added in to prohibit unlawful tying, mergers and acquisitions, something that the Sherman Act had initially not addressed.²¹ Wilson borrowed heavily from Louis D. Brandeis (who would go on to become a progressive antitrust supporting Supreme Court Justice) during his campaign and spoke against the “curse of bigness” but despite his open bias, the law held loopholes that allowed big businesses to easily bypass the laws. The anti-merger law did not account for stocks in their analysis of asset acquisition, for instance.²² The period preceding the passing of these two acts was that of relative stability in terms of both economic, technological and distributional trends. However, it should be noted that the period did see a boost in productivity and wages due to the managerial revolution from

²⁰ Federal Trade Commission, “Federal Trade Commission Act,” accessed September 10, 2019, <https://www.ftc.gov/enforcement/statutes/federal-trade-commission-act>.

²¹ Sawyer, “US Antitrust Law and Policy in Historical Perspective.” 11.

²² Duménil, Glick, and Levy, “The History of Competition Policy as Economic History.” 397.

the earlier years.²³ Labor productivity and real wage kept growing.²⁴ There have been different interpretations regarding the state of competition in that era, some deeming it too aggressive while others finding it deficient.²⁵ It appears as though a lot of the interpretations of this era have been marred by political bias.

2.2.3. Robinson-Patman Act (1936), Celler-Kefauver Act (1950), and the Hart-Scott-Rodino Act (1976)

The Robinson-Patman Act notably outlawed price discrimination and predatory pricing. This took place soon after the second New Deal right after the United States underwent the economic shock of the Great Depression and the effects of implementation of the first New Deal.²⁶ There was a structural crisis related to the pattern of technological and distributional crisis in this period. For big businesses and the sector of the economy involved in heterogeneous industrial technology, growth, efficiency and profit came fast while the traditional sector faltered. When the demand decreased in the onset of 1929, the traditional sector collapsed, the traditional sector failed. This is the only period where labor productivity and real wage and the stock of capital fell.²⁷ Since then there has been continuous growth in real wages, labor productivity and the stock of fixed capital. The Celler-Kefauver Act which closed the acquisition of stocks loophole came at a period of high productivity, wages, profits and technological growth following World War II.²⁸ On the other hand, the Hart-Scott-Rodino Act which set guidelines for mergers came at a

²³ Ibid., 392.

²⁴ Ibid., 376.

²⁵ Ibid., 392.

²⁶ Sawyer, "US Antitrust Law and Policy in Historical Perspective."13.

²⁷ Duménil, Glick, and Levy, "The History of Competition Policy as Economic History."397.

²⁸ Ibid., 405.

period of unfavorable technological and distributional trends when market concentration happened to be rising quickly.²⁹ The economy was unstable at the time and continued to be as it entered a recession in the early 1980s.³⁰

Though not all the laws seem to be preceded by favorable trends in technological and distributional patterns, it seems as though the long periods of positive technological growth or shocks to those patterns cause enough socioeconomic disturbances in the economy to have warranted amendments to competition laws in the past. This is by no means a comprehensive economic analysis of the creation of antitrust laws in the United States and this paper is not drawing any conclusive statements regarding this, but merely observing a pattern which could indicate that an antitrust amendment to meet modern competition and technology needs is long due.

2.2.4 European Antitrust Laws: The Beginnings (1957)

Before the formation of the European Union in 1993, the European Economic Community was founded as a customs and trade union between six western European countries. This occurred with the signing of the Treaty of the European Economic Community (more commonly referred to as the Treaty of Rome) in 1957.³¹ Along with the creation of this common market came laws to ensure free and fair competition within it. Articles 81 and 82 were created to safeguard against price fixing, collusions and cartels and the abuse of market power by dominant firms (See Appendix 4).³² The general

²⁹ Ibid., 410.

³⁰ Ibid., 412.

³¹ European Union, "A Peaceful Europe – the Beginnings of Cooperation," accessed September 10, 2019, https://europa.eu/european-union/about-eu/history/1945-1959_en.

³² Anca Daniela Chirita, "A Legal Historical Review of the EU Competition Rules," *International and Comparative Law Quarterly* 63, no. ICQLU 2 (March 13, 2014), <https://doi.org/10.2139/ssrn.2230429>.

framework behind the laws were similar to those generated by their American counterparts. Europe had faced a massive economic downturn in the advent of World War II and European cooperation was fundamental to the future of Europe. However, the rebuilding process and the economic stimulus from the Marshall Plan led to significant economic growth, increase in capital stock and rise in productivity in the period preceding the formation of common market and its accompanying competition laws.³³ Though slight bureaucratic legal changes were made to the laws since the formation of the European Union in the year 2000, the general ideas remained the same.³⁴ Once again, there were a lot of historical and political factors that factored into the creation of these laws, but due to the limited scope of this paper, this section merely introduces these laws and some of the relevant economic patterns that preceded their creation. When looking at the laws in a general manner (without expert legal scrutiny), both the European and American frameworks dealt with the same issues in terms of preserving competition and preventing tacit practices by dominant market powers. They were created with the same intent and yet their implementation varies so drastically today. The historical context provided in this paper is by no means comprehensive, but it should provide sufficient background knowledge needed to begin to understand the differences that arose in the decades following the creation of these laws.

³³ Barry Eichengreen, “The European Economy Since 1945,” *The New York Times*, March 25, 2007, <https://www.nytimes.com/2007/03/25/books/chapters/0325-1st-eich.html>.

³⁴ Council of the European Union, “COUNCIL REGULATION (EC) No 01/2003 on the Implementation of the Rules on Competition Laid down in Articles 81 and 82 of the Treaty” (2002), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003R0001&from=EN>.Ibid.

2.3. Theoretical Influences on the Enforcement of Antitrust Laws

The divergence that can be seen today in the application of antitrust laws across the United States and the European Union can be identified back to the differences in cultures, political institutions, economic circumstances and other individual qualities that separate the two places. These unique variables gave rise to the popularity of specific schools of economic thought that prevailed in affecting the outcomes of antitrust cases and swaying the public opinion on the government's role in intervening in "free market competition." Given that the Treaty establishing the European Economic Community was signed in 1957³⁵, this paper will examine the decades following this event to make note of the significant drifts in ideologies that contributed to the current system of antitrust law enforcement in place in both the United States and the European Union today.

2.3.1 United States

For the longest time in the United States, there was a simple economic understanding of competition –the existence of a lot of small firms equated to a more competitive market than a market with a few large firms. It was understood that a few firms with dominant market shares (oligopolies) or one firm with a dominant market share (a monopoly) were bad for competition given that these firms would have an unfair advantage that would allow them to block new entrants, fix prices and provide lower quality goods and services without facing any consequences given their market share leverage. This line of thought on competition based on market structure, affected how the court's addressed antitrust cases for the longest time until the 1970s, which saw the

³⁵ European Commission, "EU Competition Law Rules Applicable to Antitrust Enforcement Volume I: General Rules," 2013, <https://doi.org/10.2763/35312>.

advent and popularization of the very influential Chicago School of Thought. The ideas coming out of Chicago School would go onto define the attitudes around antitrust laws and its applications in courts in the United States till current times.³⁶

The most popular piece of writing in the Chicago School catalog of antitrust contributions has to be Robert Bork's *Antitrust Paradox*. This book has often been referenced to both champion and critique the level of influence of this particular school of thought. On one hand, it is an apt summary of some of the general ideas put forward by the Chicago School, on the other, using this as the sole source dismisses the many other differing contributions from economists like Benjamin Klein, George Stigler and Lester Telser, which were just as influential in the courts.³⁷ For example, it must be noted that Stigler's works on information and search costs and other ideas coming out of Chicago regarding transaction costs point to the absence of perfect markets with perfect information and no transaction costs.³⁸ Thus, the idea that the *entire* basis of influence is built on rational actors in perfect markets might be a mischaracterization of the nuances of their specific influence on antitrust laws.³⁹

All that being said, it is still important to note some of the specifics of Robert Bork's work given the sheer level of influence it wielded on antitrust thought. Bork was a proponent of economic efficiency and believed that the goal of antitrust should be to promote consumer welfare. *This* was in fact a primary point of argument by the entire

³⁶ Lina M. Khan, "Amazon's Antitrust Paradox," *Yale Law Journal* 126, no. 3 (2017): 710–805, <https://www.yalelawjournal.org/note/amazons-antitrust-paradox>. Khan, Lina M., "Amazon's Antitrust Paradox." *Yale Law Journal*. Vol. 126. No.3 (2017): 564-907.

³⁷ Joshua D Wright, "Abandoning Antitrust's Chicago Obsession: The Case for Evidence-Based Antitrust," *Antitrust Law Journal* 78, no. 1 (2012): 241–71, https://www.law.gmu.edu/assets/files/publications/working_papers/1239AbandoningAntitrustChicagoObsession.pdf.

³⁸ *Ibid.*, 305.

³⁹ *Ibid.*, 349.

school of thought.⁴⁰ He said that the primary purpose of enacting the Sherman Act was consumer welfare which was used as a precedent in the court system for numerous antitrust cases despite many debates surrounding the claim.⁴¹ Bork was also very skeptical of the idea of legally charging monopolies for predatory pricing (the act of charging below cost of production and taking up losses to get rid of competition) and thought it was an unlikely *irrational* behavior that could be easily mistaken with general price competition.⁴² He also did not think that predatory behavior through vertical mergers were likely given that the supplier firms would want to engage in commerce with more profitable firms and would simply not form ties if it was not efficient; and if they were efficient, then they should not be punished by the law because then they would be passing down the benefits to the consumers via lower prices.⁴³ Ultimately, his ideas around the concept of economic efficiency assume that rational, profit-maximizing firms *should* not engage in predatory behavior for too long since it will render them inefficient and new entrants will overtake them thus limiting their ability to monopolize for very long. It also suggests that if a monopoly were to be economically efficient, they should not punish it for being so.

A few Chicago School ideas regarding antitrust laws are especially pertinent to this paper and should be examined thoroughly. They regard “*tying*” to be an irrational act for acquiring a second monopoly profit given the fact that a rise in the price of the tied

⁴⁰ Robert H. Bork, *The Antitrust Paradox* (New York: Free Press, 1978).

⁴¹ Barak Y. Orbach, “The Antitrust Consumer Welfare Paradox,” *Journal of Competition Law and Economics* 7, no. 1 (2011): 133–64, <https://doi.org/10.1093/joclec/nhq019>. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1553226

⁴² Khan, “Amazon’s Antitrust Paradox.”

⁴³ *Ibid.*

product will reduce the demand for the tying product.⁴⁴ They also do not view price discrimination as an issue as they argue that it increases consumer welfare by getting closer to the results of perfect competition.⁴⁵ It is interesting how a recurring point in their theory is that rational, profit-maximizing firms would not *behave* a certain way even though in reality monopolies do behave in *irrational* predatory ways. This point is heavily pushed when they are undermining the concept of predatory pricing, suggesting that no firm would ever sell below cost to get rid of competitors, especially not in the long-run as it would be inefficient and they would be overtaken by newer, more efficient entrants into the markets.⁴⁶ Finally, similar to Bork, other Chicago thinkers also put a prominent focus on vertical mergers. It is deemed to be completely irrational for a firm to vertically merge unless it is absolutely economically efficient which is simply not true.⁴⁷ The Chicago School's anti-interventionist influence on all these issues have led to the courts being very resistant to punishing these crimes and this is seen in the case studies discussed later in this paper.

A closer look at the ideas stemming from the Chicago School highlights the three main characteristics they applied to antitrust, these were primarily (1) the neoclassical price theory, (2) strict empiricism and (3) the error-cost framework.⁴⁸

Richard Posner (1979) explained how the Chicago School adopted a simplistic view of the marketplace based on price theory making assumptions about rational, profit-maximizing consumers and sellers who will react to prices in these preset ways (i.e. low

⁴⁴ Posner, "The Chicago School of Antitrust Analysis."

⁴⁵ Ibid., 2.

⁴⁶ Ibid., 4.

⁴⁷ Ibid., 3.

⁴⁸ Wright, "Abandoning Antitrust's Chicago Obsession: The Case for Evidence-Based Antitrust." 305.

prices, high demand, etc.)⁴⁹ and how they try to implement it in their antitrust analysis as well. While this added a level of economic structure to antitrust proceedings in the courts that it did not have in the past, it might have also limited the courts in its ability to examine *irrational* cases.⁵⁰ Second, the Chicago School heavily emphasized the use of quantitative methods in order to support and legitimize the claims that they made which further established a more evidence based system for antitrust proceedings.⁵¹ Lastly, they focused on making a case against false positives, arguing that the costs to consumer welfare for punishing a non-predatory firm was a lot higher than not holding a monopoly liable for its actions.⁵² This narrow focus on consumer welfare based on price theory and a push towards avoiding false positives led to the current court system in the United States becoming this unwilling to prosecute monopolies.

Though various other schools of economic and legal thought have come up in the United States since the Chicago School, none have gotten as much traction in the courts as them. The Post-Chicago School, the Behavioral School and the New Brandeis of Antitrust are all breaking grounds in critiquing the ways in which the Chicago School has failed the American antitrust system but ultimately it is still the Chicago School of Antitrust that carries the most influence in the United States. They have shaped how antitrust laws are enforced in the United States for over 50 years and thus it is imperative to understand their exact influence if it is ever to be diminished here.

⁴⁹ Posner, “The Chicago School of Antitrust Analysis.” 5.

⁵⁰ Wright, “Abandoning Antitrust’s Chicago Obsession: The Case for Evidence-Based Antitrust.”307.

⁵¹ Ibid.

⁵² Ibid.

2.3.2. *European Union*

The European Union antitrust legislations were formed close to 70 years after the introduction of the Sherman Act in the United States during the Treaty of Rome in 1957.⁵³ While initially they mimicked the enforcement style of their counterparts across the ocean, the divergence occurred in the late 70s when the United States antitrust scene underwent its Chicago transformation.⁵⁴ As the orthodox neoclassical economizations of antitrust laws prevailed further in the United States, several schools of thought rose to counteract and critique it, however, it was a while before they solidified into prominence, the “Post-Chicago school” is one such school of thought. While these ideas grew to some prominence in the stateside, they were far more influential in Europe, where antitrust held more “social and political” concerns than merely “economical.” Over the years, the Europeans took note of these post-Chicago developments in antitrust laws and incorporated them into their system leading to the significant differences that can be seen in antitrust law enforcement across the two places today.⁵⁵ Post-Chicago economist Jon Baker notes that both Chicago and Post-Chicago thinkers agree that the goal of antitrust laws should be to protect consumer welfare and increase allocative efficiency, but the manner in which they think this should be done varies due to the disagreements they hold regarding the nature of markets and monopolies.⁵⁶ The Chicago School keeps a lot more

⁵³ European Commission, “EU Competition Law Rules Applicable to Antitrust Enforcement Volume I: General Rules.”

⁵⁴ Khan, “Amazon’s Antitrust Paradox.”

⁵⁵ Herbert J. Hovenkamp, “The Reckoning of Post-Chicago Antitrust,” in *Post-Chicago Developments in Antitrust Law*, ed. Antonio Cucinotta, Roberto Pardolesi, and Roger Van den Bergh (Northampton, MA: Edward Elgar Publishing, 2002), 1–33, https://ir.uiowa.edu/law_pubs/576.

⁵⁶ Jonathan B. Baker, “Recent Developments in Economics That Challenge Chicago School Views,” *Antitrust Law Journal* 58, no. 2 (1989): 645–55, https://www-jstor-org.du.idm.oclc.org/stable/40841261?seq=1#metadata_info_tab_contents.

faith in market forces and neoclassical assumptions of rationality as an answer to monopolies than their Post-Chicago counterparts. This leads the thinkers of the latter school to be a lot more skeptical of monopolies and their practices, making them much bigger proponents of government intervention than the former group.⁵⁷

One of the key ideas to have come out of the Post-Chicago circuits is their criticism of Chicago's lax attitude towards vertical mergers. They found that vertical mergers were much more damaging than they were made out to be given that in most real-life cases, rival companies are forced to raise their prices, and this leads to lower total market supply at potentially higher prices (if they have not foreclosed already). So the traditionalist argument of economic efficiency in vertical mergers misses the nuances of how anticompetitive this behavior can be.⁵⁸ The second key idea contests the Chicago concept that rational market agents would never sell below cost, given that subsequent monopoly prices would draw in new competitors into the market. The Post-Chicago thinkers note that in actuality, this sort of predatory behavior sets a negative precedent in the market and drives away competitors not only for a short time but intimidates future entrants as well.⁵⁹ It is interesting to see how the Post-Chicago economists factor in human behavior into their analysis of the impacts of anti-competitive actions (not to the same level as the Behavioral School, of course), but what was possibly their biggest contribution was the incorporation of concepts from industrial organization and game theory into their antitrust applications. Chicago School has time and time again purported

⁵⁷ Ibid.

⁵⁸ Thomas G. Krattenmaker and Steven C. Salop, "Anticompetitive Exclusion: Raising Rivals' Costs To Achieve Power Over," *Yale Law Journal* 96, no. 2 (1986), <https://digitalcommons.law.yale.edu/ylj/vol96/iss2/1/>.

⁵⁹ Baker, "Recent Developments in Economics That Challenge Chicago School Views."

that price wars were evidence against the possibility of price collusion in industries.⁶⁰ However, repeated games (also known as supergames) models show that collusive pricing techniques may be administered over a long period (with short periods of competitive price drops to increase demand) in markets with imperfect information. The nature of competition with monopolies can mimic such supergames where there are incentives for rivals to continue to match the price of their competitor or suffer the consequences. While it may seem like benign competition with price wars on the surface, there may still be anticompetitive behavior present underneath.⁶¹

The Chicago School and Bork in particular did not believe that any firm that has a presence in multiple markets would lower prices in one market to take out competition in the market for another product (as an argument against tying).⁶² This was used to justify the idea that conglomerates would be less hostile than single-product firms. However, the Post-Chicago analysis found that there was plenty of evidence to suggest that conglomerates repeatedly used predatory pricing and retaliated against each other in different markets.⁶³ Last, the Post-Chicago thinkers posit the idea of strategic entry deterrence⁶⁴, which unlike the concept of artificial barriers to entry also includes large investments into scale economies as a strategic choice used to limit new entrants into the market.⁶⁵ Most firms are expected to undertake a certain level of sunk cost when entering a new market, so they tend to enter the market when they can hope to recover these costs

⁶⁰ Ibid.

⁶¹ Edward J. Green and Robert H. Porter, "Noncooperative Collusion under Imperfect Price Information," *Econometrica* 52, no. 1 (1984): 87–100, <https://doi.org/10.2307/1911462>.

⁶² Bork, *The Antitrust Paradox*.

⁶³ Baker, "Recent Developments in Economics That Challenge Chicago School Views."

⁶⁴ Steven Salop, "Strategic Entry Deterrence," *American Economic Review* 69, no. 2 (1979): 335–38, <https://doi.org/10.2307/1801669>.

⁶⁵ Baker, "Recent Developments in Economics That Challenge Chicago School Views."

(likely at a profitable entry price). However, in the case of scale economies (or even industries where scale economies are the norm), for the aspiring entrant to reach the minimum efficient marginal cost, they would have to invest a huge sum from the start. So while the pre-entry prices may be high, the entrant has no way of knowing whether the post-entry prices would be as high and if they would be able to recover their costs thus deterring their entry in the first place.⁶⁶ These types of deterrence may also include strategic use of artificial barriers as well including high investments into advertisements, brand proliferation and exclusivity contracts setting up a variety of ways in which a monopoly can protect its dominant position in a market starting from its entry.⁶⁷

As previously mentioned, the Post-Chicago incorporation of the methodological tools from industrial organizational economics has allowed for a more in-depth analysis into markets that price theory alone could not accomplish.⁶⁸ This gave light to new ways of sub-sectioning and measuring market concentration and led the way for narrower market breakdowns in both Europe and the United States (though the Europeans tended to have adopted the methodologies a lot more religiously). The European Union has also retained a lot more from their structuralist past than the United States,⁶⁹ where they view market concentration as the primary detrimental force to be eliminated instead of focusing on promoting consumer welfare at the cost of competition.⁷⁰ Perhaps this is why they responded more to the Post-Chicago thinkers who criticized Chicago's "consumer

⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Geoffrey A. Manne, "Why US Antitrust Law Should Not Emulate European Competition Policy" (Washington D.C., 2018), <https://laweconcenter.org/wp-content/uploads/2018/12/Geoffre-A-Manne-Testimony-Why-US-Antitrust-Law-Should-Not-Emulate-European-Competition-Policy-2018-12-19.pdf>.

⁷⁰ Khan, "Amazon's Antitrust Paradox."

welfare” model and contributed theories about how monopolies and their anticompetitive behavior hurts competition and subsequently consumers. While social and consumer impacts are obviously considered in the European Union, the crucial difference lies in what is viewed to be consumer welfare. In both places, a free competitive marketplace benefits consumers, but while the United States is more receptive to recognizing consumer benefits in monopoly set ups, the European Union is a lot more attuned to the long-term detriments to consumers in concentrated markets.

It is interesting to see how despite having similar goals, the theoretical influences that dictated enforcement of the antitrust laws in the United States and the European Union have caused such drastic differences in how antitrust legislations are implemented today. The close identification of the influences and their ideas on antitrust enforcement provide the framework to better understand the decisions that were made in the cases discussed in the later chapters.

2.4. Conclusion

This chapter explored the history of the creation of antitrust legislation in the United States and in Europe and then examined the divergence in their application today. Data from the last 30 years show that profit rates and market concentration have risen dramatically in the United States whereas it has stayed a lot more stable in Europe.⁷¹ There is clearly a distinction in the application of antitrust laws between the legislative bodies across the two continents. It is possible that the heavy influence of the Chicago School and their emphasis on *consumer welfare* and fear of false positives⁷² has hindered

⁷¹ Thomas Philippon and Germán Gutiérrez, “How EU Markets Became More Competitive Than US Markets : A Study of Institutional Drift,” NBER Working Paper, 2018, <https://www.nber.org/papers/w24700.pdf>.

⁷² Wright, “Abandoning Antitrust’s Chicago Obsession: The Case for Evidence-Based Antitrust.”

the regulation of competition in the United States. On the other hand, while the European legislators invoke consumer welfare to almost the same degree in their antitrust practice, it is interesting how due to their more Post-Chicago influences, they often conflate it with harm to competition, which would be considered a major flaw by their American counterparts who err on the side of harming efficiency and welfare. The legislative bodies in the United States also hold very optimistic views of the markets compared to their European counterparts, often overestimating the abilities of newer entrants to grow, adapt and displace potential monopolies whereas the Europeans tend to begin with more restrictive assumptions which assume that monopolies will limit the market capabilities of any new entrants to a higher degree.⁷³ Another factor that has created a significant difference in not only the concentration of markets but also antitrust legislation across these two continents is the presence of lobbying.⁷⁴ While this paper will not elaborate on this specific phenomena, it is important to be aware that this exists in the United States and is an important non-economic variable to take into account when examining this variance.

It is important to contextualize the history of European and American antitrust legislation against the economic background of competition economics and how it distinctly changed its applications. More details in terms of laws, specific definitions and economic tests can be found in the appendix if additional context is required by the reader. The differences explored in this chapter are further realized in the examination of

⁷³ William E. Kovacic, "Competition Policy in the European Union and the United States: The Treatment of Dominant Firms," https://www.ftc.gov/sites/default/files/documents/public_statements/competition-policy-european-union-and-united-states-convergence-or-divergence/080602bateswhite.pdf.

⁷⁴ Philippon and Gutiérrez, "How EU Markets Became More Competitive Than US Markets : A Study of Institutional Drift."

the case studies explored in Chapter 4 and should serve as a background for the analysis of whether the implementation of antitrust laws need to improve for two of the most influential global legislative bodies.

Chapter 3: **The ECONOMICS BEHIND INFORMATION TECHNOLOGY**

3.1. Introduction

Before tackling the concept of antitrust *in* information technology, it is important to understand the economic theories behind technology and eventually information technology as these theories will determine the degree to which the technologies employed by these firms have an impact on their market activities and consequently their market abuses. Technology and technological change have existed in the economic dialogue for over centuries and their importance in affecting production at the firm level or national level has been recognized throughout this time.⁷⁵ However, it had been isolated as an exogenous variable in most major schools of thought and this limited a greater exploration into the causes and effects of technology beyond productivity changes. The first section in this chapter will briefly explore the neoclassical ways of analyzing technology and then contrast it with Joseph Schumpeter's more dynamic take, given the relevant insight it provides into the correlation between technology and competition and also due to its foundational impact on the understanding of information technology today.

⁷⁵ Markus C. Becker, Patrick Cohendet, and Patrick Llerena, "Division of Labor and Division of Knowledge: Why the Nature of the Causality Matters for the Evolutionary Theory of the Firm," in *Innovation, Industrial Dynamics and Structural Transformation: Schumpeterian Legacies*, 2007, https://doi.org/10.1007/978-3-540-49465-2_4.

As a rapidly changing *current* technology, information technology has not only branched off into a whole new set of subsidiary technologies but also faces unique economic conditions which affect their market behavior. It is thus imperative, to contextualize the greater understanding of the economics of technology and technological change with the added elements from information technology to understand exactly how information technology firms can affect competition and innovation. The last half of this chapter elaborates on the complexities of regulating competition in the information technology industry but also why it makes it that much more important to do so. Any antitrust analysis into the information technology industry needs to be sensitive to these industry-specific issues as it fundamentally changes how competition in this industry is needs to be analyzed.

3.2. Theories on Technology and Technological Change

One of the earliest notions of *technology* seen in economic theory is in Adam Smith's writing where an increase of efficiency and productivity is seen through the division of labor and using learning by doing.⁷⁶ While the importance of technology has always been acknowledged by mainstream Neoclassical economists as a vital part of economic growth and productivity, it was always cornered away as a rigid exogenous variable that existed within the already static Neoclassical equilibrium framework.⁷⁷ Though prominent writers like Marx and Schumpeter did emphasize the role of technology in the past, until the last half of the century, most economists boxed technology into limited roles within their models. Many economists opted for the model

⁷⁶ Ibid.

⁷⁷ Rosenberg, *Explor. Black Box.*,11.

where technology is simply an external, abstract, *given* variable in a production function which affects the degree of economies of scale or the rate at which the inputs generate the outputs.⁷⁸ While these firm theories focused on technology and what it could accomplish for productivity, it thoroughly lacked in its ability to explain what encompassed the machinations of this *technology* and *technological change*.

However, a few other economists tried to take on a deeper view of technology, viewing it as having a more transformative role in the production process than merely being an efficiency driver. These theories build on the idea of distinct and uneven technological knowledge and explore how there are unique costs and gains associated with applications of different technologies.⁷⁹ While many theories around technology have come up in today's modern world (and continue to do so every day), to preserve the focus of this paper, this section will briefly explore the historically limited perspectives on technology and technological change held in Neoclassical economics, the more nuanced views on technology held by Joseph Schumpeter and how they ultimately influenced a lot of the modern in-depth analysis on technology today. This section should serve as a theoretical backdrop to understanding and hopefully building ideas on the specific niche that is information technology.

3.2.1 Technological Change within The Neoclassical Black box

Nathan Rosenberg famously and aptly surmised that “Economists have long treated technological phenomena as events transpiring inside a black box” and that “The economics profession has adhered rather strictly to a self-imposed ordinance not to

⁷⁸ J. Stan Metcalfe, “Technology and Economic Theory,” *Cambridge Journal of Economics* (Oxford University Press, 2010), <https://doi.org/10.2307/24232028>.

⁷⁹ *Ibid.*, 161.

inquire too seriously into what transpires inside that box.”⁸⁰ As discussed previously, for the longest time, early neoclassical frameworks valued the role of technology and technological change but only as an exogenous factor that led to greater productivity and increase in (possibly better quality) outputs.⁸¹ It did not delve into the causes behind technological change, treated it like a residual and failed to isolate the effects of technological change on the output compared to the other factors of productions and causes. A lot of the earlier studies were also only preoccupied with technology as a cost-saving measure in production processes and did not explore the multitudes of ways in which technology is used to improve upon the quality and type of goods (and not just the quantity produced).⁸²

Though technological change has been studied in the context of production functions in the aggregate economy (notably by Robert Solow), some of the key findings about the neoclassical understanding of technology and technological change comes from their work on firm theory.⁸³ Production functions are combinations of various input factors in the market (i.e. land, labor, capital) which along with preset technological factors can create a certain number of outputs. Aside from the factors of production, everything else (including technology) in the neoclassical framework is held as a constant. All factors are utilized to accomplish the profit maximizing equilibrium for the firm, as firms are rational, profit-maximizing entities in the neoclassical framework. Technological change only occurs to either create a new product (product innovation) or

⁸⁰ Nathan Rosenberg, *Inside the Black Box* (Cambridgeshire, Cambridge: Cambridge University Press, 1982).

⁸¹ *Ibid.*, 4.

⁸² *Ibid.*, 4.

⁸³ *Ibid.*, 6.

improve upon the production function (process innovation)⁸⁴ of the existing one. This diminishes technology and technological change to its consequences of reducing costs and increasing profits and implies that it exists in vacuum only to lend its abilities for that cause.⁸⁵ This does very little to answer what causes technological change and largely ignores the relationships that exist between technological change and the other factors of production (such as capital accumulation and investment having a direct effect on technological change or how particular technological improvements affect capital and labor productivity differently).⁸⁶ The theory of the firm also rarely considered the vital decision-making role of entrepreneurship in creating technological change, which along with the fact that it proposed highly unproductive firms (firms with high average costs and small outputs in perfect competition) was just the least of its flaws.⁸⁷

As for the cause of technological change, the baseline assumption seemed to be that inventions and the direction of technological change remained outside of the firm's decision-making scope, therefore it is something that only occurred exogenously and was applied to the firm's production processes only when it became feasible to do so. These assumptions were not true as Jacob Schmookler demonstrated through historical data that not only did technological change have economic consequences, but they also had economic causes behind them.⁸⁸ He specifically found that more resources are allocated to inventions for industries that have higher market demand which means that

⁸⁴ Roberto Simonetti, "Technological Change," in *Microeconomics: Neoclassical and Institutional Perspectives on Economic Behavior* (Boston, MA, 2001), 415.

⁸⁵ Barbara S. Burnell, *Technological Change and Women's Work Experience: Alternative Methodological Perspectives* (Westport, CT: Bergin & Garvey, 1993).

⁸⁶ Simonetti, "Technological Change."424.

⁸⁷ William Lazonik, "Innovative Enterprise and the Theory of the Firm," in *Rethinking Capitalism: Economics and Policy for Sustainable and Inclusive Growth*, ed. Michael Jacobs and Mariana Mazzucato (Wiley, 2016).

⁸⁸ Rosenberg, *Inside the Black Box.*,18.

technological change does not in fact exist in economic isolation as neoclassical models would suggest, but is in reality deeply affected by the ever-changing market machinations like every other economic variable. Technological change is not just a mere outcome of external inventive processes but are connected to the same entrepreneurial impulses that dictate every other production decision.

The neoclassical framework relies heavily on a static equilibrium framework with a lot of rigid assumptions about rationality and constants. Oftentimes, the idea of profit-maximizing firms utilizing the best possible technology implies that there is a steady store of technology that they can all access at will (and that they will do so). This baseline modelling assumption is clearly not true and ultimately this deterministic view on technology has limited the ability for this framework to examine the origin of technological change with the depth that it needs. Technological change is a dynamic economic process and given its immense impact on economic outcomes, it is extremely important to understand how it is generated and diffused within the greater economic context rather than confining it within the *black box*.

3.2.2 Schumpeterian Thought on Technology

Joseph Schumpeter rejected the rigid static nature of Walrasian equilibrium models and instead argued that capitalism was inherently dynamic and was always on the verge of disequilibrium.⁸⁹ He believed that these divergences from equilibrium were not only externally prompted but were also specifically a result of changes within the system. Schumpeter did not accept the idea of one steady state equilibria to the next and instead

⁸⁹ Rosenberg, *Explor. Black Box*.49.

argued that innovation was the endogenous driving force behind economic change in capitalist economies and that the stationary nature of *perfect equilibrium* and *perfect competition* failed to capture the dynamic nature of innovation and its essential role in the economy.⁹⁰ Innovation is oftentimes referred to as the process of developing new technologies, but Schumpeter specifically defined it as “new combinations of existing or knowledge, resources, equipment or other factors.”⁹¹ In recognizing the limitations of the general equilibrium model and neoclassical assumptions, his ideas offer one of the first dynamic views on technology and technological change. Schumpeter’s two seminal theories in regards to capitalism and innovation are referred to as Mark I and Mark II and deal with entrepreneurs and institutions respectively. The ideas he developed are fundamental to our understanding of the dynamic evolutionary process that is innovation and its mechanisms, and also helped to develop the theories around technological change today.

Schumpeter thought that models that used perfect competition and perfect equilibrium assumptions were too stable to incorporate the disruptive force that was innovation and that if firms acted as price-takers there would be no room for long-run profits (which he believed to be an incentivizing force for innovative activities). For Schumpeter, profits were not a negative sign, but rewards and incentives for innovation which in his theory cannot exist under perfect competition where there are zero profits and no incentives to improve the production process.⁹² Schumpeter believed that

⁹⁰ Ibid.,50.

⁹¹ Joseph Schumpeter, *The Theory of Economic Development* (Cambridge, MA: Harvard University Press, 1911).

⁹² Roberto Simonetti, “Evolutionary Theories of Technological and Economic Change,” in *Microeconomics: Neoclassical and Institutional Perspectives on Economic Behavior* (Boston, MA, 2001), 450–72.

technological competition drove the rise in profit margins and would thus further incentivize companies to keep innovating to reach monopoly profits. He estimated an equitable overall result as the fierce technological competition would eventually eliminate monopoly profits for one firm as other firms would take over (either new firms or more efficient imitators) and the economy would be in a constant state of “creative destruction.”⁹³ The continuous innovation needed to generate profits will constantly be creating new market powers and will be destroying old market powers, and he believed that this process of creative destruction best reflected the dynamic nature of economic development in a capitalist environment.⁹⁴

Schumpeter emphasized the role of entrepreneurs in his earlier works regarding technological change, where they were central to the process of creative destruction. Entrepreneurs were described as risk-taking individuals who planned, managed and organized innovative activities. They were *social deviants* who were willing to make investments into radical ideas, and had the ability to turn them profitable. For Schumpeter who was influenced by Marx, entrepreneurs were the dynamic force behind innovation and were people who were driven to innovate with the hope of gaining *entrepreneurial gross profits*.⁹⁵ It should be clarified before proceeding further that though Schumpeter posits monopoly profits as being an important driver for innovation and notes that perfect competition is not conducive to incentivizing innovation, he does emphasize the role of creative destruction (which is reliant on technological competition). So while monopolies

⁹³ Ibid. 451.

⁹⁴ Hendrik Van den Berg, “Dynamic Models of Technological Change,” in *Economic Growth and Development* (Singapore: World Scientific Co., 2016), 321–71, <https://doi.org/10.1142/9058>.

⁹⁵ Simonetti, “Evolutionary Theories of Technological and Economic Change.” 451.

do form as temporary passing phases in Schumpeter's capitalist model, they are also meant to be destroyed just as quickly by their technological rivals (rather than just price competition rivals).⁹⁶ Schumpeter made a note of how innovation in the same field occurred in clusters and would come in waves (i.e. combinatorial innovation), and he attributed it to demand-side forces influencing entrepreneurs to innovate more in *that direction*. This further tied together the role of innovation within the greater market forces.⁹⁷

Schumpeter also emphasized the importance of stable institutions that are conducive to innovation in order to allow for creative destruction. He spoke regarding the roles of both formal (i.e. governments, policies, regulations, legal frameworks and more) and informal institutions (i.e. norms, customs, culture and more). Entrepreneurs were people who were expected to face resistance from the structures of their institutions but were willing to break free and still innovate.⁹⁸ It is interesting how one of the key defining features for Schumpeter's entrepreneurs are that they are not "rational" and are unpredictable "rule-breakers" which is what makes them the perfect driving forces behind the dynamic innovative processes. However, in Schumpeter's future writings it seemed like he feared that capitalism would self-destruct as "rational" large firms and institutions would replace these entrepreneurs and technological change would become

⁹⁶ Rosenberg, *Explor. Black Box.*, 53.

⁹⁷ Hal R. Varian, Joseph Farrell, and Carl. Shapiro, *The Economics of Information Technology: An Introduction* (Cambridge: Cambridge University Press, 2004), <https://web-b-ebsscohost-com.du.idm.oclc.org/ehost/ebookviewer/ebook?sid=944632c6-9731-4008-b53e-6c257f5089ca%40pdc-v-sessmgr02&vid=0&format=EB>.

⁹⁸ H. H. Liebhafsky, "Institutions and Technology in Economic Progress: Schumpeter's Theory of Economic Development as a Special Case of the Institutional Theory," *The American Journal of Economics and Sociology* (American Journal of Economics and Sociology, Inc., 1960), <https://doi.org/10.2307/3484774>.

predictable and automatized.⁹⁹ While the fall of capitalism is most likely a long time away, what can be understood from Schumpeter is that entrepreneurs are important driving forces behind innovation and that they need to exist within flexible institutions that need to allow them to thrive.

Schumpeter was one of the earliest figures to take a look at technological change as a driving force behind capitalist economies rather than viewing it as a byproduct of economic production. He critiqued neoclassical assumptions of perfect competition, perfect equilibrium and perfect knowledge, and in doing so he developed an economic model that captured the dynamic nature of technological competition. This helped him to better understand and identify the causes and origins behind technological change and innovation. Schumpeter's way of looking at capitalism not only revolutionized the way economists thought about technological change but also the static nature of how economic models were analyzed.

3.3. Theoretical Developments in the Age of Information Technology

Every little advance within information technology is considered a radical innovation and has widespread market impact. Information technology belongs to a unique subset of general purpose technology that has its own interdependent complementary ecosystem that tends to allow for both upstream and downstream process innovations and new product innovations.¹⁰⁰ Information technology employs a high-skilled-labor and capital-intensive form of production, which is not uncommon but it has

⁹⁹ Rosenberg, *Explor. Black Box.*, 55.

¹⁰⁰ Cristiano Antonelli, "The Digital Divide: Understanding the Economics of New Information and Communication Technology in the Global Economy," *Information Economics and Policy* 15, no. 2 (2003): 173–99, [https://doi.org/10.1016/S0167-6245\(02\)00093-8](https://doi.org/10.1016/S0167-6245(02)00093-8).

also been noted to be unskilled labor-saving but maintenance intensive.¹⁰¹ Some industries that utilize information technology are often expected to invest heavily from the beginning but can expect low marginal costs later, they thrive on economies of scale and have to rely heavily on network externalities or network effects. Information technology firms are innovative enterprises that should have to rely on the constant development and utilization of productive resources (i.e. innovation) to gain large market shares and economies of scale.¹⁰²

While most of the theories that apply to any other technology can be applied to information technology in economic analyses (notably economics of generation and diffusion of innovation), due to its wide array of different products and immense influence over the global markets, there are some particular characteristics that become more prominent for information technology firms. It is thus of utmost importance, that any economic research pertaining to information technology firms be sensitive to the specific predicaments of this industry. This section will explore some of the economic theory regarding technological change that are heavily applicable in the study of information technology and will also explore some of the economic concepts that highlight the unique characteristics of this industry that are relevant to the case studies discussed later in this paper.

¹⁰¹ Stephen Machin, A Ryan, and John Van Reenen, "Technology and Changes in Skill Structure: Evidence from an International Panel of Industries," *CEP Discussion Papers* (Centre for Economic Performance, LSE, 1996), <https://ideas.repec.org/p/cep/cepdps/dp0297.html>.

¹⁰² Lazonik, "Innovative Enterprise and the Theory of the Firm."

3.3.1. The Unique Economics of Information Technology

Information technology firms are supposed to be the bastions of innovation in today's world. Given that firms in this industry *should* be reliant on constant innovation for holding their places in the market, it is important to begin this discussion with some of the unique challenges these firms face due to the collective, cumulative and uncertain nature of innovation.¹⁰³ The innovative process is filled with uncertainties, but firms constantly face technological uncertainties in that they could make investments into certain technologies and it could fail. They also face market uncertainties where even if their technology is successfully built, it could fail to accomplish economies of scale. Lastly, they face competitive uncertainties, where even upon accomplishing economies of scale, their competitor could have built a better product and be outselling them at a lower price.¹⁰⁴ This is why most firms in this industry and even the monopolies that form spend most of their time trying to guard against these specific uncertainties by employing various market practices discussed later in this section.

It should be mentioned again that information technology has a very specific cost structure, where there are large upfront fixed costs with sometimes negligible to zero marginal costs of production. This cost structure is similar to that of natural monopolies and oftentimes information technology monopolies are defended on that basis, ignoring the fact that various other investments other than innovation and high upfront capital costs (such as lobbying, marketing, perfecting entry timing and price discrimination) have been utilized to maintain that potentially inefficient monopoly power.¹⁰⁵

¹⁰³ Ibid.

¹⁰⁴ Ibid.

¹⁰⁵ Varian, Farrell, and Shapiro, *The Economics of Information Technology : An Introduction.*, 3.

Information technology firms can also benefit from increasing returns due to supply-side economies of scale because of their low marginal costs (long-run average cost goes down), but they can also benefit from demand-side economies of scale due to network effects. Overall, firms in this industry are highly incentivized to operate at economies of scale and lock-in as many users as they can as fast as possible because of this. This could be seen in how Amazon was not profitable for almost 15 years, but chose to keep low prices just to build up their scale and drive away competitors. Now they can reap the benefit from their low marginal costs and huge user base without the threat of any rival being able to invest as much into the market anytime soon.¹⁰⁶ Information technology firms take advantage of and sometimes misuse certain economic effects that are amplified due to the specific nature of their technology. These are discussed in-depth below.

3.3.1. (a) Network Effects and Increasing Returns

Information technology belongs to a network industry and are thus privy to both direct and indirect network effects. Network effects is the idea that agents gain additional value from adopting a technology that already has more users, and in turn the technology gains more value with the addition of the agent.¹⁰⁷ This is sometimes referred to as demand-side economies of scale since this increases the average revenue as the scale increases.¹⁰⁸ Network effects were previously seen in technologies such as telephones or the fax system, where the value of the product increased significantly as more users adopted the technology. Though, network effects have been seen in the past before, the

¹⁰⁶ Rani Molla and Jason Del Rey, "Amazon's Epic 20-Year Run as a Public Company, Explained in Five Charts," *Vox*, May 15, 2017, <https://www.vox.com/2017/5/15/15610786/amazon-jeff-bezos-public-company-profit-revenue-explained-five-charts>.

¹⁰⁷ Simonetti, "Evolutionary Theories of Technological and Economic Change." 467.

¹⁰⁸ Varian, Farrell, and Shapiro, *The Economics of Information Technology : An Introduction.*, 34.

combination of network effects along with increasing returns amplify a lot of conditions for firms in this industry, most notably their incentives to price discriminate and lock-in users.¹⁰⁹

Given that most firms have high fixed costs and low marginal costs, and that network effects are present, they have the incentive to reach economies of scale as soon as possible to benefit from increasing returns to scale. Sometimes firms will utilize predatory pricing to corner in a large share of the market to maximize the benefit from network effects (and subsequently benefit from supply-side economies of scale). Once the users are *locked-in* to the network, it might be really expensive for the user to leave said network, as they might have to switch a lot of *complementary infrastructure* related to the product. This might make it impossible for an entrant with a competing technology to acquire enough users to ever benefit from network effects as the *switching costs* are too high. Acknowledging that information technology operates at an increasing returns model, allows one to note how *unpredictable* the market outcomes could be. A more inferior product can be the dominant product merely based on timing of entry.¹¹⁰ These types of *inefficiencies* only occur in increasing returns models because in the constant returns model, the previous number of adoptions of a technology would not affect the returns to adoptions, the agent will simply choose their preferred technology.¹¹¹ Under diminishing returns, the agent will only use the technology that is superior since there is a higher opportunity cost to utilizing technology.¹¹² It is important to take into

¹⁰⁹ Ibid., 37.

¹¹⁰ W. Brian Arthur, "Competing Technologies, Increasing Returns, and Lock-In by Historical Events," *The Economic Journal* 99, no. 394 (March 1989): 116, <https://doi.org/10.2307/2234208>.

¹¹¹ Ibid., 122.

¹¹² Ibid., 122.

consideration these factors about the information technology industry to better understand how the firms and consumers will behave in the market.

3.3.1. (b) First Mover Advantages & Spillover Effects

It is important to consider not just the innovation itself but the time at which the technology is adopted by a firm in the market. There are certain advantages and disadvantages associated with being a “first mover.” First movers tend to incur most of the development costs of the new technology while bearing most of the risks regarding its future profitability. However, the first mover can stay ahead of their rivals due to capturing the market early on, developing brand recognition and benefiting from network effects which might make the switching costs for their consumers really high.¹¹³ These advantages could ultimately still be temporary if they do not keep developing their technology or find a way to deter competition.

Almost all technology will undergo diffusion, where it is adopted by others and sometimes even improved (i.e. innovated) upon. Though certain technologies diffuse a lot faster than others, sometimes firms can take measures to inhibit the process through proliferous misuse of intellectual property laws and by setting up other standardization barriers (where they limit the complementary technologies that can be used with their technologies).¹¹⁴ When it comes to the information technology industry, it has been shown in numerous studies how most of their technologies tend to have large spillover

¹¹³ Eric Rasmusen and Young-Ro Yoon, “First versus Second Mover Advantage with Information Assymetry About the Profitability of New Markets,” *The Journal of Industrial Economics* (Wiley, 2012), <https://doi.org/10.2307/23324442>.

¹¹⁴Varian, Farrell, and Shapiro, *The Economics of Information Technology : An Introduction.*, 37.

effects, even if they are delayed sometimes.¹¹⁵ When there are positive spillover effects at both the inter-industry and intra-industry level¹¹⁶ firms often become very careful about early adopters who might become more profitable faster as they did not have to incur any of the early development costs.¹¹⁷ Early adopters are also more likely to make the technology more efficient as they utilize learning-by-doing.¹¹⁸ Firms have to heavily consider whether their first mover advantage (if they are able to build wide network effects early on) outweigh the losses they might incur from potential spillover effects.

These effects are very prominently seen in the information technology industry where many of the largest monopolies today were not pioneers in their fields but were early followers who benefited heavily from adopting and improving upon the technology that was the result of large investments by other firms or even governments. Most notably, the iPhone by Apple Inc., one of the highest selling phones in the world, incorporated technologies such as multitouch screens, global positioning systems (GPS) and other cellular and internet technologies that had been developed by other companies through heavy subsidization by the government or were direct results of government research and development projects.¹¹⁹ Apple is not the only beneficiary of such technologies, Microsoft, Google, Amazon and many others have benefited from others' investments into various technologies. However, it is unfortunate that most of these

¹¹⁵ Ana Rincon, Michela Vecchi, and Francesco Venturini, "ICT as a General Purpose Technology: Spillovers, Absorptive Capacity and Productive Performance," Discussion Paper, 2013, <https://pdfs.semanticscholar.org/559b/35dbeacbe8dc8fedd297cfb723f74974031c.pdf>.

¹¹⁶ Ibid., 24.

¹¹⁷ Simonetti, "Evolutionary Theories of Technological and Economic Change."466.

¹¹⁸ Frederic M. Scherer, *Innovation and Growth : Schumpeterian Perspectives* (Cambridge, MA: MIT Press, 1989).

¹¹⁹ Mariana Mazzucato, "The State Behind the iPhone," in *The Entrepreneurial State : Debunking Public vs. Private Sector Myths* (New York: Public Affairs, 2013), 237.

companies often file hundreds of patents a year on minor technicalities just to limit the spillover effects that they themselves benefitted so greatly from.

3.3.1. (c) Price Discrimination and Bundling

The high fixed costs and low marginal costs, and sometimes the disproportionate market power that comes with it means that firms in this industry have high incentives for price discrimination. Though it is understandable that firms would want to recoup their initial investment, oftentimes consumer surplus is disproportionately lower compared to the exorbitant producer surpluses. They are further able to maximize their profits due to the unique position they have as information technology firms to not only collect monetary compensation for their products but also highly detailed user data, which has been used to design various degrees of price discrimination plans¹²⁰ Amazon has in the past conducted first-degree price discrimination when they charged different prices for the same good to different consumers based on their past purchase activities.¹²¹ These sort of discriminatory behavior allows for firms to target consumers' reservation prices and allows them to extract greater surpluses.¹²²

While one could argue that second-degree price discrimination (where cheaper, lower functionality alternatives are available to those who are willing to pay less e.g. Windows 10 Home, Pro, etc.) and third-degree price discrimination (where segments of population are targeted based on certain attributes (e.g. student discounts, veteran

¹²⁰ Ibid., 13.

¹²¹ Silvia Merler, "Big Data and First-Degree Price Discrimination," Bruegel, 2017, <https://bruegel.org/2017/02/big-data-and-first-degree-price-discrimination/>.

¹²² David Ulph and Nir Vulkan, "Electronic Commerce and Competitive First-Degree Price Discrimination," ESRC Centre for Economic Learning and Social Evolution, 2000, <https://pdfs.semanticscholar.org/3d9d/4b8447cb336bd0cb56e74d70ba6e95be5b32.pdf>.

discounts, etc.) have been used in other industries as well and that more access to information technology is an overall gain for society, the cost at which this comes should also be weighed thoroughly.¹²³ While market research has helped firms in the past build price discrimination plans, the sheer scale and accuracy of data that most information technology firms have today is not comparable. Consumers are more vulnerable to exploitation than ever before and this becomes especially problematic in light of the fact that most information technology firms tend to monetize user data for advertising or third-party sales purposes as well. So, it should be clarified, that price discrimination in itself is not a harmful activity all the time, but the scale at which it is being conducted, the means through which it is conducted, and the consequences of it are being pointed as the issues in this industry.

Similarly, another discriminatory pricing practice that has larger effects within the information technology industry is bundling. Bundling is the process of tying one good to the sale of another. While it may sound counterintuitive for profit margins, it is actually very beneficial for firms under certain circumstances. Bundling tends to disperse a consumer's willingness to pay whereby the firm can take advantage of the consumer's willingness to pay for the tying product to make them pay for the slightly higher price of the bundle as a whole.¹²⁴ Bundles allow for firms to offload unpopular products and recoup the cost for the production and at other times they allow for the sale of two complementary goods, allowing the firms to become more competitive in the market for the tied products. Bundling raises the profit in most cases, but in information technology

¹²³ Varian, Farrell, and Shapiro, *The Economics of Information Technology : An Introduction.*, 17.

¹²⁴ *Ibid.*, 18.

industries, this is even more evident due to the low marginal costs. However, information technology firms use bundling very strategically as means to enter new markets, lock-in new customers into their ecosystem and to further increase the costs that the consumers might face if they try to switch products.¹²⁵ These are some of the specific elements pertinent to information technology industries that exacerbate the impact of certain market abuses.

3.3.2. Big Tech: The Convoluted Economics Behind Rapidly Changing Products

While the previous section provided some insight into some of the economic ideas around information technology, this section will dive into the complications that have arisen in recent times when it comes to applying certain economic theories to firms specifically in what is being termed as the “tech” sector of the information technology industry. This section will primarily explore the complex nature of some of the “Big Tech” monopoly firms based on specific examples relevant to the case studies explored later on and how traditional economic ideas can be limited at times in capturing the intricate realities of this technology.

3.3.2. (a) The Data Economy

Information technology industries are not unique in requiring the collection of copious amounts of data but where they stand out is their ability to process it at an unforeseen speed. Legislators foresaw the need for data protection acts with the advent of these industries, however, the technology accelerated at a much faster rate than any legislative body could keep up, so some gap in oversight was to be expected. What was

¹²⁵ Ibid., 21.

unexpected, however, was the sheer scale of economization of data and how quickly it would go on to change integral facets of this industry and beyond. It should be noted that this is not just a “tech” issue, information technology has facilitated mass data collection inside of other sectors as well, most notably the financial sector. If data were to be incorporated within antitrust analyses, it would have far wider impact beyond information technology industries.

Data is used in the input that designs the technology and to personalize the output that consumers buy, and it can also serve as a commodity to be sold to advertisers for revenue.¹²⁶ Large datasets (often termed as “Big Data” as a gimmick) have endless potential for commercialization not only as means to improve a technology but also simply as something to be sold en masse.¹²⁷ The values of datasets increase with the increase in their size and thus companies that benefit heavily from network effects are more likely to also have more valuable data assets than smaller companies.¹²⁸ This opens up another facet where a firm may benefit from economies of scale and maybe incentivized to accomplish it through predatory means (which a large cumulation of data makes easier, as explained in the previous section). There is evidence in the intrinsic value of data and its ability to gain more market power as firms have been seen attempting to acquire other firms just to acquire their users (and data).¹²⁹

A common argument made against the misuse of data is that it is a non-rival good and that one firm acquiring a certain data point does not diminish another firm’s ability to

¹²⁶ Maureen K Ohlhausen and Alexander P Okuliar, “Competition, Consumer Protection and the Right [Approach] to Privacy,” *Antitrust Law Journal* 80, no. 1 (2015).

¹²⁷ *Ibid.*, 132.

¹²⁸ Maurice E. Stucke and Allen P. Grunes, *Big Data and Competition Policy* (Oxford: Oxford University Press, 2016).

¹²⁹ Khan, “Amazon’s Antitrust Paradox.”

acquire and utilize it.¹³⁰ For the purposes of their example, they acknowledge the time constraints on a user's ability to be on different websites at a time and it potentially hindering data collection ability for a competitor, but they make the argument that any superior website should be able to draw in users and collect data for themselves (even if it has been collected before).¹³¹ This fails to recognize that most information technology firms operate on an increasing returns model and that users are unlikely to use a newer website regardless of quality when there is already a more "established" website with more users. So, data being non-rival is a moot point when it is subject to the same network effects that normal sales are. Another argument against data's value as an asset is its short shelf life.¹³² A lot of the times the arguments against the incorporation of data in antitrust analysis focus on terminology rather than its effect. Though there is no denying that data has temporary value as an asset, if only a few firms are able to collect data continuously due to their size, then new entrants are further disadvantaged as they will never gain enough users to have their datasets be valuable (and the value will erode quickly if the same users not return). Data is a very tricky unit to incorporate into economic analyses, but it seems evident that it has economic value and immense effect on technological competition.

A lot of technology products are often sold at little to no cost to users which makes price analysis of their anticompetitive behavior extremely difficult. Some of the arguments for the integration of data into antitrust analysis focuses heavily on the value

¹³⁰ Joe Kennedy, "The Myth of Data Monopoly: Why Antitrust Concerns About Data Are Overblown," 2017, <http://www2.itif.org/2017-data-competition.pdf>.

¹³¹ *Ibid.*, 7.

¹³² *Ibid.*, 7.

of consumer privacy as a dimension for market power¹³³ or the role of data as tangible economic assets, but while both have merits in acknowledging the ever growing dominance of data within markets, both tend to take on very narrow and limiting definitions which makes it open to pedantic attacks about the nature of data and how it is used rather than *how it is used at a certain scale*. There are ways in which literature on increasing returns and network effects can offer ideas on how to address issues with data and its effects on competition, but there are so many more elements of commercialization of data, much beyond the scope of this paper, that requires economic analysis to better understand the nature of competition today.

3.3.2 (b) Endless Vertical Integration

Vertical integration is the process of merging a “distributor” of a product with the “supplier” whereby both firms benefit via the reduction of transaction costs and have the ability to provide goods at a lower cost (due to no markup from supplier) and become more competitive as a result. As previously discussed in Chapter 2 (pg. 15), the Chicago School thinkers found nothing particularly harmful about this. They argued that as long as it brought about economic efficiency and passed on benefits to the consumers (in the form of low prices), it should be fine to let it continue.¹³⁴ The repercussion for competition was completely ignored, especially the fact that this would limit the number of suppliers available for their rivals and would ultimately force their rivals to raise their prices and potentially exit the market.¹³⁵ While vertical integration can be efficient, it

¹³³ Ohlhausen and Okuliar, “Competition, Consumer Protection and the Right [Approach] to Privacy.”

¹³⁴ Bork, *The Antitrust Paradox*.

¹³⁵ Krattenmaker and Salop, “Anticompetitive Exclusion: Raising Rivals’ Costs To Achieve Power Over.”

needs to be evaluated fairly against its anticompetitive effects as well, which the Post-Chicago thinkers made an effort to recognize.

The problem, however, arises when vertical integration becomes more complex, making it harder to evaluate the extent of the anticompetitive nature of certain integrations. Apple has been one of the biggest companies to incorporate vertical integration in terms of their flagship software and hardware, namely the iOS (mobile operating system) and the macOS (computer operating system) for their phone, tablet and laptop devices.¹³⁶ They avoided scrutiny for the vertical integration of iOS and iPhones in the European Commission even though Google faced charges for setting limitations regarding the devices that their Google Android mobile operating systems can be used in.¹³⁷ The European Commission made the distinction that Google Android was a licensable mobile operating system whereas the Apple iOS was a proprietary mobile operating system made solely for use on the iPhone, which affected their decision (discussed more in Chapter 4, pg. 78). This is still a relatively simple distinction that can be made due to the evident nature of components of the vertical integration, it starts to get more complicated further down the line.

Within the Google Android mobile operating system (for the purposes of this example, within a Google device), there are countless applications that users need to use to utilize the full functionality of their phone. Some primary functional applications that allow calling, messaging, calendars and others are preloaded onto the phone like most

¹³⁶ “Apple,” accessed November 12, 2019, <https://www.apple.com/>.

¹³⁷ European Commission, “Antitrust: Commission Sends Statement of Objections to Google on Android Operating System and Applications – Factsheet,” Press Release, 2016, https://ec.europa.eu/commission/presscorner/detail/en/MEMO_16_1484.

phones, but other applications are downloaded from the Google Playstore. Google Playstore is the Google Android mobile operating system's mobile application store where other developers *and* Google's *own* developers produce applications for all phones operating on Google Android. Some of the applications are up for purchase and most tend to collect data or show advertisement (essentially, there is a financial incentive for getting applications downloaded). Some of these applications have further purchase options inside of them. This is where it starts to get a little more convoluted. Should the Google Playstore be counted as another "retailer" within the Google Android mobile ecosystem? Does Google have an unfair advantage within this system given the fact that they are then second stage vertical integrators? Can they abuse their market dominance at the previous market level especially when their store of data on consumers and rivals are taken into account? Should the applications themselves be considered another stage of integration given that small bundle offers are marketed on those miniscule monopolies? To give an example, Google Drive is an application within the Google Playstore which exists in the Google Android mobile operating system in Google Phones, but they also sell storage upgrades at specific monthly rates within the Google servers. Amazon and Microsoft both sell similar storage spaces on their own platforms, so they could argue that they are competing with each other under rates for application-based storage services rather than being uncompetitive within one application. However, a counter-argument can be made that someone using Google Drive is already so invested into the Google application ecosystem that they might face high switching costs for using anything else, so they might be trapped into the set of prices Google sets for storage inside of the

application without the option of having to purchase additional storage from competitors for their files.

One could define the relevant markets to evaluate anticompetitive behavior based on the extent of harm done to consumer welfare, but it ultimately seems like one has to rely on subjective judgement. Though economic theory has noted anticompetitive effects of vertical integration across different markets,¹³⁸ for the most part it seems like it did not foresee a future where markets would scale down to such miniscule factions and explore the potential negative repercussions of that. Hopefully, as time passes legislative institutions will become more sensitive to these details and will recognize the extent of control that some of these conglomerates have.

3.4. The Importance of Regulating Competition in Big Tech

“Big Tech” notably refers to a few large companies within the tech sector which belong within the greater information technology industry. Though over the last 40 years, countless tech companies have entered and exited the market, a couple of names continue to dominate the markets despite the ebbs and flows. It is an umbrella term for a few firms who seem to each specialize in a few distinct technologies, but share similar economic characteristics in the greater tech sphere. Apple, Samsung, Microsoft, Alphabet (Google’s parent company), Intel and Facebook are a few such companies.¹³⁹ Most of these firms have the dominant market shares in a lot of the markets that they are participating in; they are also vertically and horizontally integrated across various markets, and their specific

¹³⁸ Khan, “Amazon’s Antitrust Paradox.”

¹³⁹ Jonathan Ponciano, “The Largest Technology Companies In 2019: Apple Reigns As Smartphones Slip And Cloud Services Thrive,” *Forbes*, May 2019, <https://www.forbes.com/sites/jonathanponciano/2019/05/15/worlds-largest-tech-companies-2019/>.

technology encourages them to pursue economies of scale over profit-margins even if it means utilizing unique anticompetitive methods (which their technology conglomerates can facilitate).¹⁴⁰

As discussed earlier, the common consensus within the United States (which has immense global influence), tends to lean on the side of these companies. There is obviously the “American rhetoric” of not wanting to punish the winners of competition, which added with the heavy influence of Chicago School and their “consumer welfare” argument led to a dilution of anti-monopoly arguments in the stateside. Though the Europeans maintained a stronger stance against monopolies, they still showed legislative hesitation thinking about the potential impact of regulations on innovative activity.¹⁴¹ Though there is no doubt that these are important considerations that any government institution should be debating before enforcing any antitrust legislation, it is also becoming imminent that they do this soon given the rate at which these companies are growing not just in size but also in global influence. Both Chicago School with its strict ideas around competition and general neoclassical thought around technology fail to encapsulate the nature of these big technology monopolies. To fully realize the extent of exploitation and harm that these companies are capable of undertaking, one must take on a more nuanced look at the technology to recognize how at a certain scale they are made prime for predatory behavior.

¹⁴⁰ Khan, “Amazon’s Antitrust Paradox.”

¹⁴¹ European Commission, “Antitrust: Commission Takes Further Steps in Investigations Alleging Google’s Comparison Shopping and Advertising-Related Practices Breach EU Rules,” Press Release, 2016, https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2532.

A lot of the proponents against regulations in technology will ironically default to Schumpeter and his idea of monopoly profits as incentives for innovation; arguing that regulations would inhibit innovation.¹⁴² They argue against the social costs of breaking down these companies, justify their behavior based on their contribution to the economy and suggest that their continued research and development investments and patents are proof of the existence of competition.¹⁴³ It seems as though these specific critics of increased antitrust legislation hope to take on a more dynamic look at technology as Schumpeter did and argue that Microsoft and Google are merely temporary monopoly profit winners who will be replaced by the next best technology to come.¹⁴⁴ This idea of technological competition that Schumpeter proposes, while much more dynamic than its earlier neoclassical counterparts, simply does not exist in its perfect form any more than perfect price competition exists in the real world. In the real world, these technology giants exist across multiple platforms and they benefit from an unparalleled scale that no new entrant can compete with, and while certain individual products of theirs will fail from time to time, they have the ability (both technologically and economically) to sustain themselves much longer than any new entrant in any potential market. Tech monopolies also spend a large portion of their profits in predatory value extraction through stock buy backs instead of innovative practices.¹⁴⁵ It has been made apparent time and time again that it is the government and not these tech monopolies that are the

¹⁴² James Pethokoukis, "A Schumpeterian Look at Monopoly and Big Business |," American Enterprise Institute, 2018, <https://www.aei.org/economics/a-schumpeterian-look-at-monopoly-and-big-business/>.

¹⁴³ Jason Bourne, "Is This Time Different? Schumpeter, the Tech Giants, and Monopoly Fatalism," Cato Institute, 2019, <https://www.cato.org/publications/policy-analysis/time-different-schumpeter-tech-giants-monopoly-fatalism>.

¹⁴⁴ Ibid.

¹⁴⁵ Lazonik, "Innovative Enterprise and the Theory of the Firm."

biggest spenders in initial radical innovative activities, so it is a weak argument to suggest that monopolies should be protected for their contributions to research and development given how little they prioritize it.¹⁴⁶

A lot of the times, Nokia, Kodak, Myspace and other companies are shown as examples of the creative destruction process.¹⁴⁷ What this always fails to account for is that none of these companies reached the level of horizontal and vertical integration across multiple markets as today's tech monopolies, especially not with the same level of global market dominance. They were also hit with a lot of the pitfalls of being first movers or having their technologies become obsolete. Schumpeter is right about the fact that firms will keep innovating to pursue monopoly profits, which explains why firms like Google, Amazon, Facebook and others continue to invest into research and development. However, they maintain their monopoly power through a variety of factors other than innovation which is why leaving it to market forces to break apart monopolies might not lead to desirable results. These can range from predatory pricing, tying of products to the setting up of artificial barriers and others that have been discussed in details in the previous sections. All of these have behavior have anticompetitive effects and these firms are in uniquely large positions to have an even bigger negative repercussion on the market as a whole.

The "Big Tech" firms tend to prioritize their scale over their short-run profit margin, which often means they are incentivized to conduct themselves in manners that prioritize growing in size and becoming a monopoly rather than focus on the competitive

¹⁴⁶ Mazzucato, "The State Behind the iPhone."

¹⁴⁷ Bourne, "Is This Time Different? Schumpeter, the Tech Giants, and Monopoly Fatalism."

outcome, be it price or technology. This not only hinders the entrance of new and better technology into the markets, but also makes consumers vulnerable to exploitation by a few limited firms. While there is a level of benefit that consumers derive from these firms, their size and influence can become problematic as it broaches into social and political spheres. Though it would be naive to assume that a real world model for perfect competition can exist, legislative institutions can at least strive to prevent consumers from being exploited by monopolies and ensure that there is an environment for healthy levels of competition to thrive in the technological sector.

3.5. Conclusion

As outlined in this chapter, information technology firms operate under unique conditions which not only differentiate their incentives as firms but also how they operate once they achieve monopoly status. Information technology firms require high initial investments and see high fixed costs but negligible marginal costs. The combination of increasing returns with economies of scale added with the race to achieve network effects mean that oftentimes, these firms aim to incentivize growing a user base before growing profits, so their anticompetitive behavior often pertains to preventing other firms from gaining users. Innovation is not always the determinant of who holds the dominant position in the market, but a variety of factors in regards to who moved first, intellectual property rights, the degree of spillovers can also affect this. There is also the fact that the technology itself facilitates price discrimination, tying and other tacit behavior often concealed under efficient coding.

While the general themes are similar to previously known economic concepts present individually in other industries, it is evident that these conditions are exacerbated

within the information technology industry to the point where antitrust analyses are missing acts of abuses by monopolies here due to the failure to incorporate the nuances in their technology. It gets even more complex when it comes to topics where the literature is not as developed yet, such as the economic value of data or the presence of multilevel markets within technologies which have immense implications for antitrust analysis.

Chapter 4: CASE STUDIES

4.1. Introduction

After the in-depth look at how antitrust laws are implemented in two of the world's leading legislative bodies (at least those with the ability to enact most global impact on competition for now) and how information technology firms are uniquely positioned when it comes to antitrust analysis, it is vital to evaluate this information against case studies in this field. For the purposes of this paper, two of the most important cases across both continents pertaining to two of the biggest monopolies in this industry have been chosen as a part of this evaluation, namely the Microsoft case of the 1980s in the United States and the Google case of the 2010s in the European Union. While the chapter does briefly explore equivalent cases (if there are any) in the United States and European Union for the two monopolies to pinpoint the contrast, it however focuses primarily on the landmark cases as the basis for exploring how information technology has evolved in the last 30 years, how antitrust analysis has evolved in this time frame and if and what considerations they need to consider for future evaluations in this industry.

Microsoft and Google were chosen for this case study due to the level of market dominance they held at the time of the antitrust allegations brought against them, the similar manners in which they exhibited the incentives for conducting information

technology facilitated abuses and lastly, the ways in which both legislative bodies missed their abuses due to a greater lack of understanding of the nature of this technology. The case studies in this chapter will elaborate on the technical details of the antitrust allegations which will help to contextualize the issues explored in the previous chapter. Due to the limited paperwork available for some of the European Commission case files for Google at the time of writing this paper, this case study chose not to contrast the specific economic tests used in the antitrust analysis, focusing instead on the technology-specific details of the analysis which is more imperative to the analysis presented in the next chapter. Despite the 30 years between the two cases and rapid change of technology in between, there have been similar trends displayed in both cases which allow a relatively conclusive argument to be drawn in regards to the implementation of antitrust legislation in this industry and also allows one to infer what antitrust bodies should be considerate of in its future analyses of this industry.

4.2. Microsoft Case Details

Though not the first of its kind, the Microsoft case was one of the most defining antitrust cases in the technology industry, partly because of the notoriety of its founder Bill Gates but mostly due to the sheer scale at which it was monopolizing the industry. When the case was brought forth to the courts in 1998, it forced the lawmakers and economists at the time to reevaluate the manners in which they evaluated product markets and the products themselves. It highlighted the inadequacies and the limitations of the current set of antitrust laws and the measures of market concentration and set the stage for antitrust cases in the technology sector for the future. The case also led to widespread public debate about monopolies, government regulations and whether it was hindering

progress and innovation. Thus, it is of utmost importance to examine the details of this case –an antitrust case set right at the beginning of the mass global consumption of tech products, which necessitated antitrust laws to evolve and led to a greater societal examination into how influential monopolies in this sector could affect the rapidly globalizing world. This case has been the center of scholarly debates long since it took place almost 30 years ago, yet conversations still continue regarding the many merits and demerits of the case and how it shaped the environment for antitrust cases today. In this section, the specific details of the infamous 1998 Microsoft case will be discussed. This will then be further analyzed in the economic context for the next chapter.

4.2.1. Setting

In the mid-1970s, personal computers had not taken its place in American and global households the same way that it would merely a decade later. This is in part due to the costs but mostly it was because of the level of expertise needed to operate a computer operating system (requiring clunky text-based commands to operate and perform tasks on).¹⁴⁸ Simply put, the operating system of a computer is the software that manages and connects the hardware of the computer and all the other software applications that are run on it¹⁴⁹. It is the most integral software for computers and in the 1980s, this was mostly a text-based command-driven setup and Microsoft’s MS-DOS was the industry standard. Though not the only ones in the industry (notably Steve Jobs and Steve Wozniak’s Macintosh), Microsoft would go onto develop Windows which would provide a graphical

¹⁴⁸ Michael Kanellos, “PCs: More than 1 Billion Served - CNET,” *C|Net*, March 2009, <https://www.cnet.com/news/pcs-more-than-1-billion-served/>.

¹⁴⁹ GCF Global, “Computer Basics: Understanding Operating Systems,” LearnFree.Org, accessed July 6, 2019, <https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/>.

interface to the operating system, simplifying the use of computers and propelling personal computer sales to the mass global dominance that it has today.¹⁵⁰

Microsoft Windows was not only an operating system (the definition of which becomes heavily contentious to the case) but was also the software environment for which Microsoft and others started developing many Microsoft Windows compatible user software applications including but not limited to word processors, spreadsheet tools, drawing tools, calculators, games, and many others. This further popularized Microsoft's operating system as the number of complementary goods (i.e. computer applications that consumers use) that were functional with Windows kept increasing, which led to Microsoft holding over 95% of the market share in the operating system used by the 1990s.¹⁵¹ The 1990s also marked the advent of the mainstream use of the internet requiring computer users to install internet browsers and at the time the top name in the industry was Netscape Navigator occupying 70% of the market share.¹⁵² This was the case until Microsoft prepackaged an integrated web browser with its operating system called the Internet Explorer, adding yet another application to the catalog of applications usable on Microsoft Windows OS.

It is only evident that consumers would want to buy the operating system that has the most applications available and that developers would produce applications for the operating system with the largest consumer base – a simple case of *network effects*,

¹⁵⁰ William H. (William Hepburn) Page and John E. Lopatka, *The Microsoft Case : Antitrust, High Technology, and Consumer Welfare* (Chicago: University of Chicago Press, 2007).

¹⁵¹ “U.S. VERSUS MICROSOFT: Setback for a Software Giant: Key Sections of Judge’s Findings of Fact,” *The New York Times*, November 7, 1999, <https://www.nytimes.com/1999/11/07/us/us-versus-microsoft-part-1-7-setback-for-software-giant-key-sections-judge-s.html>.

¹⁵² Victor Luckerson, “‘Crush Them’: An Oral History of the Lawsuit That Upended Silicon Valley - The Ringer,” *The Ringer*, May 2018, <https://www.theringer.com/tech/2018/5/18/17362452/microsoft-antitrust-lawsuit-netscape-internet-explorer-20-years>.

innovation and first-mover advantage (discussed in-depth in Chapter 3). *Except*, that was not the case. While Microsoft's innovative success played a significant role in their rapid growth, behind the scenes, the story had a lot less to do with just an entrepreneurial spirit and a lot more to do with predatory pricing and a show of intense anti-competitive behavior. The Federal Trade Commission began investigating the popular tech giant in the early 1990s and it all culminated in the era-defining Court antitrust case that would go on to set the precedent for competition in the tech sector in America for decades to come.

4.2.2. Case Allegations

The allegations brought forth against Microsoft by the U.S. Department of Justice, the Attorney General of 20 States and the District of Columbia are noted below:¹⁵³

- (1) Microsoft was in violation of §2 of the Sherman Antitrust Act for illegally possessing monopoly power for operating systems (OS) in the market for Intel-based personal computers (PC).
- (2) Microsoft was in violation of §2 of the Sherman Antitrust Act for forming exclusionary contracts with original equipment managers (OEMs) and internet service providers (ISPs) and partaking in anticompetitive behavior to maintain their monopoly power.
- (3) Microsoft was in violation of §2 of the Sherman Antitrust Act for attempting to monopolize the market for internet browsers, namely with their product Internet Explorer by using illegal exclusionary tactics.

¹⁵³ Nicholas Economides, "The Microsoft Antitrust Case," *NYU Center for Law and Business* 1, no. 3 (April 2, 2001), <https://doi.org/10.2139/ssrn.253083>.

(4) Microsoft was in violation of §1 of the Sherman Antitrust Act for bundling Microsoft Internet Explorer with its Microsoft Windows operating system. The details of each allegation are further discussed in each subsequent section. For reference to the Sherman Act, please refer to Chapter 2, page 9.

4.2.3. Explanation of Charges

(1) Microsoft was in violation of §2 of the Sherman Antitrust Act for illegally possessing monopoly power for operating systems (OS) in the market for Intel-based personal computers (PC).

For the purposes of this antitrust case, the DOJ defined the relevant market for operating systems to be limited to Intel-based personal computers (the dominantly sold computers at the time). It was also noted that the operating system software was a market good that had a high initial fixed cost but negligible marginal costs and that this could in part play into the low prices that they maintained. It was thus up to the courts to determine whether there were significant barriers to entry and if Microsoft was playing a role in artificially enhancing those to maintain its monopoly market shares. One of the primary barriers to entry noted for any competitors in the operating systems market was the availability of the number of compatible software applications and they termed it the “applications barriers to entry.” Any other operating system entering the market would not be a viable competitor if they did not have a similarly competitive software applications catalog.

The Java programming platform developed by Sun Corp. used by many software developers at the time allowed developers to build multi-platform applications that could run on any operating systems. Microsoft specifically built a Windows-only iteration of

Java and distributed it to software developers in order to make sure that the applications that they built would be exclusive to their operating system. Given that developers were already incentivized to create applications for the operating system with the largest market share, this further limited the number of applications available on other operating systems even if they were to come up.¹⁵⁴ Microsoft's actions were, in particular, noted to artificially and illegally maintain its monopoly power and protect itself against the competition arising with the rise of Netscape Navigator web browsers which could be run on multiple operating systems and could itself run many applications.

(2) Microsoft was in violation of §2 of the Sherman Antitrust Act for forming exclusionary contracts with original equipment managers(OEMs) and internet service providers (ISPs) and partaking in anticompetitive behavior to maintain their monopoly power.

Microsoft formed exclusionary contracts with Original Equipment Managers (OEMs) and also coded in certain elements into their operating system to monopolize the market for their Internet Browser, Internet Explorer. First, they took measures to ensure that if Netscape Navigator was pre-installed into their Windows OS, it would cause system issues or be confusing to find. Second, they refused to license Windows 95 to OEMs without Internet Explorer pre-packaged into it and also made it so that they could not uninstall it. Both of these actions significantly hurt Netscape's market shares as OEMs could not install alternative browsers for users. Last, Microsoft used a variety of incentives and threats to make sure that prominent OEMs would favor their web browsers

¹⁵⁴ US Department of Justice, U.S. V. Microsoft Corporation (1998).

over Netscape's regardless of the merits of the products. They did so by placing Windows license restrictions with threats of litigation, where they barred them from removing Internet Explorer from the Desktop and Menu Items, making any changes to the boot sequence, or allowing any competing software applications to be placed on the Desktop.¹⁵⁵ Microsoft also had contracts with Internet Service Providers (ISPs) whereby they were given referral fees for providing free copies of Internet Explorer to be given to users when they set up internet access in their homes. This further hurt Netscape Navigator's market shares as they were charging \$20 for their browser at the time. Microsoft was pursuing an artificial monopoly by predatory pricing in this "browser war" despite not earning any revenue from it, only being able to do due to its monopoly power in the operating systems market.¹⁵⁶

(3) Microsoft was in violation of §2 of the Sherman Antitrust Act for attempting to monopolize the market for internet browsers, namely with their product Internet Explorer by using illegal exclusionary tactics.

Microsoft not only provided Internet Access Providers (IAPs) with free copies of Internet Explorer to distribute but also made outright payments and granted rebates to top IAPs to bundle their client software with Internet Explorer and *upgrade* their existing customers with Internet Explorer as well. Microsoft Windows had an Online Services Folder which they used as a referral server for IAPs, so they threatened that if any of the IAPs increased their orders of Netscape Navigator, then they would no longer be on the list of referrals¹⁵⁷. This sort of aggressive exclusionary anticompetitive behavior went on

¹⁵⁵ Page and Lopatka, *The Microsoft Case : Antitrust, High Technology, and Consumer Welfare*.

¹⁵⁶ Ibid.

¹⁵⁷ US Department of Justice, *U.S. V. Microsoft Corporation*, 98–1233.

to further hurt Netscape's market shares and establish the artificial dominance of a more inferior product.

(4) Microsoft was in violation of §1 of the Sherman Antitrust Act for bundling Microsoft Internet Explorer with its Microsoft Windows operating system.

Microsoft already had a monopoly in the operating systems market and for the purposes of this particular charge, web browsers were considered a separate market. This bundling (beneficial or not) negatively affected competitors in the secondary market (i.e. Netscape Navigator) and consumers were forced to accept this bundle without a choice.¹⁵⁸ Microsoft also prevented OEMs from uninstalling this from the bundle by removing Internet Explorer from the Add/Remove Program Utilities and coded in difficulties in setting another web browser as the default browser. They made it virtually impossible to unbundle Windows OS from Internet Explorer.

4.2.4. Microsoft's Defense

Microsoft defended their case by making the argument that because of a previous Court of Appeals decision from 1998¹⁵⁹ they were legally entitled to add new features to their Windows OS and were thus not in any violation of the law by integrating and bundling Internet Explorer to the operating systems that they were selling. They also argued that their actions against Netscape were merely competitive in nature and not exclusionary by any means.¹⁶⁰ The courts did not accept Microsoft's justification given

¹⁵⁸ Page and Lopatka, *The Microsoft Case : Antitrust, High Technology, and Consumer Welfare*.

¹⁵⁹ Economides, "The Microsoft Antitrust Case."

¹⁶⁰ Ibid.

that they were using their monopoly power to hurt their competition's market shares with predatory pricing and because their action did not further competition based on merits.¹⁶¹

Their defense made a case that Microsoft did *not* hold monopoly power in the operating systems market, and it was thus impossible for them to use their monopoly position in the operating systems market to illegally affect the outcomes of the web browsers market. Microsoft made the argument that the technology industry was too fast paced for any company to hold on to a monopoly and that the competition was too ruthless for Microsoft to be considered one. This Schumpeterian *creative destruction* notion of innovation and competition was put forth but not defended well by their economic witnesses.¹⁶² Microsoft could not make a strong enough case to justify that they were not a monopoly and the court ultimately noted that they were a monopoly given that they could raise their prices significantly above competition level for a long enough time without losing market shares to any new market entrants (i.e. SSNIP test). The court also did not accept the excuses of innovative patterns in the technological industry or their efforts to keep low prices as sufficient explanations to their defense that they were not a monopoly.¹⁶³

Microsoft's defense argument was built on the idea that their role as innovators providing low prices (and free products in some cases) led to consumer welfare and that this was made possible due to their large market share, and that they should not be persecuted for it.¹⁶⁴ Their defense argument leaned heavily on the Chicago School of

¹⁶¹ US Department of Justice, U.S. V. Microsoft Corporation, 98–1233.

¹⁶² Economides, "The Microsoft Antitrust Case."

¹⁶³ US Department of Justice, U.S. V. Microsoft Corporation, 98–1233.

¹⁶⁴ Economides, "The Microsoft Antitrust Case."

Antitrust Laws in valuing consumer welfare over competition (discussed thoroughly in Chapter 2, pg. 15). They reiterated this point in their defense against the bundling allegation suggesting that the Windows OS and Internet Explorer were being sold to a single market and that this should not constitute bundling as they were simply making *improvements* to their previous product. Despite the precedent set by the Court of Appeals, the sitting Judge decided that the *character of demand* for both the products were different and they were ultimately not in the same market since consumer perception of products need to be considered when evaluating the markets for goods (for more on relevant market measurements, see discussion on Appendix 1).

4.2.5. Ruling

The Courts ultimately found Microsoft in violation of §2 of the Sherman Act by possessing a monopoly power in the market for operating systems on Intel-based personal computers and engaging in illegal exclusionary behavior by imposing license restrictions on OEMs thus setting up evident barriers to entry for their competitors. They were also found in violation of this for designing elements in their Windows OS which would make it impossible to remove Internet Explorer from the system. They were found in violation of §2 of the Sherman Act for their illicit behavior in regards to building a Microsoft-only Java code and tricking developers into using the code to ensure that developers only built applications for Windows OS instead of building multi-platform applications which hindered competition in the operating systems market.¹⁶⁵

¹⁶⁵ Page and Lopatka, *The Microsoft Case : Antitrust, High Technology, and Consumer Welfare*.

Microsoft was found in violation of all the charges alleged initially but the decision was appealed and ultimately a lot of the charges were reversed, namely: for building an incompatible Java Virtual Machine, for distributing Internet Explorer for free and providing paid incentives to IAPs to upgrade existing customers to Internet Explorer, and for tying Internet Explorer to Windows OS.¹⁶⁶ At the end of the appeals, Microsoft was not found in violation of §1 of the Sherman Act.

In 2001, Microsoft and the DOJ reached a settlement whereby both parties agreed that Microsoft would share its Application Programming Interface with competitive programs, that they would not retaliate against any OEMs and ISVs that helped promote any competitors and that they would have to allow an impartial expert panel to look over their internal proceedings to make sure that they were following through with court orders¹⁶⁷. This settlement was highly controversial and the subject of many debates as the consequences seemed very mild compared to what a lot of people thought was a blatant show of anticompetitive behavior.

4.2.6. European Commission vs. Microsoft

In 1998, Sun Microsystems Inc. brought forth charges against Microsoft alleging that Microsoft was withholding the use of certain interoperability functions that inhibited Sun's abilities to compete as a work group server operating system supplier.¹⁶⁸ This ultimately led the European Commission to begin its investigation into Microsoft in

¹⁶⁶ Ibid.

¹⁶⁷ US Department of Justice, *United States v. Microsoft Corporation: Final Judgement* (2002).

¹⁶⁸ European Commission, "Commission of the European Communities v. Microsoft Corporation" (Brussels, 2004), https://www.tjsl.edu/slomansonb/Microsoft_EC.pdf.

2000¹⁶⁹ due to the inoperability of Windows OS to run software applications from other manufacturers and also their tying of Windows Media Player to its Windows OS.

Microsoft was facing allegations for violating two treaties that guard against anticompetitive behavior undertaken by companies holding dominant positions in the market, Article 82 (now Article 102) and Article 54¹⁷⁰ (noted in Appendix 4). After requesting access to Microsoft's non-confidential documents, the European Commission proceeded with the investigation for two years upon which they decided to run an extensive market enquiry in 2003.

The European Commission's documents very strictly defined the three relevant product markets significant to this case, notably the operating systems market, the work group server operating systems market and the streaming media player market. The market inquiry found that while the first two relevant markets did not have significant substitutes available. Microsoft tried to claim that media players were merely additions to operating systems and should be viewed as one product market but due to the availability of standalone media player substitutes, their defense was not accepted.¹⁷¹ Given the global reach of Microsoft, the European Commission decided to consider the whole world as the relevant geographic market.¹⁷²

They noted that Microsoft had an exceptionally large market share (standing at over 90% at the time of the case)¹⁷³ and due to the self-reinforcing nature of the number

¹⁶⁹ Free Software Foundation Europe, "European Commission vs Microsoft: Chronology of the Case," accessed July 8, 2019, <https://fsfe.org/activities/ms-vs-eu/timeline.en.html>.

¹⁷⁰ European Commission, "Commission of the European Communities v. Microsoft Corporation."

¹⁷¹ *Ibid.*, 7.

¹⁷² *Ibid.*, 7.

¹⁷³ *Ibid.*, 8.

of applications available and the number of users, it was highly unlikely that their competitive edge was likely to end soon, setting up high barriers to entry for the operating systems market with an ever-growing monopoly. They also held nearly 50-75% of the market share in the work group server operating systems market based on a couple of different measures of market shares¹⁷⁴ and their closest competitors Netware and Linux barely occupied 6.75%¹⁷⁵ of the market. So, while Microsoft's position as a dominant firm in itself was not an issue for the purposes of the investigation, their actions to inhibit competition was a violation of Article 82. The European Commission noted that Microsoft was at full liberty to supply their interoperability information to the companies that it chose to but further analysis of the case showed that their action was specifically undertaken to hurt Java's entry into the market and ended up hurting consumer welfare (Microsoft argued vehemently against this point).¹⁷⁶ Regardless of welfare, the European Commission ultimately decided that Microsoft was diminishing consumer choices and inhibiting innovation and competition and were ultimately charged in violation under Article 82.¹⁷⁷

As for the tying of the Windows Media Player to Windows OS allegation, the market inquiry proved that the character of demand for both the goods were inherently different and that the availability of substitutes in the market for the product proved that they were a separate relevant market (especially given that Microsoft itself marketed a version of Windows Media Player for Apple's operating system). They clearly had a

¹⁷⁴ Ibid., 9.

¹⁷⁵ E. Coulon, *Microsoft v Commission: Judgement of the Court of First Instance (Grand Chamber)* (2007).

¹⁷⁶ European Commission, "Commission of the European Communities v. Microsoft Corporation."

¹⁷⁷ Ibid., 16.

dominant market share in the operating systems market and thus tying their media player (without the option to receive the dominant product without the tied product) to their Windows OS was in violation of Article 82 since it hinders competition in the market for streaming media players.

At the conclusion of this case in 2004, Microsoft was charged and then fined EUR 497.2 million with the order to disclose their interoperability functions and to provide versions of Windows that are not bundled with Windows Media Player. They also set up a monitoring board to ensure that Microsoft complied with the decisions put forward by the court. Microsoft then tried to appeal the fines under a merit case which were ultimately rejected in 2008 and they were fined an additional EUR 899 million for not complying with the earlier decision, this was ultimately reduced to EUR 860 million in 2012.¹⁷⁸

4.3. Google Case Details

The most visited site on the internet¹⁷⁹, Google has become not only a global staple for web users, but its popularity has reached heights to carve itself a spot in everyday lexicon. It has come far from its origins as the small Stanford student search engine project built by its founders Larry Page and Sergey Brin in 1995¹⁸⁰ to the massive corporate powerhouse sprawling multiple technological fields such as online advertising, cellular technology, global positioning system (GPS), gaming, cloud services, artificial

¹⁷⁸ Free Software Foundation Europe, "European Commission vs Microsoft: Chronology of the Case."

¹⁷⁹ "Google.Com: Competitive Analysis, Marketing Mix and Traffic," Alexa, accessed July 12, 2019, <https://www.alexainfo.com/siteinfo/google.com>.

¹⁸⁰ "How We Started and Where We Are Today," Google, accessed July 12, 2019, <https://about.google/our-story/>.

intelligence and more (eventually coming under the umbrella of the conglomerate of Alphabet Inc.).

Being one of the biggest names in technology, if not *the biggest* it certainly drew attention to how they might have been using their industry position to manipulate their ventures in other markets. Though the Federal Trade Commission led some small investigations into Google's anticompetitive behavior, not much progressed in this side of the pond.¹⁸¹ The European Union, on the other hand, tackled this case intensely which led to the biggest technology sector antitrust investigation of the decade against a behemoth of a company. Taking place almost two decades after the infamous Microsoft case, the Google antitrust proceedings are highly significant to the understanding of the role of antitrust laws in the constantly evolving technology sector and how important it is for the laws and theories that regulate technology to be as dynamic as the sector is.

4.3.1 Setting

Over the years, Google has been the subject of multiple antitrust investigations in the European Union, but for the purposes of this paper the three largest antitrust cases are being considered. Due to the nature of how antitrust investigations begin in the European Union, the cases were initially brought forth by various companies facing the brunt of their anticompetitive behavior, but soon more companies joined in on the litigation process. The first case investigated was in regards to Google Shopping in 2010¹⁸² for using their dominant position in the search service providers market (i.e. Google Search)

¹⁸¹ Tony Romm, "The Justice Department Is Preparing a Potential Antitrust Investigation of Google," *The Washington Post*, May 31, 2019, <https://www.washingtonpost.com/technology/2019/06/01/justice-department-is-preparing-potential-antitrust-investigation-google/?noredirect=on>.

¹⁸² European Commission, Google (Shopping) Opening of Proceedings (2010).

to preferentially advertise their own services (i.e. Google Shopping) over their competitors. This led them to examine Google for imposing license restrictions on companies advertising on their platform (named Google AdSense) which affected their ability to advertise ads from competing advertising platforms (notably Microsoft's Bing or Yahoo's Yahoo! Search),¹⁸³ leading to the second big antitrust investigation regarding Google AdSense, which is an advertisement plug-in that different websites can use to display search ads on their own website.¹⁸⁴ The exclusive supply obligations further strengthened the stronghold that Google had in the online advertising market (accounting for almost 70% of the market share at the time of the case).¹⁸⁵ The last and the biggest of the antitrust charges brought forth against Google was against their illegal anti-competitive tactics with the proliferation of its Android platform in 2015.¹⁸⁶ Google was investigated for tying its Android mobile operating system (for which it had an 80% dominant market share¹⁸⁷) to its Google Search application and also its Google Chrome Web Browser. They were also investigated for making illegal payments to device manufacturers for exclusively installing Google Search application on their devices and for obstructing the development of competing Android operating systems.¹⁸⁸

For almost ten years, Google grew at an unprecedented rate globally without any regulatory checks, and while innovation and their contribution to it must be celebrated, it is also important to examine how even two decades after the Microsoft case, technology

¹⁸³ Ibid.

¹⁸⁴ European Commission, "Antitrust: Google Fined €1.49 Billion for Online Advertising Abuse," Press Release, 2019, https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1770.

¹⁸⁵ Ibid.

¹⁸⁶ European Commission, "Antitrust: Commission Fines Google €4.34 Billion for Abuse of Dominance Regarding Android Devices," Press Release, 2018, https://ec.europa.eu/commission/presscorner/detail/en/IP_18_4581.

¹⁸⁷ Ibid.

¹⁸⁸ Ibid.

companies continue to believe that they can out-innovate the laws set in place that helped companies like them to arise in the first place. Technology has come a long way since 1998 and will continue to evolve further and further as market definitions get even blurrier, this is why it is fundamentally important to examine the three antitrust cases against one of the biggest consumer-facing technology conglomerates existing today. It is not merely a guideline in what to do to ensure that competition continues to exist in a field that demands it, but a retrospective in how it needs to evolve with time.

4.3.2. Case Allegations

- (1) In the 2010 European Commission investigation which concluded in 2017, Google was alleged to be in infringement of Article 102 of the TFEU and Article 54 of the EEA Agreement (noted in Appendix 4) for preferential advertising of their Google Shopping services compared to their competitors on their search services which hold a dominant market share.¹⁸⁹
- (2) Though initially a part of the broader investigation from 2010, in 2016, the European Commission accused Google for having protected its dominant position in the online advertising market (for its product Google AdSense) through exclusionary market tactics. Their anti-competitive behavior and abuse of dominant market position was in violation of Article 102 of the TFEU and Article 54 of the EEA Agreement.¹⁹⁰

¹⁸⁹ European Commission, Summary of Commission decision: Google Search (Shopping) (2017).

¹⁹⁰ European Commission, Google (AdSense): Initiation of Proceedings (2016).

(3) In 2015, the European Commission began its third investigation into Google whereby they were alleging that Google was in violation of both Article 101 and Article 102 of the TFEU (noted in Appendix 4) for their conduct in regards to their Android operating system, especially in terms of the tying of the Google Search application and Google Chrome application to the Android mobile operating system. They were also under investigation for hindering the development and market access for competing mobile and tablet operating systems.

4.3.3. Explanation of Charges

(1) Google Shopping

It is important to understand the nature of online search services like Google Search which helps index and rank relevant websites based on user queries entered compared to the more specialized vertical search services which provide more nuanced services (such as comparing and ranking prices for goods across different websites).¹⁹¹ Though all variants of search services tend not to charge users a fee for using their service, the European Commission considers it an economic activity due to the exchange of user data (whereby they consider data as a currency),¹⁹² the use of the search results page as an advertising platform (which in turn brings in revenue) and that the competition to draw new users in the online search services market occurs not through their prices but through the quality of the service (namely user interface, relevancy and speed of

¹⁹¹ Antonio Buttà, “Google Search (Shopping): An Overview of the European Commission’s Antitrust Case,” *Italian Antitrust Review* 2, no. 1 (2018), <https://doi.org/10.12870/iar-12872>.

¹⁹² European Data Protection Supervisor, “Privacy and Competitiveness in the Age of Big Data: The Interplay Between Data Protection, Competition Law and Consumer Protection in the Digital Economy” (Brussels, 2014), https://edps.europa.eu/sites/edp/files/publication/14-03-26_competition_law_big_data_en.pdf.

results).¹⁹³ The Commission found that for the purposes of this investigation there were two relevant product markets: the online search services market and the specific search services market of comparison shopping services. They noted after their market inquiry that there was limited demand-side and supply-side substitutability between the two products. They also decided that the relevant geographic markets were “national in scope.”¹⁹⁴

Google had a dominant market share in online search services in all of the EEA aside from the Czech Republic since 2011 and was found abusing its dominant position to favor its own comparison shopping service Google Shopping in its search results compared to its competitors. Google Shopping was prominently featured in search results whereas they designed algorithms to lower ranks of competitor services and show them in less visible positions on the results page. This diverted away traffic from competitors to their own service.¹⁹⁵

The Commission then ran further inquiries to provide evidence as to why this action would have anticompetitive effects finding that users tend to click more on more prominently visible links which would lead to more traffic to that service and that more favorable rankings lead to more traffic which was found evident in the fact that Google Shopping got more traffic due to its position on the page.¹⁹⁶ Additionally, it was found that Google Search services accounted for a huge portion of the traffic for the competing

¹⁹³ Buttà, “Google Search (Shopping): An Overview of the European Commission’s Antitrust Case.”50.

¹⁹⁴ European Commission, Summary of Commission decision: Google Search (Shopping), 39740.

¹⁹⁵ European Commission, Google Search (Shopping) : Commission Decision (2017).

¹⁹⁶ Ibid.

comparison shopping services and that there were no substitute search services that could lead to those numbers.¹⁹⁷

All the investigation led the Commission to ultimately decide that Google with its Google Search had not only a dominant market position but also significant market influence on consumer choice, which could not only affect the entry of new competitors in the other services but completely diminish the ability to compete for any competitors they might already have.¹⁹⁸ This had significant negative implications for consumer welfare, innovation and competition.

(2) Google AdSense

Created in 2003, Google AdSense was built to provide an intermediary service to website owners to ease the process of advertising on their websites. Once the website owners plugged in Google AdSense into their web pages or the specialized search services on their websites, they could expect a revenue stream based on the amount of views that were directed to the ads. Both Google and the website owner received commissions for the advertisements displayed.¹⁹⁹ The relevant product market for the purpose of this case was online search advertising intermediation and the relevant geographic market being analyzed was the European Economic Area for which Google had a dominant market share of 80% for the product.²⁰⁰

Through their investigation, the Commission found that Google was imposing anti-competitive supply obligations in their contracts with their “direct partners” where

¹⁹⁷ Ibid.

¹⁹⁸ European Commission, Summary of Commission decision: Google Search (Shopping), 39740.

¹⁹⁹ European Commission, “Antitrust: Commission Takes Further Steps in Investigations Alleging Google’s Comparison Shopping and Advertising-Related Practices Breach EU Rules.”

²⁰⁰ Ibid.

they prohibited them from placing ads from Google’s competitors up till 2009.²⁰¹ When those exclusivity contracts were relaxed a little, they still contractually obligated their partners to place Google ads in premium locations on the websites without any other ads near them.²⁰² They also required the website owners to seek Google’s approval before making any changes to competitor’s ads.²⁰³ In this case, Google was not leveraging its dominance in the search services market like the other cases, but using its dominance in the intermediary advertising services market to inhibit competition by preventing consumers (the website owners) from purchasing products from competing suppliers through exclusivity contracts.²⁰⁴ Google was using anti-competitive practices to protect its dominance in the market for intermediary advertising services.

(3) Google Android

Through their investigation, the European Commission decided that the relevant product market for this case were general internet search services, licensable smart mobile operating systems and app stores for the Android mobile operating system.²⁰⁵ Google Android is a licensable smart mobile operating system which unlike the Apple iOS (which is a vertically integrated smart mobile operating system exclusively available to Apple iPhones) is available for integration by third party mobile handset manufacturers.²⁰⁶ Google Playstore is the app store for Android mobile operating systems,

²⁰¹ Aurelien Portuese, “Google AdSense for Search: Fines Always Come in Threes,” Competition Policy International, 2019, https://www.competitionpolicyinternational.com/google-adsense-for-search-fines-always-come-in-threes/#_edn4.

²⁰² European Commission, “Antitrust: Commission Takes Further Steps in Investigations Alleging Google’s Comparison Shopping and Advertising-Related Practices Breach EU Rules.”

²⁰³ Ibid.

²⁰⁴ Portuese, “Google AdSense for Search: Fines Always Come in Threes.”

²⁰⁵ European Commission, “Antitrust: Commission Sends Statement of Objections to Google on Android Operating System and Applications – Factsheet.”

²⁰⁶ Ibid.

where Android users can download software applications for their Android smartphones. These are the Google products along with Google Search that came into question under the purview of this case. The relevant geographic market was limited to the European Economic Area.²⁰⁷

Google was found to be holding a dominant market position (over 90%) in all three of the relevant product markets.²⁰⁸ When it came to Google Android, there were significant barriers to entry for new competitors noted due to the large number of applications available for the platform (due to the large number of users) as a result of network effects (discussed further in Chapter 3, pg. 39). There was also limited substitutability due to the fact that most users were unlikely to switch their mobile operating systems as it is harder to transfer application data across devices with different mobile operating systems.²⁰⁹ It is also important to note that almost 90% of all applications downloaded on Android devices were downloaded via the Google Playstore, most users also did not have the option to download alternative app stores and for them to have access to other app stores they would need to switch devices (which is unlikely).²¹⁰

Google, with its dominant market position, was accused of participating in two anticompetitive acts of tying, namely, tying the Google Search application to all Android devices and tying the Google Chrome web browser application to all Android devices. The pre-installation of both of these applications to the Android mobile operating systems created what the Commission called a “status quo bias” where users are less likely to

²⁰⁷ Ibid.

²⁰⁸ Ibid.

²⁰⁹ Ibid.

²¹⁰ Ibid.

switch to alternative applications if certain software applications are already preloaded onto their phones due to the high *switching costs*.²¹¹ This inhibited the competition in both of those markets within the app store.

Google was also found in violation for making illegal payments to the largest manufacturers of mobile devices and mobile network operators to incentivize them to integrate Google Search exclusively across the platform on all their Android devices.²¹² This hindered the ability of rival search services to compete against Google on the basis of merit and helped to artificially protect Google's already dominant position in the market. Their anti-competitive tactics left their rivals in a precarious position where even if they could provide a better product, they had further barriers of entry in terms of compensating device manufacturers for the payments they would have lost from Google.²¹³

Last, it should be noted that some manufacturers use their own variants of the Android mobile operating system exclusively (notably Amazon's Fire OS) since Android is an open source operating system; these are referred to as Android forks. Google contractually obligated other third party device manufacturers to never use any of these Android "forks" and if they were found in violation of the contract, they were threatened with the loss of access to all other Google services including Google Search, Google Playstore and others.²¹⁴ This "Anti-Fragmentation Agreement" significantly inhibited

²¹¹ European Commission, "Antitrust: Commission Fines Google €4.34 Billion for Abuse of Dominance Regarding Android Devices."

²¹² Ibid.

²¹³ Ibid.

²¹⁴ European Commission, "Antitrust: Commission Sends Statement of Objections to Google on Android Operating System and Applications – Factsheet."

competition in the licensable smart mobile operating systems market, limited innovation in terms of the software applications that it could give rise to and negatively affected consumer welfare by limiting consumer choices and their access to alternative and potentially better products.

4.3.4. Google's Defense

Though the cases are relatively new and the complete case files were not available for inspection for the AdSense and the Android cases as of writing this paper, the press releases and supplemental discussions regarding the cases provide insight as to some of the defenses that Google might have had to these accusations.

First, in the case of Google Shopping, Google defended themselves by suggesting that the position and outlook of the comparison shopping services on Google Search did not affect the amount of traffic that went to the services.²¹⁵ The market inquiry and analysis had proved this untrue.²¹⁶ They also claimed that Google Shopping was not a comparison shopping service, but in fact just an improved version of their Google AdWords service (keyword based advertising bidding service).²¹⁷ There was significant evidence available to the fact that this was a separate product given that users had separate sets of data interactions with it.²¹⁸ Google also tried to defend their case by noting that other comparison shopping services could simply participate in Google Shopping and then they would have access to the premium page locations, but this was found to be not as accessible as they framed it as AdWords spots could be auctioned to

²¹⁵ European Commission, Google Search (Shopping) : Commission Decision, 39740.,111.

²¹⁶ Ibid., 112.

²¹⁷ Ibid.,111.

²¹⁸ Ibid., 112.

unlimited bidders but the spots for Google Shopping were not as easily available.²¹⁹ Google's final defense in this case was that they applied the same relevance standards when finding comparison shopping services as they did in their general search services and their product ads. Google provided no concrete evidence to support this claim and their user study did not address the issue well.²²⁰ All their claims were ultimately unfounded.²²¹

Though Google's own defenses on the AdSense case are not available but some literature on the topic have discussed the fact that Google AdSense requires exclusive and premium placements for the viability of their two-sided business model²²² given that they provide the service to web owners for free. Though it is debatable whether a cost advantage and consumer welfare alone are justifiable reasons for inhibiting competition and innovation, it does bring to question whether Google AdSense finds that their business model necessitates relationship-specific investments²²³ from their partners to carry on their ad-based revenue service.

Last, in terms of the Google Android case where Google was accused of tying the Android operating system with Google Search and Google Chrome, they defended themselves by noting that tying was necessary to monetize its investment into Android.²²⁴ This defense did not stand as Google had a significant revenue stream from Android devices through their Google Playstore and through the data that they collected from

²¹⁹ Ibid.,111.

²²⁰ Ibid.,119.

²²¹ Ibid.,111.

²²² Portuese, "Google AdSense for Search: Fines Always Come in Threes."

²²³ Ibid.

²²⁴ European Commission, "Antitrust: Commission Fines Google €4.34 Billion for Abuse of Dominance Regarding Android Devices."

these devices.²²⁵ The Commission also dismissed their claims that their exclusivity contracts with device manufacturers regarding the pre-installation of Google Search was necessary to ensure that device manufacturers would keep producing Android devices.²²⁶ Finally, their claims that they only obstructed manufacturers from using Android forks to prevent fragmentation of their Android ecosystem was unfounded since they could simply require that the Android forks were up to the technical standards necessary to operate other Google applications. They also did not provide any evidence to suggest that these Android forks were incompatible with their Google applications.²²⁷

4.3.5. Ruling

On June 27, 2017, it was announced that Google was going to be fined EUR 2.42 billion for their anticompetitive behavior in regards to the Google Shopping case. They were also asked to immediately cease all of the actions that they faced charges for. Google was asked to ensure that their Google Shopping service received similar treatment as any other comparison shopping services on their Google Search service.²²⁸

On March 20, 2019, it was announced that Google was going to be fined EUR 1.49 billion for their illicit practices regarding the Google AdSense case. They were asked to (and had stopped by 2016) their illegal conduct in regards to the exclusive supply dealings.²²⁹

²²⁵ Ibid.

²²⁶ Ibid.

²²⁷ Ibid.

²²⁸ European Commission, "Antitrust: Commission Fines Google €2.42 Billion," Press Release, 2017, https://ec.europa.eu/commission/presscorner/detail/en/IP_17_1784.

²²⁹ European Commission, "Antitrust: Google Fined €1.49 Billion for Online Advertising Abuse."

On July 18, 2018, Google was fined EUR 4.34 billion for their exclusionary behavior in regards to the Google Android case. They were also ordered to cease all illegal actions within 90 days of the decision. While they had to ensure that device manufacturers were allowed to use any Android forks of their choice, Google was allowed to set up technical prerequisites to ensure that the Android ecosystem was still properly functional.²³⁰ Though the fines and the decisions have been set, it is likely that Google will challenge these decisions and appeals may be filed soon.

4.3.6. Google in the United States

There was a brief investigation into Google by the Federal Trade Commission in 2011 pertaining to its behavior in regard to the way it launched its Google Buzz service through its already large Gmail service, the investigation ultimately ended in a settlement where both parties agreed on better protection for consumer data privacy.²³¹ This never grew into a full-blown antitrust investigation. There was, however, another investigation regarding its Google Search service where the efficacy and neutrality of their algorithm was questioned once again. Rival services for travel vertical search engines like Expedia were less likely to be shown in searches compared to Google's own services despite their claims of neutrality.²³² The only big issue found was that Google was lifting user reviews from rival reviewing sites to display on their Google Search but threatened to completely drop the rival sites when they complained about it.²³³ This case ultimately led to a

²³⁰ European Commission, "Antitrust: Commission Fines Google €4.34 Billion for Abuse of Dominance Regarding Android Devices."

²³¹ Federal Trade Commission, "FTC Gives Final Approval to Settlement with Google over Buzz Rollout," 2011, <https://www.ftc.gov/news-events/press-releases/2011/10/ftc-gives-final-approval-settlement-google-over-buzz-rollout>.

²³² Edward Wyatt, "A Victory for Google as F.T.C. Takes No Formal Steps," *The New York Times*, January 2, 2013, <https://www.nytimes.com/2013/01/04/technology/google-agrees-to-changes-in-search-ending-us-antitrust-inquiry.html>.

²³³ Ibid.

settlement with promises of better business ethos from Google where they also agreed to remove exclusivity contracts with companies advertising on their advertising platform.²³⁴

Though the cases pursued were definitely worth the attention, not much has occurred in terms of an in-depth antitrust investigation against Google's greater misconducts in the United States, there is news that the US Department of Justice is planning a bigger antitrust probe into the company soon.²³⁵ While previous precedents set in the courts do not suggest a lot will be accomplished in terms of regulating Google and its anticompetitive practices, there is at least hope for a stronger case to be made.

4.4. Conclusion

Microsoft and Google have held dominant market shares in a variety of markets in the information technology industry and continues to expand their frontiers today into newer markets such as artificial intelligence, cloud computing, robotics and others.²³⁶ Their monopoly status and vast profits from other ventures allow them to invest and outcompete if not, absorb any new entrants in any new field that they enter.²³⁷ It is imperative to recognize that these monopolies need to be regulated thoroughly unless one imagines the future of information technology to be limited to a few select names where the incentive to innovate by any new entrant is curtailed. The cases brought forth against Microsoft and Google recognized the danger that they posed as monopolies in this field

²³⁴ Ibid.

²³⁵ Diane Bartz, "U.S. Justice Department Prepares Google Antitrust Probe: Sources," *Reuters*, May 31, 2019, <https://www.reuters.com/article/us-google-doj-probe/u-s-justice-department-prepares-google-antitrust-probe-sources-idUSKCN1T22SU>.

²³⁶ "Google AI," Google, accessed December 8, 2019, <https://ai.google/>.

²³⁷ Catherine Shu, "Google Acquires Artificial Intelligence Startup DeepMind For More Than \$500M | TechCrunch," *Tech Crunch*, January 26, 2014, <https://techcrunch.com/2014/01/26/google-deepmind/?guccounter=1>.

given the sheer scale of their monopoly power and also showed the extent of abusive market conduct possible by these information technology firms.

The Microsoft case in the United States was a landmark case that took place before most legislative bodies could identify the full extent of tacit behaviors facilitated by information technology when operating at economies of scale. It also highlighted the flaws of the Chicago School's influence in the American court system's decision making with their heavy focus on consumer welfare and efficiency rather than the preservation of competition. However, the case is still vital to the study of how legislative bodies examine the economics behind information technology, and is a guide in what they caught onto early on and also what they missed. This is perhaps why the European Commission had better success with their Microsoft case which occurred a few years later, but this could also be attributed to their more hardline post-Chicago implementation of the law rather than just lessons from the Americans.

In the 20 years since Microsoft, another global tech giant rose to power and eventually faced antitrust challenges of their own. Google with its dominant market shares in various platforms (some integrated within other Google platforms) led to a far more complex case than the Microsoft case, but a closer look made it evident that the general themes were the same even though the scale was drastically different. Information technology had evolved a lot since the Microsoft case and yet the pattern of abuse displayed by Google implied that information technology incentivized and facilitated certain types of market abuse which are different from general market abuses, and while newer technologies may be introduced, and certain names may change, a little flexibility will allow antitrust bodies to recognize their misconducts better. Aside from

this, the Google case also set a precedent for the incorporation of data into antitrust analysis which could potentially have important implications for any future cases. The European Commission prosecuted Google on all of the charges they presented and while that is to be commended, there is still room to examine if they could have been sensitive to more elements of this technology.

CHAPTER 5: ANALYSIS OF THE CASE STUDIES

5.1. Introduction

Though antitrust laws have been more or less stagnant since its conception, the economic theories affecting its applications have seen periodic changes across both the United States and Europe. However, these changes have not arrived as rapidly as the changes in technology and now, information technology. Traditional interpretations of the laws and technologies have led to many decisions that were widely debated for years to come and helped to shape the intellectual landscape around these topics. Before Google and Microsoft, there was AT&T, where they had nearly reached the sheer scale of horizontal and vertical integration as today's tech firms and caught the attention of antitrust authorities in the United States. They were an effective monopoly in most sectors of the telecommunications market, being the primary telephone service provider in most of North America while also holding majority market shares in telephone manufacturing, communications research facilities and other complementary goods pertaining to this sector such as telephone books.²³⁸ This is often likened to how today's tech giants have sprawling subsidiaries across various platforms which allow them to become the sole provider for most common consumer technology needs without the

²³⁸ "AT&T; BREAKUP II : Highlights in the History of a Telecommunications Giant," *Los Angeles Times*, September 21, 1995, <https://www.latimes.com/archives/la-xpm-1995-09-21-fi-48462-story.html>.

ability to find an alternative (i.e. high switching costs due to lack of network effects on other ecosystems). They were protected for the longest time under the presumption that they were a *natural monopoly*, however it is important to distinguish that large economies of scales are not always the result of natural monopolies – it was not for AT&T and it is not for today’s tech monopolies; the rise of competition in the telecommunication industry following AT&T’s divestiture was proof of that. The government would have broken up the large conglomerate at the end of the case, but AT&T ultimately chose to settle fearing the loss of one of its larger companies, Western Electric. Instead, they split up the company into smaller parts.²³⁹ This *significantly* improved competition in the telecommunications market as new companies entered the market, and while they failed to make a mark in the up-and-coming technology sector (as they were expected to) without their guaranteed user base, parts of the AT&T corporation went onto thrive and exists today as another media behemoth.²⁴⁰

While the legislators did settle on a relatively favorable outcome, the AT&T case and the company’s continued success is a reminder that not only are antitrust laws necessary but that they are also not designed to impede growth and innovation but instead, create room for it. The problem, however, arises when the legislation and the economics behind the laws fail to capture the nuances of the specific industries and inhibiting enforcement. Despite positive intentions and the dire need for government oversight in these industries, antitrust legislation into these industries are often questioned due to the ambiguity of their technologies. In this chapter, the difficulties of employing

²³⁹ Ibid.

²⁴⁰ Andrew Pollack, “AT&T Move Is a Reversal Of Course Set in 1980’s,” *The New York Times*, September 22, 1995, <https://www.nytimes.com/1995/09/22/business/at-t-move-is-a-reversal-of-course-set-in-1980-s.html>.

traditional antitrust methods in information technology industries will be discussed followed by an analysis of the case studies elaborated on in the previous chapter. The literature around the analysis of the Microsoft case is meant to serve as a framework for the analysis of the Google case, which will reflect on how today's antitrust laws are lacking in their abilities to deal with the information technology sector today and how it is vital for changes to be made soon.

5.2. The Limitations of Antitrust Laws in the Information Technology Sector

Despite its various interpretations, the basic tenets of antitrust laws are built around the economic idea that a firm holding significant market power has the ability to charge higher prices and produce fewer goods than that would have been produced under perfect competition. A firm in this position, can then abuse its monopoly power through a variety of anticompetitive techniques to limit new entrants and limit consumer choice (discussed in Chapter 3). While the merits and demerits of perfect competition could be a subject of its own paper, the previous chapters emphasize why an environment that fosters competition is, at the very least, conducive to technological innovation as well. Despite semantic differences, irrespective of industries, most legislative bodies face the burden of proving two main issues when trying to prosecute in most antitrust cases, the fact that the firm holds monopoly power and that they are in fact abusing it.

Proving the market power happened to be relatively easy for the greater part of the century as market power could be easily identified despite deliberations over various calculation methods (noted in the Appendix 2). The two important details needed to administer calculations by most legislative bodies are relevant geographic and product

markets,²⁴¹ and while these details were debated in other antitrust cases, they are nowhere near as complex to analyze as they are in the cases of digital products which are marketed and distributed globally to anyone who has access to the internet. Though the scope of market power has been attempted to be understood by the number of active units sold or downloaded, in the case of certain technologies even those numbers are redundant as daily active users can vary. It becomes even more complicated when large tech monopolies have products that compete with other slightly-differentiated products inside of certain digital-only markets (notably, Google apps inside the Google Playstore inside Android devices). This makes market assessments significantly harder than it used to be in the case of tangible goods and services distributed in certain regions. A big issue that arises in the analysis of market power is also the lack of appropriate tools to measure market power in information technology industries fairly, for example, the Lerner Index ($P-MC/P$) lead to excessive number of false positives as it does not account for the high fixed costs or negligible marginal costs in this industry.²⁴²

There is also the added issue regarding the durability of information technology products in case of antitrust analysis. While they are *durable* goods, they face obsolescence whether it is planned or not. The “Coase Conjecture” suggests that the market for durable goods could work similarly to competitive markets as the monopolist could be incentivized to offer the product closer and closer to marginal cost as demand starts to fall. If this were a recurring pattern in this industry then consumers would

²⁴¹ Federal Trade Commission, “Markets,” Guide to Antitrust Laws - Mergers, accessed November 30, 2019, <https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws/mergers/markets>.

²⁴² Herbert Hovenkamp, “Antitrust and Information Technologies,” *Florida Law Review* 68, no. 2 (2017), <http://scholarship.law.ufl.edu/flrhttp://scholarship.law.ufl.edu/flr/vol68/iss2/9>.

anticipate the low prices and would wait out their purchases.²⁴³ Though traditionally firms require a steady flow of consumers or continue to improve their products in order to avoid the Coase trap, it seems as if the tech firms have found various ways to not price at the marginal cost. Aside from pushing out updates and newer models on a yearly basis which lead to hardware and software incompatibilities forcing consumers to make a purchase (i.e. planned obsolescence), many have also moved to a subscription or rental model which also ensures a steady stream of revenue.²⁴⁴ Antitrust bodies need to take into account the changing revenue generation models that these information technology monopolies utilize, while taking into consideration the durability of these products, in order to properly evaluate consumer welfare in their pricing practices.

Regulatory bodies also run price-cost analyses to see if firms display significant market power or not (i.e. if they would alter their prices when new firms enter the market), but these sort of short-run studies while valuable, tend to offer varying results for tech firms who are still recovering their initial high fixed costs or for firms who may offer their products at the “freemium” model (i.e. free version with advertisements, paid version for additional functions).²⁴⁵ It is reductive to completely isolate the tech firm’s products when it comes to building antitrust cases, because ultimately they hold market power across multiple markets with performances across each market affecting their profits and market shares on others, most notably their shares in the advertising and data markets. Thus, it is vital for antitrust bodies to take into account their multi-sided

²⁴³ Michael L. Katz and Carl Shapiro, “Antitrust in Software Markets,” in *Competition, Innovation and the Microsoft Monopoly: Antitrust in the Digital Marketplace* (Springer Netherlands, 1999), 29–81, https://doi.org/10.1007/978-94-011-4407-0_3.

²⁴⁴ *Ibid.*, 8.

²⁴⁵ Hovenkamp, “Antitrust and Information Technologies.”14.

nature²⁴⁶ when analyzing market power while also being sensitive to the details of their cost structure (i.e. high fixed costs and negligible marginal costs). With the number of technology monopolies on the rise, it is imminent that a fair and accurate measure be devised soon which takes into consideration all these elements.

As discussed in Chapter 3, certain elements of their technology facilitate the abuse of market power for tech firms more so than traditional firms. While traditional tests (see Appendix 2) are meant to test for anticompetitive behavior like predatory pricing, tying and other tactics used to prevent the entry of new rivals into the market, again, a lot of them will fail to take into effect the dynamic nature of technological competition and the hostility that is built into the code. Some of the biggest abuses of power within the tech industry tend not to come from high recoupment prices, but instead from locking users into their ecosystem, forcing them to face high switching costs, whether it is through software incompatibilities with other products or through increasing the ease of use within their own set of products (e.g. Microsoft Office Suite and Google Suite). Due to the network effects exhibited in this industry, the biggest incentive most firms initially have is growing their user base and not necessarily their profits, thus the traditional interpretation of rational firms' incentives may not be the best lens to examine their anticompetitive behavior in the short-run. A lot of tech firms also tend to receive revenues via advertising and through their collection of data, and it is important that legislative bodies consider the abuses that occur in these unclear markets as well. The issues regarding identifying market power is that it is not sensitive to the particular

²⁴⁶ Ibid., 16.

characteristics of tech firms specifically, as for identifying abuse of power, traditional tests are often too limited to fully encompass the extent of anticompetitive behavior exhibited by tech firms.

5.3. Microsoft

The technical details of the Microsoft case study are discussed in the previous chapter (See Chapter 4, pg. 58). This section will serve as an examination of the literature surrounding the case in order to evaluate both the failures and strengths of the of the antitrust bodies and their abilities to regulate one of the earliest behemoths of the tech industry.

5.3.1. Economic Discourse

In the infamous American trial, Microsoft was alleged to have a monopoly in the market of operating systems for Intel-based personal computers, holding over 90% of the market. The relevant product market for this assessment was determined based on the fact that this was the predominant type of personal computer available in the market at the time without many substitute operating systems consumers *could* switch to.²⁴⁷ It also appeared that even competitors willing to undertake the high fixed costs of producing a rival good could not chip away at their market share (most notably IBM with their OS/2 with their \$1 billion investment).²⁴⁸ While the failure of newer entrants in this field could be attributed to Microsoft having an early mover advantage and benefiting from network effects, there were also the very evident additional network effects around the production of applications leading to the “applications barrier to entry.” Richard Schmalensee,

²⁴⁷ US Department of Justice, U.S. v. Microsoft Corporation, 98–1233.

²⁴⁸ Richard J Gilbert and Michael L Katz, “An Economist’s Guide to U.S. v. Microsoft,” *Journal of Economic Perspectives* 15, no. 2 (2001): 25–44, <https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.15.2.25>.

Microsoft's chief economic expert at the trial argued that the relevant product market was not for operating systems but in fact for "platforms," which he described as a set of software interfaces (including middleware such as web browsers) for applications to function on; he insisted that Microsoft faced significant competition from the likes of Apple, Linux, Java and other companies under this market definition.²⁴⁹ He also argued against market power being a useful indicator for competition in this industry and made a case for Schumpeterian creative destruction, whereby the radical innovation, network effects and economies of scale along with catastrophic entries indicated that this industry was most likely to see a string of short-lived monopolies.²⁵⁰ The government accepted this dynamic approach to looking at this industry but still noted that the issue was not holding a monopoly but using anticompetitive means to do so, and it was made clear that Microsoft was not in fact being persecuted for holding a monopoly due to the nature of its technology, but what they were further doing to take illicit advantage of their position.

Microsoft was specifically charged for engaging in exclusionary conduct (elaborated on in Chapter 4, pg. 58) in regards to imposing licensing restrictions on OEMs and ISPs for the use of Windows OS. They also provided free copies of Internet Explorer to IAPs and threatened to remove them from their desktop referral folder if they provided Netscape Navigator as an option. Traditional Chicago interpretations find that exclusionary contracts promote efficiency as both firms would not agree to such a contract if it was not more profitable.²⁵¹ However, this fails to take into account the scenario where multiple vendors can start to form exclusionary contracts with one

²⁴⁹ Richard Schmalensee, "Microsoft Defense Testimony," 1999.

²⁵⁰ Gilbert and Katz, "An Economist's Guide to U.S. v. Microsoft." 28.

²⁵¹ Bork, *The Antitrust Paradox*.

supplier which can lead to one supplier holding a dominant market power, which would inadvertently reduce competition and allow them to engage in anticompetitive behavior: which can range from price discrimination to enforcing penalties on the vendors for breaking their contracts.²⁵² This was evident in the case of Microsoft, where if the multi-sided nature of their operation is to be considered, they were a dominant market power in the operating systems market and were using that to leverage exclusionary dealings with these other firms to make gains in the web browsers market.

Predatory behavior in the information technology industry can very rarely utilize price cutting and recoupment in the same way that other industries can due to the fact that despite high fixed costs, low marginal costs allow the company to charge low prices. Most tech monopolies tend to engage in a lot of non-price predatory behavior, some of which are even facilitated by their technology such as data collection for price discrimination or easier ability to tie complementary products due to their low marginal costs which further increases network effects and locks in more consumers. In Microsoft's case, their choice to tie Internet Explorer to the Windows OS was such a tying arrangement that not only increased the market share for the tied product but also ensured that it was steadily locking in users to the greater Windows OS platform. Microsoft also paid Apple to use its browser, which debunked their argument that it was merely a part of their *platform* and not in fact a product competing with a noteworthy rival in the market that Apple could option (i.e. Netscape Navigator). This effort to grow the user base and take advantage of network effects went beyond tacit bundling decisions

²⁵² Gilbert and Katz, "An Economist's Guide to U.S. v. Microsoft."31.

and exclusionary contracting. Microsoft was not charged for their conduct with independent software vendors (ISVs), where they were providing Windows OS free of charge to them as an incentive to create applications for Microsoft faster. As noted before, the DOJ defined the relevant market for operating systems to be limited to Intel-based personal computers and they also opted to take on a very rigid definition of the market regarding this case, viewing Windows and all the applications written for it as a set package rather than viewing the market *dynamically* whereby software applications *could be* written for other operating systems thus creating the potential for other operating systems to become more competitive. In fact, a more fluid view of the market would allow the courts to note the incentives that software developers would have in regards to creating applications for Microsoft Windows; incentives which Microsoft purposefully affected with their practice by artificially inducing the network effect by providing free access to Windows OS to developers and creating a Microsoft-only version of Java, so that they would create applications for an OS which more users would use *because* there are *more* applications available.²⁵³

The European Commission case charged Microsoft for the lack of interoperability in their code and the tying of Windows Media Player to their Windows OS. The latter charge displayed yet another component of Microsoft's ever growing ecosystem which it intended to lock its users into in order to increase their switching costs, while also continuing to be the sole beneficiary of network effects. However, the first charge was more in line with their conduct in regards to the Java case in the United States. This is

²⁵³ Economides, "The Microsoft Antitrust Case."

where the consideration of the interdependent nature of these products become imperative once again, especially in how they can affect the growth of competition and innovation in markets within these platforms. While this case was pursued almost two decades ago, it foreshadowed the complexities information technology could bear on competition economics in terms of multiple levels of markets inside of software programs.

An idea of a benevolent monopoly kept arising in both cases across the Atlantic. Microsoft's defense argued that if Microsoft were to be charging a monopoly price, they would be charging 16 times the market price, which Franklin Fisher, the economist on the government's side argued would not be the case as this did not account for their fear of slowing their user growth rate and possibly deterring the possibility of creating new demand for complementary goods.²⁵⁴ In the United States, the legal experts have a predisposition towards the Chicago School of Thought whereby as long as consumer welfare is unhindered (though very loosely), monopolies are expected to get a pass. It has led to a judicial atmosphere that fears false positives and the repercussions of inhibiting "welfare," "growth" and "innovation." So, it was not unexpected when Microsoft ultimately settled with minimal repercussions in the United States. Their European regulatory counterparts, however, tend to hold a slightly more strict view of anticompetitive behavior finding the restriction of competition a sufficient reason to prosecute. There have been mixed econometric evidence in regards to the linkages between the degree of competition and the degree of innovation²⁵⁵, but it is unlikely that a

²⁵⁴ Franklin M. Fischer and Daniel L. Rubinfeld, "U.S. v. Microsoft - an Economic Analysis," *The Antitrust Bulletin*, 2001, <https://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=2032&context=facpubs>.

²⁵⁵ Gilbert and Katz, "An Economist's Guide to U.S. v. Microsoft."38.

case of Schumpeterian creative destruction is likely to *completely* displace a tech monopoly that has sprawled enough subsidiaries. Consumer welfare on the other hand, while not unanimous with competition, does seem to be closely affected by it in the long-run. While consumers benefited from the low prices and an abundance of applications on their personal computers in the short-run, in the long-run they were potentially being locked into a subpar Windows OS with subpar Windows products. Almost two decades later, Windows still holds nearly 80% of the global desktop operating system market share.²⁵⁶ Though it has dropped a little more in North America (nearly 70%)²⁵⁷ due to the surge in Mac and alternative products, it still reigns as the dominant market power. Despite other Microsoft products thriving, Internet Explorer failed once they stopped imposing restrictions on ISPs; it has been taken off the market, with its older version occupying less than 10% of the market today.²⁵⁸

5.3.2. State of Information Technology and Application of Antitrust

While not a first mover, Microsoft definitely benefited from being an early follower during the beginning stages of affordable personal computer sales. They quickly amassed a large user base, and the growing network effects incentivized them to invest more to benefit from the increasing returns that would eventually come from achieving economies of scale. This was an inevitability with enough of a user growth in this industry. By the time the late 90s came around, Microsoft was one of the biggest market powers in the information technology industry and were employing every move available

²⁵⁶ “Desktop Operating System Market Share Worldwide,” StatCounter Global Stats, 2019, <https://gs.statcounter.com/os-market-share/desktop/worldwide>.

²⁵⁷ Ibid.

²⁵⁸ “Browser Market Share Worldwide,” StatCounter Global Stats, 2019, <https://gs.statcounter.com/browser-market-share>.

to them to hold on to that position. The infamous American case that would follow would provide the public with their first glimpses into the capabilities of anticompetitive behavior made possible by this technology and would preface the decades to come where it would become even more complex.

Like any other information technology firm, Microsoft's market power is complex to analyze since information technology behaves differently. A firm would simply not be punished for experiencing network effects and economies of scale, nor could a price-cost analysis be employed as they experienced high fixed costs but low marginal costs relative to their average costs. This would incentivize a firm to reach economies of scale rather than grow profits, however, it also meant that the market tended to get concentrated as there were high risks to entry, as new firms may have been unaware of post-entry equilibrium prices.²⁵⁹ In the case of Microsoft, these were obvious barriers to entry for new rivals, but Microsoft helped to set up further artificial barriers of entry both within and outside their code to make the market hostile to any new entrants.

Microsoft had already amassed a network of applications at the time of the case, while it could be an error in identifying all the technologies involved, but it was important for the courts to recognize and bring forward more charges of misconduct by defining more relevant markets beyond the market for Intel-based personal computers. Though Internet Explorer was noted as a separate product, it was not identified as a separate relevant market. The applications market was also viewed as a whole rather than taking into account the inoperability of applications on different platforms, which would

²⁵⁹ Katz and Shapiro, "Antitrust in Software Markets."

mean Microsoft was hindering innovation and competition in the market for applications made for non-Windows operating systems. This specificity in recognizing the multiple levels of markets within the technologies and also recognizing the multi-sided nature of these companies would allow for a closer inspection into their flaws while recognizing how they are able to leverage their dominance in one market to gain dominance in another unfairly (even with an inferior product). This was evident in how the European Union chose to analyze their case by defining more relevant markets, which allowed them to build stronger cases and pick up on the nuance of markets within markets.

It is also important in retrospect to analyze how Microsoft was building a technological ecosystem to lock its users into, which goes beyond benefitting from the traditional outcome of network effects. Not only would users benefit from the number of other users on the platform, the number of applications built for a system with a large number of users (as programmers do not want to develop as much for smaller user groups), but also the ease of interoperability of the host applications. This aggressive move into locking users in through operability functions should have been a concern in the United States case (with the Java issue, specifically) but did see some attention in the European Union. Consumers facing high switching costs inhibit competition and will eventually render the market unsuitable for any substitutes to arise. Both antitrust bodies should have looked into other instances of interoperability coded into their platform and host applications, which would have pointed to more anticompetitive behavior.

While Microsoft faced fines and repercussions for some of their anticompetitive behavior in the European Union, they were allowed to settle with minimal oversight in the United States with the promise to disengage from their illegal contracts with ISPs and

IAPs.²⁶⁰ It is beyond the scope of this paper to suggest appropriate remedies, but it can hopefully help inform on the matters of what transgressions *need* remedying. It was not as if the courts in the United States failed to recognize Microsoft's market abuses, it merely failed to take action when it was direly needed. The European Commission, on the other hand, did charge Microsoft, but they faced far fewer charges across the Atlantic than they deserved, and it was made evident that neither of the world's biggest courts were either willing to or capable of bringing these tech monopolies under the proper oversight that they require. The Microsoft case might have taken place at a time before the full extent of this technology could be realized, but it is immensely important to ensure that technology monopolies today are regulated thoroughly and fairly by the most influential legislative bodies present globally in order to ensure competition, innovation and consumer welfare.

5.4. Google

Google is one of the largest standing tech monopolies in the global economy. While it appears that the United States will bring forth antitrust charges against Google in the near future, as of writing this paper, Google has been hit with a series of fines in recent years by the European Commission (for more details, see Chapter 4, pg. 83), with some proceedings still ongoing. The Google case, although widely debated still does not have the vast array of literature that the Microsoft case had, though with time, it is likely to become as relevant if not more to study of antitrust in the information technology sector. This section will discuss the economic debate surrounding the Google case in the

²⁶⁰ Economides, "The Microsoft Antitrust Case."

European Union but will also utilize the reflections from the Microsoft case to better understand how antitrust laws should accommodate the changing information technologies of the future.

5.4.1. Economic Discourse

Google's continued dominant position in the general search services market has been questioned similarly to the Microsoft case, as this is often the first benchmark at antitrust investigations. This is followed with the rhetoric of "punishing winners" and the loss of consumer welfare. The free services are often cited as an example of the benevolence of this monopoly, disregarding the advertisement revenues or the collection and sale of data.²⁶¹ Though there is still not sufficient literature elaborating on how to correlate concentration with these figures, it is important to at least grasp the transactional nature of these services. It should also be acknowledged how it does not cost Google anything to distribute their products due to the negligible marginal costs, and while they can continue to improve and invest into their products, the free pricing clearly aided in amassing a large user base early on, which allowed them to benefit from network effects. Their user base in itself is not a marker of abuse, but when a service is the "primary" access point to the rest of the internet, it wields a lot of power across multiple markets. There is no doubt that Google's market power has bigger repercussions for consumer choice and welfare than any other tech company, which is why it should be regulated accordingly.

²⁶¹ Privacy and competitiveness in the age of big data," European Data Protection Supervisor, March, 2014.

The earliest charge against Google pertained to their behavior in regards to Google Shopping, which is a vertical search service product. Google at the time of the charges held the dominant position in general search services, but was using this position to promote their subsidiary on this platform while purposefully demoting competing products on their general search services. A lot of the economic arguments on behalf of Google in this case was built around the Chicago rhetoric of consumer welfare and efficiency. Even if one were to assume Google Shopping was a superior product that benefited consumers compared to the substitutes, Google was still leveraging their market power in one market to affect their position in a different market tacitly through their algorithms (despite their claims against this). The Commission recognized the multi-sided nature of these markets and identified the relevant markets that were operating at the different levels, this allowed them to fully examine the level of Google's control over the vertical search services market, since competitors relied on them for new users.²⁶²

The second case brought forth against Google drew a lot less discussion as it pertained to very anticompetitive exclusionary contracts in regards to not allowing their clients to display advertisements from competing advertisement intermediaries. Though few counter arguments have been made in regards to the economic benefits to both the supplier and buyer in the contract, which is in line with Chicago style thinking, it is understandable why the Europeans who lean on a more post-Chicago approach viewed this as a strategic entry deterrence.²⁶³ Google was a dominant player in this market and the network effects they were creating from such contracts could have lead to

²⁶² Buttà, "Google Search (Shopping): An Overview of the European Commission's Antitrust Case."

²⁶³ Baker, "Recent Developments in Economics That Challenge Chicago School Views."

immeasurable switching costs. If most websites used Google AdSense exclusively then most advertisers would buy ads there, which in turn would affect website clients' decisions to enter into these contracts with Google if they had the most advertisers. This was similar to the setup of the "applications barrier to entry" that Microsoft had devised, which took advantage of network effects to increase switching costs.

The decision in the Android case where the European Commission charged them for tying Google Search and Google Chrome to Google Android, drew the most criticism of all from economic and technology experts alike (the technical details can be reviewed in Chapter 4, pg. 78). This decision is argued to have harmed the future of open-source distribution since it failed to recognize how integration within these platforms is vital to their functioning.²⁶⁴ Others have argued about the efficiencies of the contracts and the vertical integration of these processes, and how such regulations do more to harm to consumer welfare than benefit them. Most defenses rely on Google being the victim of unnecessary prosecution for holding market power when they were merely benefiting from network effects and not being able to control the result of the "applications barriers to entry" in the mobile operating systems market. It was argued that they evidently had a superior product that benefited customers and drew the programmers.²⁶⁵ First of all, despite being an open-source distribution there are numerous Google products integrated within the Android platform which collect data for Google and while integration may

²⁶⁴ Heather Greenfield, "European Commission Issues Problematic Antitrust Decision Against Android," *Computer & Communications Industry Association*, 2018, <https://www.cciainet.org/2018/07/european-commission-issues-problematic-antitrust-decision-against-android/>.

²⁶⁵ Ryan Khurana, "The Economic Illiteracy of the Google Antitrust Case," *Institute for Research in Economic and Fiscal Issues*, August 1, 2018, <https://en.irefeurope.org/Publications/Online-Articles/article/The-Economic-Illiteracy-of-the-Google-Antitrust-Case>.

help build a cohesive ecosystem from one firm, it should be acknowledged that Google can code better operability with non-native applications as well, but chooses not to, thus inhibiting competition. Second, consumers being robbed of their choices at every level of using a technological product while being imposed with increasing switching costs every day is not reflective of consumer welfare. Third, to draw a comparison to Microsoft once again, “the applications barrier to entry” in their case could be attributed to the fact that Google Android, the dominant mobile operating system (excluding forks) comes pre-built with the Google Playstore, which could be argued as a part of the *platform* but it happens to be downloadable on other Android devices (including forks), ensuring that if application programmers wanted to reach the majority of mobile users, they would have no choice but to program for the Playstore due to the immense network effects. The one failing in part of the European Union case, was the inability to recognize the application stores as a separate market from the Android mobile operating system. This would allow for the recognition of Google Search application for mobile and Google Search on web browsers as separate products. While the tying of the Chrome web browser was the result of them leveraging multiple market dominances and using their vertical integration to inhibit competition, this distinction could have allowed for further prosecution on the basis of Google Search as the default homepage on Chrome browsers.

The Google cases clearly introduced a lot of nuances to the examination of antitrust legislation into information technology. While there are still ways in which it was limited, it opened up a broader dialogue regarding the need for flexible and dynamic market definitions, expanded on the extent of abuse that a multi-platform monopoly can

commit and will ultimately help to realize the scope of antitrust in this new rapidly changing industry.

5.4.2. Information Technology and the Future of Antitrust Applications

Google is a technology giant that has achieved a level of scale and multi-platform integration that could frankly be hard to imagine let alone assess for the purposes of antitrust investigations. While innovation is to be rewarded, Google has built upon the network effects to become in essence the gateway to the internet, which despite its claims of lack of bias, certainly helped to develop its ever-growing list of complementary internet products and services. It would be nearly impossible for a new entrant to reach the economies of scale accomplished by Google, nor is it possible for them to penetrate the locked-in user base forced to use the majority of Google's ecosystem with its hundreds of products. Schumpeterian creative destruction could displace one monopoly in one market under the right conditions, but to put forward the argument that hundreds of disruptive entries will occur at the same time and be cohesive enough to remove all switching costs is a naive thought. Though it began with Google Search, Google has now leveraged their position into holding dominant market shares in a variety of markets through a multitude of tacit means facilitated by their scale and their technology. This is the outcome of an unregulated information technology industry and should serve as a cautionary tale for why it is imperative that antitrust regulations start to become more rigorous and informed.

One of the key ideas seen in the Google antitrust trials was the ability of the European legislators to move towards more fluidity in terms of defining relevant markets. This was a problem that hindered the Microsoft case. In rapidly changing industries,

relevant markets will constantly be evolving so it is up to the legal bodies, and the economists involved to be cognizant of that and define markets accordingly. They also need to take into account the multi-sidedness of firms (i.e. their functioning in different sectors affecting outcomes in others) as a lot of the markets one may encounter in the future might exist within a platform belonging to a certain firm. The idea of vertically integrated markets should be taken into consideration as well. An example of this can be Google Docs competing with other document processing mobile applications in the Google Playstore which competes with other application stores inside of Google Android Devices which competes with mobile operating systems. In this scenario, Google operates two of the dominating markets while competing in it; the antitrust implications of this is confusing but needs to be evaluated especially if competition is inhibited at any of these stages.

Another important issue which may come to dominate conversations in future antitrust legislations, is the issue of inter-product operability. Intellectual property rights are often expensive investments and the proliferate use of these allow firms to *protect* their technologies while discouraging newer entrants (the economic literature around IP rights is vast and could be a paper of its own). Often these are cited as reasons for refusing to provide the code to ensure easy *interoperability* to rival products that may want to compete on their platforms. While the merits and demerits of intellectual property laws can be debated, it is possible that with the rise these vertically integrated monopolies with their own platform markets, the question may arise in regards to whether the lack of interoperability is an explicit abuse of power or not. It increases the switching costs for consumers who benefit from their network effects, while also making it nearly impossible

for newer entrants to compete. The deliberate imposing and increasing of switching costs should be taken into consideration in these analyses, if not, perhaps the reduction of switching costs could be utilized as a way to promote competition.

This case also helped also set an important precedent in regards to the acknowledgement of the transactional nature of data. While the economic research in this field, especially in forming valuations for data to study market concentration in the information technology industry is still lacking, there is no doubt that this will become an important issue in future antitrust legislations due to the recent proliferation of data misuses within the tech sector.²⁶⁶ The value of data is also highlighted in the practice of targeted advertisement which most of these firms tend to draw revenue from. Data is also a durable good which loses value quickly but can be collected constantly provided the company already benefits from a large amount of network effects, these specificities make the analysis of data for antitrust analysis even more complex. Data collection poses immense implications within antitrust legislation given its scope to increase market abuse like price discrimination, it is important that some form of analysis into a firm's stock of data be evaluated as a standard for measuring their market power.

Ultimately, in the decade since the Microsoft case in the United States and now at the face of another landmark antitrust case ahead, it is important to reflect on the failures of not recognizing the specificities of the information technology industry but also to note that it is a dynamic, rapidly changing industry which demands flexible interpretations that

²⁶⁶ Alvin Change, "The Facebook and Cambridge Analytica Scandal, Explained with a Simple Diagram," *Vox*, May 2, 2018, <https://www.vox.com/policy-and-politics/2018/3/23/17151916/facebook-cambridge-analytica-trump-diagram>.

can truly help to regulate the monopolies that have already arisen and could rise in the future.

5.5. Conclusion

The European Union and the United States are both in positions of power where they can administer regulations which can have a positive impact on competition in the information technology industry. Given the global nature of these monopolies, it is important that other countries (be it unilaterally or multilaterally) also start reinforcing antitrust measures against these companies to ensure that the competition in the global information technology sector is not hindered. As these monopolies expand their market dominance in more and more complex technologies like cloud computing and artificial intelligence, and broaden their sphere of influence, it becomes even more necessary to implement these measures as soon as possible. However, this broad analysis of these two prominent cases, nearly 20 years apart, across two of the biggest legislative bodies influenced by two entirely different schools of antitrust thought, have shown one thing: antitrust analysis in the information technology industry is still lacking today.

The findings from the case studies and the concurrent analyses show that certain patterns have emerged in terms of how information technology monopolies conduct themselves and the specific ways they abuse the markets. These include but are not limited to artificially taking advantage of network effects, increasing the switching costs for consumers by locking them into ecosystems, manipulating markets developed within their technologies, tying products under the guise of platform efficiency, and the unethical use of data amassed for price discrimination and advertisement. These are all issues that antitrust bodies have to be specifically sensitive to in their future cases in

order to fully prosecute all market abuses. While the paper has not recommended remedies, it has hopefully aided in pointing out elements of information technology that require more stringent analysis. Although it appears that certain schools of thought are more likely influence more strict interpretations of competitive fairness and thus catch the little nuances in information technology industries than others, it is important for any legislative body to grasp the economics behind the changing technology and be flexible in order to fully regulate this industry.

CHAPTER 6: CONCLUSION

This thesis evaluated two representative case studies and the associated literature to conclude that antitrust regulatory bodies need to be more responsive to recognizing how information technology facilitates anticompetitive behavior in information technology monopolies. The literature surrounding information technology and their unique behavior from Chapter 3 were supported by the findings in the Microsoft and Google cases, where both the technology giants displayed similar patterns of market misconducts, suggesting that it is of utmost importance for these behaviors to be taken into consideration for any future antitrust analysis. The research also pinpointed some specific elements of these monopolies that require further attention. Notably, it showed how it is important to realize that information technology monopolies have radically different initial growth incentives compared to their non-information technology counterparts, where they are motivated by user growth instead of profits. Information technology firms depend on network effects, and on top of that, their cost structures (i.e. high initial fixed costs and low marginal costs) lead them to prioritize achieving economies of scale rather than gain short-run profits. This changed the nature of anticompetitive behaviors that were employed by information technology monopolies

given that most of it was geared around creating artificial barriers of entries to stop new entrants from taking advantage of the network effects needed to stay in the market.

The case studies showed the ways in which these monopolies employ such anticompetitive behavior and how they were facilitated by the nature of their technology. Microsoft did this by setting up “applications barriers to entry” where they created a proprietary Java language to mislead programmers to only build Microsoft-only applications to reduce the number of applications on all other platforms thus reducing the marketability of their competitors.²⁶⁷ Both Microsoft and Google employed illegal bundling of other products like Internet Explorer and Google Search under the guise of platform efficiency.²⁶⁸ They both utilized exclusionary contracts with suppliers and retailers to curtail competition in the market.²⁶⁹ Finally, both firms have coded in reduced interoperability with rival products to increase switching costs to lock in users to their platforms.²⁷⁰ There is also the fact that traditional anticompetitive tactics like price discrimination are exacerbated when data collection is taken into account, which makes price discrimination plans more accurate making consumers more vulnerable to exploitation by these monopolies who have a greater store of data. Information technology monopolies are capable of more market abuses and thus require more oversight, it is thus imperative that antitrust regulatory bodies take note of these non-price abuses when examining their market misconducts.

²⁶⁷ US Department of Justice, *U.S. V. Microsoft Corporation*, 98–1233.

²⁶⁸ *Ibid.*

²⁶⁹ European Commission, “Antitrust: Commission Fines Google €4.34 Billion for Abuse of Dominance Regarding Android Devices.”

²⁷⁰ Free Software Foundation Europe, “European Commission vs Microsoft: Chronology of the Case.”

While it is important to register a deeper understanding behind information technology in order to recognize the full extent of abuses committed by information technology monopolies and better implement antitrust legislation in this sector, it is also important to remain flexible as certain elements in this field are still nebulous as it is a rapidly developing sector. The case studies showed how the rigidity in the measures of market concentration led to the failures in the prosecution of so many more levels of market abuses. Though the Google cases displayed more nuanced interpretations²⁷¹ of relevant markets than the Microsoft case²⁷² it still could have benefited from even more flexibility. Information technology monopolies today tend to have markets built inside of their platforms where they compete at every level of the market while wielding dominant market power over the previous market levels (i.e. Google Phone > Google Android > Google Playstore > Google Drive) making it hard for their rivals to compete. As newer microlevels of markets are created, it is increasingly important to not ignore these potential areas of market misconducts and instead assess the culmination of market behavior by the dominant firm to see if they are abusive or not. Additionally, as more literature around the economic valuation of data develops, antitrust bodies will have to change how they evaluate market dominance and market abuses as information technology monopolies tend to profit the most from the utilization and sale of data.

The decisions of the cases chosen were reflective of the two schools of thought analyzed in Chapter 2, notably the Chicago School and the Post-Chicago School; it was

²⁷¹ European Commission, “Antitrust: Commission Sends Statement of Objections to Google on Android Operating System and Applications – Factsheet.”

²⁷² US Department of Justice, U.S. V. Microsoft Corporation, 98–1233.

important for the paper to recognize the economic thoughts considered by the legislative bodies before they came to their decisions in order to see if either was more sensitive to the nuances of information technology. The Chicago School's prioritization of consumer welfare and efficiency neglected harmful anticompetitive behavior like vertical market integrations, tying and price discrimination.²⁷³ Whereas the Post-Chicago thinkers recognized the detrimental effects of predatory pricing, identified the consequences that might stem from the firms facing low marginal costs at economies of scale and also made efforts to recognize strategic deterrence to entry.²⁷⁴ These additional contributions by the Post-Chicago thinkers were visible in the decision-making processes of the European regulatory bodies, where they paid careful attention to more non-price market abuses, displayed flexibility in recognizing different markets and were generally more prone to administering intervention. Despite this, there were still shortcomings in the decisions made by the European Commission, but the literature they are influenced by *does* present the hope that they could employ a more nuanced implementation of antitrust in information technology in the future if they become a bit more sensitive to the economics behind the technology itself. The case studies from this paper found that both the regulatory bodies (though one more than the other) faced failures, however, it can be said without a doubt that the antitrust legislators in the United States could benefit a fair amount from distancing itself from their Chicago roots.

The goal of this paper was to remark on whether the current implementation of antitrust laws in the information technology sector was sufficient. In doing so, the paper

²⁷³ Wright, "Abandoning Antitrust's Chicago Obsession: The Case for Evidence-Based Antitrust."

²⁷⁴ Baker, "Recent Developments in Economics That Challenge Chicago School Views."

found the manner in which it was not and what issues the antitrust bodies need to be vigilant of in their future analyses to improve their oversight. However, due to the limited scope of this research, the paper could not explore the economic impact of potential legislative solutions and their effect on competition and innovation, which could be a point of further research. While this paper focused more on the recognition of market abuses facilitated by information technology, it was merely the starting point for the broader conversation around the creation of the antitrust remedies (i.e. fines, breaking up companies, access to intellectual property, etc.) necessary for the formation of competitive markets in this sector. Though not specifically pertaining to antitrust, some of Mariana Mazzucato's work on the state taking a share of the winnings of tech monopolies (who benefited from government R&D) and reinvesting it on innovative capabilities could be utilized in the creation of such antitrust remedies.²⁷⁵ Though this paper only briefly touched on this topic, Mazzucatto identifies how the private sector is not the sole source of innovation but that the state plays an important role in innovation as well, and how it is vital to socialize the rewards when the risks of innovation have been socialized by the state.²⁷⁶ Future research in this area can also make an effort to pay attention to the weaknesses in the American antitrust approach, where the system effects of judging costs and benefits at the sub-sectoral level are mostly ignored. The research may also benefit from a focus on supply factors as it could create the opportunity to find additional implications for antitrust in this sector. Given that so much of the innovation and development at the earlier stages depend on government investments, one can argue

²⁷⁵ Mariana Mazzucato, "Socialization of Risk and Privatization of Rewards," in *The Entrepreneurial State : Debunking Public vs. Private Sector Myths* (New York: Public Affairs, 2013), 237.

²⁷⁶ Ibid.

that firms have a social responsibility that they must exercise. This could be potentially be a point to develop stronger arguments in support of stricter antitrust remedies.

Fortunately, an intellectual movement has begun in the United States built around enacting stronger antitrust measures against information technology monopolies and they have started to examine the impacts of different legislative actions on competition. The creation of the “New Brandeis School” was inspired by Justice Louis Brandeis from the Wilson Era, who was strongly against market concentration and the curse of “bigness.”²⁷⁷ The New Brandeis Thinkers are a lot more sensitive to the malpractices of information technology monopolies as they reject Chicago ideas and take on a more structuralist look at market competition.²⁷⁸ This leads them to disproportionately estimate the negative impact of market concentration alone (often HHI) compared to other schools of thought, but it could be argued that given information technology monopolies have their market abuses facilitated and incentivized by their scale, the estimates might not be too exaggerated. Though it is in its early days, it will be interesting to see what research comes forward from a school of antitrust thought strictly dedicated to the improvement of the antitrust process in the information technology sector. There could be significant research potential in examining all the different schools of antitrust and their impact on competition and innovation in this sector to present more informed legislative recommendations.

²⁷⁷ Jake Walter-Warner and Jonathan H. Hatch, “A Brief Overview of the ‘New Brandeis’ School of Antitrust Law,” Antitrust Update, accessed January 10, 2020, <https://www.pbwt.com/antitrust-update-blog/a-brief-overview-of-the-new-brandeis-school-of-antitrust-law>.

²⁷⁸ Khan, “Amazon’s Antitrust Paradox.”

At the time of writing this paper, there have been only a few notable antitrust cases in this sector but it is still considerably sparse compared to the number of monopolies and the breadth of market abuses seen today. However, it appears that both the United States²⁷⁹ and the European Union²⁸⁰ along with other countries like Russia,²⁸¹ South Korea²⁸² and others are planning to bring forth antitrust charges against information technology monopolies in the near future. It is commendable that all these legislative bodies are starting to recognize the threat that these information technology monopolies pose, and are starting to consider intervening in the markets, but it is just as important that the antitrust processes that they conduct are politically unbiased, informed about the economics behind information technology and flexible to interpretations and implementations of the law. The case studies have shown that the failure to adapt to the changes in the technology-specific details is what led these antitrust bodies to not recognize the bulk of the market abuses. Further research into this topic can examine if the patterns of market abuses are present in other technology monopolies like Amazon, Facebook and Apple are similar to those presented in this paper or if there are more such behaviors that antitrust bodies need to be made aware of.²⁸³ The United States will be bringing forward antitrust charges against Google in the late 2020s,²⁸⁴ one can hope that

²⁷⁹ Tony Romm, "50 U.S. States and Territories Announce Broad Antitrust Investigation of Google," *The Washington Post*, September 9, 2019, <https://www.washingtonpost.com/technology/2019/09/09/states-us-territories-announce-broad-antitrust-investigation-google/>.

²⁸⁰ European Commission, "Antitrust: EC Opens Formal Investigation against Amazon," Press Release, 2019, https://ec.europa.eu/commission/presscorner/detail/en/IP_19_4291.

²⁸¹ Jack Nicas, "Russia Opens Antitrust Inquiry Into App Restriction at Apple," *The New York Times*, 2019, <https://www.nytimes.com/2019/08/09/technology/russia-antitrust-apple-apps.html>.

²⁸² Kim Jaewon, "Tech Giants Brace against Korea's New Antitrust Enforcer," *Nikkei Asian Review*, September 5, 2019, <https://asia.nikkei.com/Business/Technology/Tech-giants-brace-against-Korea-s-new-antitrust-enforcer>.

²⁸³ Martin Sandbu, "The Economics of Big Tech," *Financial Times*, 2019, <https://www.ft.com/economics-of-big-tech>.

²⁸⁴ Bartz, "U.S. Justice Department Prepares Google Antitrust Probe: Sources."

the legislative bodies have learnt their lessons from the events that transpired from the Microsoft cases and followed the European cases closely. There has been much contemplation regarding this upcoming era-defining case, especially regarding a potential change of influences in the American antitrust applications. Though it is unlikely, there is at least hope that their decisions this time around will be much more technically informed and will set the constructive precedents needed for better implementation of antitrust legislation in the information sector in the future.

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Appendix 1

A1 Relevant Market Definitions across the US and the EU

Competition policies and antitrust laws rely on the theoretical framework surrounding market definitions and market concentrations. Being able to define markets is immensely important for fostering competitive environments, but before market concentrations can be measured, it is very important to navigate the ambiguous and often arbitrary means through which relevant markets and market shares are defined. Market definitions can often be the difference between whether a firm is a monopoly or not. Markets are most often defined through product characteristic boundaries and geographic boundaries which are measured by looking at either the demand substitutability or the supply substitutability of the products between certain characteristics or locations.²⁸⁵ Both the Federal Trade Commission and the European Commission have their own methods for defining markets. Though, the basic theoretical approach is the same, some semantic differences can be noted.

The European Commission employs very specific market definitions when enforcing their antitrust laws. They combine the product markets and the geographic market to define the relevant markets for their analyses. For them:

- a relevant product market comprises all those products and/or services which are regarded as interchangeable or substitutable by the consumer by reason of the products' characteristics, their prices and their intended use;

²⁸⁵ Robert S. Pindyck, "Market Definition, Concentration and Optimal Advertising" (Cambridge, MA, 2015), <http://www.mit.edu/~rpindyck/Courses/MMDA15.pdf>.

- a relevant geographic market comprises the area in which the firms concerned are involved in the supply of products or services and in which the conditions of competition are sufficiently homogeneous.²⁸⁶

At first, the Commission checks whether two products belong to the same market or not and then they attempt to determine whether they belong to the same geographic market by looking at their market shares within a certain region and the price differential between the products. Once this has been determined, a more detailed analysis is undertaken by measuring both demand-supply substitutability and potential competition faced by the products.

A market is competitive if customers can choose between a range of products with similar characteristics and if the supplier does not face obstacles to supplying products or services in the given market.²⁸⁷

For demand side substitution, they calculate whether a permanent small increase in prices for one product would cause consumers to switch to the other product. If they switch, they belong to the same market, whereas they don't if the consumers do not switch. If the market is not sufficiently competitive to begin with, they account for substantially increased initial prices. On the supply side, substitutability is determined through a firm's ability to enter or switch production to products that are more relevant in the short term. If the firms can easily switch their production between certain products, then the products are not considered a part of a separate market. However, if there are other significant obstacles in doing so (distribution, advertising, testing, etc.), this is examined separately than the base supply side calculations.²⁸⁸ Once the markets are defined, then the analysis

²⁸⁶ European Commission, "COMMISSION NOTICE on the Definition of Relevant Market for the Purposes of Community Competition Law" (Brussels, 1997), [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997Y1209\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997Y1209(01)&from=EN).

²⁸⁷ Ibid.

²⁸⁸ Ibid.

for whether effective competition is present in the markets is undertaken. Demand side substitutions are determined by looking at evidences of substitutions in the recent past, conducting quantitative tests (cross-price elasticities, similarity of price movements, convergences, etc.), analyzing the views of customers and competitors, looking at consumer preferences within multiple geographical samples, noting the extent of barriers and costs of switching to substitutes for consumers (location, retooling, uncertainty about other suppliers, etc.) and finally examining the price discrimination faced by consumers.²⁸⁹

The geographic dimension of the markets are analyzed by looking at past evidence of price changes in different locations, noting patterns in demand characteristics (culture, lifestyle, local preferences, etc.), evaluating the views of both customers and competitors, looking at geographic patterns of purchases or examining trade flows when geographic patterns are too large to be established and finally identifying the barriers to entry and the cost for switching production (which can get complex since certain costs can be offset by other costs e.g. labor vs. transport costs).²⁹⁰

In the United States, the Federal Trade Commission and the Department of Justice enforce antitrust laws, although private parties and state governments also bring forth charges as well. While the theoretical framework behind markets definitions have been improved upon with each case handled, there is a general guideline that the FTC and the DOJ follow. They note that for some products, multiple relevant markets are often considered when considering the impact on competition. It should be noted that their

²⁸⁹ Ibid.

²⁹⁰ Ibid.

guidelines primarily focus on demand substitution factors, considering supply side factors only in the identification of market participants and the measurement of market shares.²⁹¹

The FTC guidelines on market analysis specifically focus on the elasticity of substitute goods. They primarily analyze the prices of the products, consumer behavior and business sales data to determine the competitive nature of the market.²⁹² Price and consumer behavior are big determining factors since high prices and the consumer's inability to switch to an alternative may indicate a higher concentration of market shares. Demand side substitutability calculations similar to those in the European Union are undertaken to analyze this. Though the primary focus is on the demand side, certain supply side factors are also taken into consideration, such as geographical location of the market and the shipping capabilities of the particular businesses in question. This is used to determine the geographical radius of the market and is done so by noting consumer sales patterns (if it is centered around a certain region) and the business's shipping abilities (if they sell where they manufacture or if they have the capacity to import elsewhere).²⁹³ Often times, the legislative bodies in the United States will employ hypothetical monopoly tests and critical loss ratio analyses to examine relevant markets as well (these are noted in Appendix 2). The definitions for product markets and geographic markets are ultimately mostly the same, the main differences between the two institutions make themselves visible in the ways that applications emphasize different tests more than others.

²⁹¹Federal Trade Commission, "Horizontal Merger Guidelines," 2010, <https://www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf>.

²⁹² Federal Trade Commission, "Markets."

²⁹³ Ibid.

Appendix 2

A2 Relevant Market Concentration Calculations and Monopoly Tests

A2 (i) Herfindahl-Hirschman Index

Despite its efficacy being widely debated, both the Federal Trade Commission²⁹⁴ and the European Commission²⁹⁵ have utilized the Herfindahl-Hirschman Index as a measurement of market concentration (usually mentioned more in the case of merger analyses) on top of comparing the bulk percentage of market share held by companies. Despite using the same measure, the two institutions do have different set thresholds for what they consider to be minimally concentrated versus highly concentrated.

$$HHI_s^t = \sum_{i \in S}^{N_s^t} MS_{i,t}^S{}^2$$

Where, $MS_{i,t}^S$ is the market share of firm i in year t and industry s .²⁹⁶ HHI calculated by squaring the market shares of all of the firms competing in a certain industry and summing their total. Theoretically, for a perfectly competitive industry, the HHI would be 0, but for a perfect monopoly it would be 10,000 (100% market share under one firm). The table below depicts the thresholds that the United States and European Union consider to be concentrated.

²⁹⁴ Federal Trade Commission, "Horizontal Merger Guidelines."

²⁹⁵ European Commission, "Guidelines on the Assessment of Horizontal Mergers under the Council Regulation on the Control of Concentrations between Undertakings," *Official Journal C 031*, 05/02/2004 P. 0005 - 0018 (Brussels: OPOCE, 2004), [https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52004XC0205\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52004XC0205(02)&from=EN).

²⁹⁶ Maria Chiara Cavalleri et al., "Concentration, Market Power and Dynamism in the Euro Area," Working Paper Series, 2019, <https://doi.org/10.2866/379250>.

Table A2. (i)

	United States ²⁹⁷	European Union ²⁹⁸
Not concentrated	<1500	<1000
Mildly concentrated	1500 - 2500	1000 - 2000
Highly concentrated	> 2500	>2000

A2 (ii) Lerner Index

The Lerner index is used to measure the degree to which price of a product exceeds marginal costs, though not widely used in the United States, it is sometimes used in European antitrust analyses to see the extent of markups employed by monopoly firms. As noted in the paper, the Lerner index is not a viable measure for goods with negligible marginal costs like software products.

$$L = \frac{P - MC}{P} = \frac{1}{|E|}$$

Where P is price, MC is marginal cost and E is price elasticity of the product.

A2 (iii) Monopoly Tests

A lot of the literature surrounding the measurement of market concentration and the identification of relevant markets focus around mergers primarily. This is why the analytical tools used to analyze the levels of market concentrations emerge from those areas, this includes estimates of critical loss, price discrimination, price effects due to the entry of a new competitor and consumer behavior.²⁹⁹ This section will make note of a few

²⁹⁷US Department of Justice, "Horizontal Merger Guidelines," US Department of Justice, 2010, <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#5c>.

²⁹⁸ European Commission, "Guidelines on the Assessment of Horizontal Mergers under the Council Regulation on the Control of Concentrations between Undertakings."

²⁹⁹ Delegation of the United States, "Market Definition," 2012, <http://www.justice.gov/atr/public/guidelines/hmg-2010>.

important ones that are administered by the legal bodies in both the European Union and the United States.

- (a) **SSNIP Test (also called hypothetical monopoly test):** This checks if a hypothetical imposition of a small significant but non-transitory price (SSNIP) on one or more products in a candidate market would raise the hypothetical monopolist's profits for a certain period of time. The effect on sales of the substitutes allows the legal bodies to infer the level of concentration in relevant markets.³⁰⁰ Though this is not necessarily full-proof given that it does not account for degree of substitutability.³⁰¹ So for example, the test could check the impact on monopoly profits of a price increase of 5% over 12 months.
- (b) **Critical Loss Ratio Analysis:** It analyzes the amount of percentage loss in sales needed for a price increase to be unprofitable. It can be used to measure anticompetitive effects and also find relevant markets. However, it lacks in its ability to account for cross-price elasticities of demand amongst other issues.

³⁰⁰ US Department of Justice, "Horizontal Merger Guidelines."

³⁰¹ States, "Market Definition."

Appendix 3

A3 Relevant Technology Definitions

Operating System: The main software that controls the primary operation of a computer and allows the functioning of programs by assigning memory space and controlling input and output functions.³⁰²

Mobile Operating System: An operating system built exclusively for mobile devices. It is responsible for defining mobile device features and functions and serves as a platform for the use of mobile applications.³⁰³ Can be exclusive and integrated to specific phones like iOS for Apple iPhones or can be licensable to other mobile devices like Google Android.

Graphical User Interface: It is a user interface that includes graphical elements, such as windows, icons and buttons. This distinction was necessary as command line interfaces was the norm before.³⁰⁴ The availability of the graphical user interfaces made it easier for common consumers to confidently operate personal computers in the 1970s.

Software Environment or Ecosystem: A platform that is host to multiple other compatible software applications. Can be a desktop operating system, a mobile operating system, a cloud-based or web-based platform as well.

³⁰²“Operating System,” Merriam-Webster, accessed January 11, 2020, [https://www.merriam-webster.com/dictionary/operating system](https://www.merriam-webster.com/dictionary/operating%20system).

³⁰³ “What Is a Mobile Operating System (Mobile OS)?,” Techopedia, accessed January 11, 2020, <https://www.techopedia.com/definition/3391/mobile-operating-system-mobile-os>.

³⁰⁴ Per Christensson, “GUI (Graphical User Interface),” TechTerms, 2006, <https://techterms.com/definition/gui>.

Software Applications: Software programs developed for users for various functionalities that run on operating systems, mobile operating systems or web-based platforms.

Mobile Application Store: A mobile operating system application which allows users to download other mobile software applications. Notably Google Playstore and Apple App Store.

Web Browser: It is an application used to access and view websites on the internet.

³⁰⁵Different from mobile web browsers which are used to run the same function on mobile phones (a different platform).

Platform: A platform is a group of technologies that are used as a base upon which other applications, processes or technologies are developed.³⁰⁶

Work-group Server: It is a peer-to-peer network system. All the connected computers on the system are allowed to access shared resources such as network files, system resources and hardware like printers.³⁰⁷

General Search Services: These services are provided by search engines like Google, Bing or DuckDuckGo to help users find relevant websites when they enter specific terms onto search bars. This is done by indexing large databases of websites based on titles, keywords, text in the pages and user activity. ³⁰⁸

³⁰⁵Per Christensson, "Web Browser," TechTerms, 2014, https://techterms.com/definition/web_browser.

³⁰⁶ "What Is a Platform?," Techopedia, accessed January 11, 2020, <https://www.techopedia.com/definition/3411/platform>.

³⁰⁷ "What Is a Workgroup?," Techopedia, accessed January 11, 2020, <https://www.techopedia.com/definition/10075/workgroup>.

³⁰⁸ Per Christensson, "Search Engine Definition," TechTerms, 2006, <https://techterms.com/definition/searchengine>.

Vertical Search Services: A web-based search engine that indexes specialized content.

This functions similarly to search engines, except the databases are more suited to narrower search queries like finding airplane prices or restaurants in an area.³⁰⁹

Android Fork: Since Google Android is a licensable mobile operating system, they allow developers to make customizations to their software to better suit their devices. An Android fork is simply a custom iteration of the Google Android mobile operating system. Most notably, the Amazon Fire OS.

³⁰⁹ Ziff Davis, "Definition of Vertical Search Engine," in *PC Mag*, 2020, <https://www.pcmag.com/encyclopedia/term/vertical-search-engine>.

Appendix 4

A4 List of Applicable Laws

Though, there are many laws that fall under the umbrella of antitrust laws (such as merger guidelines) that play a role in regulating monopolistic behavior, this section makes note of the specific antitrust laws in the United States and European Union relevant to the case studies analyzed in this paper.

2.3.1 (a) United States

Sherman Antitrust Act (1890)

§ 1: Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal.³¹⁰

§ 2: Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony[...]³¹¹

2.3.1 (b) European Union

Article 101 of the Treaty on the Functioning of the European Union

The following shall be prohibited as incompatible with the internal market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market, and in particular those which:

- (a) directly or indirectly fix purchase or selling prices or any other trading conditions;
- (b) limit or control production, markets, technical development, or investment;
- (c) share markets or sources of supply;
- (d) apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage.
- (e) make the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.

2. Any agreements or decisions prohibited pursuant to this Article shall be automatically void.

3. The provisions of paragraph 1 may, however, be declared inapplicable in the case of:

- any agreement or category of agreements between undertakings,

³¹⁰ Legal Information Institute, “Trusts, Etc., in Restraint of Trade Illegal; Penalty [” (1890), <https://www.law.cornell.edu/uscode/text/15/1>.

³¹¹ Legal Information Institute, “Monopolizing Trade a Felony; Penalty” (1890), <https://www.law.cornell.edu/uscode/text/15/2>.

— any decision or category of decisions by associations of undertakings,
— any concerted practice or category of concerted practices,
which contributes to improving the production or distribution of goods or
to promoting technical or economic progress, while allowing consumers a
fair share of the resulting benefit, and which does not:
(a) impose on the undertakings concerned restrictions which are not
indispensable to the attainment of these objectives;
(b) afford such undertakings the possibility of eliminating competition in
respect of a substantial part of the products in question.³¹²

Article 102 of the Treaty on the Functioning of the European Union (previously Article 82 of the Treaty of the European Economic Community)

Any abuse by one or more undertakings of a dominant position within the
internal market or in a substantial part of it shall be prohibited as
incompatible with the internal market in so far as it may affect trade
between Member States.

Such abuse may, in particular, consist in:

- (a) directly or indirectly imposing unfair purchase or selling prices or other
unfair trading conditions;
- (b) limiting production, markets or technical development to the prejudice of
consumers;
- (c) applying dissimilar conditions to equivalent transactions with other
trading parties, thereby placing them at a competitive disadvantage;
- (d) making the conclusion of contracts subject to acceptance by the other
parties of supplementary obligations which, by their nature or according to
commercial usage, have no connection with the subject of such contracts.³¹³

Article 54 of European Economic Area Agreement

Any abuse by one or more undertakings of a dominant position within the territory covered by this
Agreement or in a substantial part of it shall be prohibited as incompatible with the functioning of
this Agreement in so far as it may affect trade between Contracting Parties. Such abuse may, in
particular, consist in:

- (a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading
conditions;
- (b) limiting production, markets or technical development to the prejudice of
consumers;
- (c) applying dissimilar conditions to equivalent transactions with other trading parties, thereby
placing them at a competitive disadvantage;
- (d) making the conclusion of contracts subject to acceptance by the other parties of supplementary
obligations which, by their nature or according to commercial usage, have no connection with the
subject of such contracts.³¹⁴

³¹² European Commission, “EU Competition Law Rules Applicable to Antitrust Enforcement Volume I: General
Rules.”

³¹³ Ibid.

³¹⁴ Ibid.