

**United States v. Google:  
A Game-Theoretical Analysis of  
Modern Antitrust Enforcement**

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## Preface

Here before you is the Senior Integrated Project, “United States v. Google: A Game-Theoretical Analysis of Modern Antitrust Enforcement.” This paper has been completed to fulfill the graduation requirements for the Bachelor of Arts degree at Kalamazoo College in Kalamazoo, MI. I began this project in March of 2024, developing it from a research idea inspired by my coursework and completing it in November of 2024.

This project grew from a fascination with two intersecting fields: the rapid acceleration of technological development and the increasingly complex issue of regulating the companies driving that development. My curiosity about how regulatory bodies, particularly the Department of Justice, address the power dynamics of Big Tech companies – especially a market-dominant entity like Google – became a core motivation. The ways in which historical antitrust precedents shape contemporary regulatory perspectives fueled my interest, prompting me to analyze this issue through the lens of game theory.

Game theory, as a unique subfield of behavioral economics, explores how rational agents interact in strategic environments, making it a powerful tool for examining the interactions between regulatory bodies and corporate entities. I was drawn to the depth game theory offers by focusing on the motivations, incentives, and constraints that influence decision-making. In particular, the principles of Nash Equilibrium and backward induction provide structured approaches to evaluating how each “player” might act to achieve optimal outcomes, especially when

outcomes hinge on sequential choices and imperfect information. By employing game theory in this context, I aimed to bring an analytical perspective to the ways in which the DOJ and Google navigate this high-stakes legal contest, identifying where their interests align or clash, and analyzing potential paths the case could take.

Expanding this project from an initial course paper allowed me to expand on and further pursue my interests in Behavioral Economics, ultimately deepening my understanding of strategic decision-making in both the corporate and regulatory spheres. It is my hope that this project will provide insights into the delicate balance of power in the digital economy, shedding light on how economic models and strategic thinking can inform our understanding of legal and regulatory processes in an era increasingly shaped by technology.

## **Acknowledgements**

First and foremost, I would like to thank Dr. Julia Cartwright. Her guidance, insight, and unwavering encouragement have been the foundation of this project. She has challenged and inspired me to be better, do more, and reach higher in both academia and in life. Without her advisory and support, my interest in economics and game theory would not exist, and this project would not have come to fruition.

I am also deeply grateful to my academic advisor, Dr. Rachel Love, who has shown me the importance of creativity across all fields. Her example reminds me of the impact that truly good people have on those around them, and her encouragement has taught me to approach my work with imagination and care, regardless of the discipline.

To my family — my parents and brother — thank you for your unending support of my education and goals. In every imaginable way, you have been there for me, and everything I have done and will do is with an owed thanks to you.

I would lastly like to thank Jordan Flink, who contributed greatly to the first iteration of this paper, and whose insights and friendship have been invaluable throughout this process.

To all of you, my deepest gratitude.

## Abstract

In the digital era, technology giants have reshaped the global economy, but their unprecedented influence has raised critical concerns around monopolistic practices and market control. This paper explores the United States Department of Justice's (DOJ) antitrust case against Google, framing it within the broader context of U.S. antitrust law, and examines the implications of the DOJ's strategies through a game-theoretical model. The analysis highlights how historical antitrust precedents, such as the Sherman Act and landmark cases like Standard Oil and AT&T, inform current regulatory approaches toward Big Tech. With Google's substantial market share in search and digital advertising, the DOJ's lawsuit seeks to prevent monopolistic practices that allegedly stifle competition and consumer choice.

This study applies an extended game-theoretical model to simulate strategic interactions among the DOJ, Google, and the judicial system, identifying negotiation as a theoretically optimal path for both sides. Yet, contrary to model predictions, the DOJ's decision to pursue litigation reflects political motivations, the need for durable legal precedent, and the intention to influence both national and international regulatory standards. Through this case, the DOJ aims to achieve a broad-based regulatory impact, setting boundaries for market dominance that may apply across the tech industry. The outcomes of this case bear significant implications for future antitrust enforcement, the operational strategies of tech companies, and judicial standards for addressing monopolistic behavior in digital markets. This analysis underscores the strategic complexities

of regulating Big Tech and the evolving relationship between government authority and corporate power in the digital age.

## Table of Contents

Introduction	1
Key Players in The United States v. Google Antitrust Case	7
Preferences and Strategies of Key Players	11
Game-Theoretical Model with Visual Representation	19
Strategic Analysis of The Extended Game Matrix	21
Assumptions of The Extended Game Model	25
Implications for Future Antitrust Regulatory Strategy	32
Conclusion	36
References	38
Appendix 1	40



## 1. Introduction

In the modern digital economy, a small number of technological giants wield a vast influence to shape markets, innovation, and consumer behavior on a global scale. Companies such as Amazon, Apple, Microsoft, and – perhaps most notably – Google have transformed industries and driven innovation at an unprecedented pace. As these companies have grown to such global dominance, however, so too have concerns about their market dominance and anti-competitive, and seemingly monopolistic practices. The case of Google is particularly salient as its undeniable market dominance in the online search engine and digital advertising industries has made it a focal point of the ongoing discourse surrounding antitrust regulations specifically in the technology sector (Bork, 1978). In response, the United States Department of Justice (known acronymically as the DOJ) – with support of a coalition of state attorneys general – has filed a series of antitrust lawsuits against Google's parent company Alphabet Inc. These legal actions and subsequent proceedings allege that Google has exploited and abused its market position to restrict and stifle innovation in such a manner that competitive firms are unable to naturally arise (House Judiciary Committee Report on Competition in Digital Markets, 2020). This case, denoted as *United States v. Google*, is understood to be an inflection point in modern antitrust law, evoking comparisons to the historical precedents set by the likes of *United States v. Standard Oil* and *United States v. AT&T*. At the heart of the case, however, lies a fundamental question about the nature of market governance: What is the government's role in cooperating with and regulating technological industry giants to ensure the

maintenance of fair competition in an era marked by rapid technological change and market expansion?

### **The Foundation of U.S. Antitrust Law**

The origins of U.S. antitrust law lie in the economic transformations brought about by the Industrial Revolution. As vast corporations gained dominance over sectors such as steel, railroads, and oil, public and government concerns grew over the effects of monopolies on competition and consumer welfare – resulting in the Sherman Act. Passed in 1890, this new legislative reform aimed to prevent monopolistic and anti-competitive business practices, ultimately allowing the government to challenge companies that consolidated power at the expense of competition and consumer choice (Lamoreaux, 1985). Senator John Sherman, the Act's author and namesake, emphasized the dangers of market share concentrations, stating, "If we will not endure a king as a political power, we should not endure a king over the production, transportation, and sale of any of the necessaries of life." In the wake of Sherman's stark analogy, this legislation ultimately operated as and established the legal framework for dismantling monopolies, marking the beginning of an era in the United States where the federal government would actively seek to promote fair competition through regulatory practices and interventions.

The Sherman Act, furthermore, was most famously applied in the 1911 Supreme Court case against Standard Oil, owned by industrial magnate John D.

Rockefeller. The Supreme Court ruled that Standard Oil's control over the oil

industry constituted a monopoly due to predatory pricing practices and contract exclusivity which were facilitated by the firm's accrual of market shares (Sherman Antitrust Act, 15 U.S.C. §§ 1–7; Standard Oil Co. of New Jersey v. United States, 1911). The court's ruling resulted in the dissolution of Standard Oil into 34 smaller companies, thereby diversifying the market and restoring competitive balance. At its closing, the case against Standard Oil set a powerful precedent as an exemplification of the government's new-found commitment to confronting monopolistic entities as a means to safeguard consumer choice and maintain fair market conditions. In doing so, this case established the precedent that firms could be dissolved and deconstructed if they used their market power to unfairly stifle competition — a concept that continues to influence antitrust enforcement in new industries, including modern tech.

### **The Clayton Act and Federal Trade Commission**

As the United States' economy grew and further evolved, additional legislative measures were introduced by necessity as a means to strengthen antitrust protections and more effectively address continued monopolistic behaviors. The Clayton Antitrust Act of 1914 and the following establishment of the Federal Trade Commission (known acronymically as the FTC) marked significant advancements in the cultivation of the regulatory landscape, ultimately providing a better-tailored set of tools to counteract the prevailing anti-competitive practices.

The Clayton Act was designed to reinforce the principles of the Sherman Act by addressing certain business practices that were not accounted for under the existing set of legislation. The Act prohibited specific actions, particularly those of mergers and acquisitions that would substantially reduce market competition, price discrimination that favored certain buyers, and exclusive contracts that prevented companies from engaging in business with competitors (Clayton Antitrust Act, 15 U.S.C. §§ 12–27). By focusing on these specific anti-competitive practices, the Clayton Act gave regulators a more precise framework to prevent market consolidation and protect competition, and subsequently a more specific grounds on which firms that engaged in such behaviors could be sanctioned and disbanded (Blair & Sokol, 2014).

The same year as the Clayton Act, the Federal Trade Commission was established to provide proactive oversight of the aforementioned unfair business practices. Whereas previous antitrust legislation was reactionary and punitive, the FTC's mandate was preventative, allowing for anti-competitive practices to be addressed on a regulatory basis before market domination occurred. The FTC's founding marked a shift in regulatory strategy within the United States, signaling a new and expanded approach to protecting consumer rights and competitive industries as the economy continued to grow at unprecedented rates. In the following decades, the FTC's regulatory role grew much the same, adapting to the needs and nature of an ever-evolving economy.

## **United States v. AT&T**

The 1982 case of the United States v. AT&T represents one of the most significant and radical applications of antitrust law, as the resolution and decision of this case ultimately reshaped the telecommunications industry entirely. For background's sake, AT&T's Bell System had achieved near-total control over telephone services in the United States, limiting competition and suppressed innovation within the industry. After years of legal proceedings and ongoing battles, the DOJ and AT&T reached a settlement agreement in which AT&T would divest its regional telephone providers, resulting in the creation of seven smaller firms which came to be known as "Baby Bells" (Fox & Crane, 2007). The restructuring of AT&T which resulted from this case reintroduced competition into the telecommunications industry, thereby driving down prices for consumers and reviving technological innovations. In its example, United States v. AT&T serves as the blueprint for antitrust interventions, particularly for industries in which there exist high barriers to entry and complex technological infrastructures – both of which are factors still relevant in the ongoing development of the modern tech industry (Fox & Crane, 2007).

## **United States v. Google: A New Chapter in Antitrust Enforcement**

The DOJ's lawsuit against Google, filed in October of 2020, marks the first major antitrust action against a tech giant in more than two decades. The DOJ, by means of their suit, seeks to address Google's alleged monopolistic behaviors pertaining to search engines and digital advertising, ultimately questioning the company's

business practices and the broader implications of its market dominance (Kades & Scott Morton, 2021).

Central to the DOJ's case is the stark allegation that Google leveraged exclusive agreements with device manufacturers, namely Apple and Samsung, to serve as the default search engine on their products – thereby cultivating and further securing its dominance. By establishing such agreements, Google created significant barriers to entry for competitors such as Microsoft's Bing and privacy-centric alternatives like that of DuckDuckGo. The DOJ's contention is founded on the basis that these agreements restrict and prevent competition, thereby limiting consumer choice and disallowing those competitors from gaining market share even if they make a superior product (United States Department of Justice, 2020).

In response to these allegations, Google argued and continued to argue that its market dominance and accrual of market share is a reflection not of anti-competitive practices, but rather of the consumer's preference for its superior services. Additionally, Google contends that its partnerships with Apple and Samsung reduce friction for users, ultimately resulting in a better experience with their products. Such an argument raises significant questions about how one may go about defining competition in this context: Is dominance that is achieved through product quality inherently anti-competitive, or are there cases in which dominance truly is a probable reflection of consumer preferences?

The DOJ's pursuit of legal action against Google did not stop at a single suit, however, as an additional suit was filed in January of 2023 – now targeting Google's hold on the digital advertising market. This case shifted focus to Google's vertical integration of products and services, allowing it to control every stage of the advertising process – from creation to placement. The DOJ argues that Google's acquisitions of smaller advertising services, namely DoubleClick and AdMeld, have allowed for the creation of disproportionate influence of the ad tech market, thereby limiting competition, inflating service prices, and reducing the economic viability of other publishers (Khan, 2017).

In its totality, the DOJ's series of antitrust lawsuits against Google represents more than just a single regulatory action – it marks a critical inflection point in the history of U.S. antitrust law enforcement. By drawing influence and precedence from a century of antitrust policies and court decisions, the case against Google reaffirms and, relative to Big Tech, redefines the government's role in protecting and maintaining competitive markets.

## **2. Key Players in the *United States v. Google* Antitrust Case**

The antitrust case of *United States v. Google* highlights the complex strategic interplay between the Department of Justice, a powerful corporate entity, and federal judiciary that will almost certainly redefine the regulatory rules of play in the modern digital economy. Each respective player – those being Merrick Garland, Sundar Pichai, and judge Amit Mehta – occupies a role which will shape both the trajectory of this specific case and the broader landscape of antitrust law

enforcement in the 21st century. Through game theoretical modeling, specially by means of an extended game model, we can obtain insight into how each player's actions, preferences, and respective constraints will influence the complex dynamics and potential outcomes of this case.

### **Merrick Garland: Attorney General of the United States**

As Attorney General, Merrick Garland leads the Department of Justice and serves as the principal advocate for enforcing antitrust regulations against Google.

Garland, a former federal judge often characterized by his centrist legal interpretations, exercises a nuanced approach to regulatory enforcement, particularly as applied to the complex and exponentially ever-growing technology sector. Since his appointment by President Joe Biden in 2021, Garland has placed a particular focus on restoring the trust of the American people in the DOJ whilst asserting regulatory authority over industries where unchecked corporate power had previously threatened to suppress competition and restrict consumer choice (Crane, 2020).

Garland's decision to pursue antitrust action against Google is reflective of his commitment to what he notably perceives as a critical regulatory shift toward holding tech giants accountable for their business practices. From his perspective, Google's dominance in search and digital advertisement poses significant barriers to competition, noting that smaller firms struggle to penetrate and thrive in markets in which Google operates. By initiating this suit, Garland is signaling that the DOJ is well-equipped to challenge monopolistic behaviors in a manner



reminiscent of historic antitrust cases, such as the aforementioned actions taken against Standard Oil and AT&T (Areeda & Hovenkamp, 2021). Garland's actions also reflect an alignment with the more global efforts, particularly in Europe, to regulate Google's power and influence in these markets.

In an extended game model, Garland acts as the first mover as the key decision maker in the process of how these proceedings should be initiated. Although he is responsible for choosing to either initiate formal legal action in court or proposing a series of negotiations, Garland's objectives extend beyond this case alone. Garland's handling of these proceedings will set precedence to guide future regulatory actions against similar firms. In this regard, Garland's role represents the comprehensive vision to maintain regulatory oversight and ensure the enforcement of antitrust laws in the United States.

**Sundar Pichai: CEO of Google's Parent Company, Alphabet Inc.**

As the CEO of Google's parent company, Alphabet Inc., Sundar Pichai is responsible for defending the practices and testifying on behalf of Google. As an engineer and long-standing Google executive, Pichai has led the company through its substantial growth in the latter half of the 21st century, overseeing not only its continued dominance in search but also its continued expansions into cloud computing, artificial intelligence, and digital advertising. Google's prominent market position in the tech sector, as Pichai primarily claims, is the outcome of superior product quality, significant consumer satisfaction, and technical

innovation – not the non-competitive actions of which they stand accused (United States Department of Justice, 2020).

In this game-theoretical model, Pichai's role is largely reactionary (Binmore, 2007). His strategy centers on countering the DOJ's arguments while preserving Google's operational freedom and market position. His primary responsibility is managing the balancing act of justifying Google's existing practices without inviting additional scrutiny that could potentially lead to even stricter regulations or restructuring. As Google's top executive, Pichai's decisions within this game are therefore carefully calculated to present Google as a pro-consumer innovator. Pichai's actions will ultimately be central to determining how far Google is willing to go to settle with or defend against the DOJ's charges, and his choices will have implications not only for Google's market strategies but for other tech firms that face similar regulatory pressures as well.

### **Judge Amit Mehta: Presiding Judicial Authority**

Amit Mehta, appointed to the U.S. District court for the District of Columbia by President Barack Obama in 2014, plays a critical role in *United States v. Google* as the keystone judicial authority presiding over the case. Mehta is primarily tasked with evaluating the DOJ's claims and allegations, and Google's defense and counter position. Mehta's background in regulatory and antitrust law positions him a highly qualified and well-versed arbiter in this case. His rulings will help shape the legal landscape for antitrust law as it applies to firms with significant market share.

Mehta's role in this extended game is that of the impartial decision-maker. His rulings must weigh both the DOJ's concerns about the harm to competition that Google's business practices pose, as well as Google's reasoning for those practices being lawful and beneficial to consumers. Mehta's judgements and final decision in this case will also reflect a larger judicial philosophy about the court's role in balancing natural market forces with regulatory oversight. His position as the final decision maker in the game – choosing whether to rule in favor of Google or antitrust law – underscores the judicial power to set precedent, and create transformative standards when the conditions of the economic environment call for such (Areeda & Hovenkamp, 2021).

### **3. Preferences and Strategies of Key Players**

#### **Merrick Garland's Strategies, Preferences, and Payoffs**

As the head of the DOJ, Garland's primary goal is to curb monopolistic practices by imposing antitrust restrictions on Google, ideally through a negotiated settlement or a favorable court ruling.

#### **Strategies and Ordinal Preferences**

1. **Initiate Action, Pursue Legal Action, Rule in Favor of DOJ (Payoff = 5)**
  - *Outcome:* The DOJ initiates legal action, proceeding to trial, with Judge Mehta ruling in favor of antitrust enforcement.

This is Garland's top preference, as a court ruling establishes a strong legal precedent against monopolistic practices in tech, promoting fair competition.

**2. Initiate Action, Successful Negotiation (Payoff = 4)**

- *Outcome:* Garland initiates legal action, resulting in a successful negotiation with Google before reaching trial.

This outcome imposes regulatory constraints while avoiding the cost and uncertainty of a trial, though it lacks the legal precedent of a court ruling.

**3. Pursue Negotiation, Successful Negotiation (Payoff = 3)**

- *Outcome:* Garland pursues negotiation from the start, achieving a successful resolution without legal action.

A successful negotiation still fulfills Garland's regulatory objectives, though with less impact than formal legal action.

**4. Initiate Action, Pursue Settlement, Google Settles (Payoff = 2)**

- *Outcome:* Garland initiates legal action, prompting Google to settle before trial.

A pre-trial settlement allows Garland to achieve regulatory success, but it's less advantageous than direct negotiations or a full trial.

**5. Pursue Negotiation, Decline (Payoff = 1)**

- *Outcome:* Garland seeks negotiation, but Google declines to participate.

While not yielding a resolution, Garland's openness to negotiation highlights his willingness to pursue regulatory dialogue.

**6. Initiate Action, Pursue Legal Action, Rule in Favor of Google (Payoff = -1)**

- *Outcome:* Garland initiates legal action, but Judge Mehta rules in favor of Google.

A court ruling against the DOJ weakens Garland's position, diminishing the DOJ's capacity to challenge monopolistic practices.

**7. Pursue Negotiation, Accept, Breakdown of Negotiation (Payoff = -2)**

- *Outcome:* Both parties agree to negotiate, but negotiations fail.

A failed negotiation reflects poorly on the DOJ's ability to regulate, though less damaging than a court defeat.

**8. Initiate Action, Pursue Settlement, Breakdown of Settlement (Payoff = -3)**

- *Outcome:* Legal action is initiated, but settlement discussions collapse.

This scenario is Garland's least desirable as it indicates a breakdown without concessions from Google, wasting DOJ resources and forcing a costly escalation.

### **Sundar Pichai's Strategies, Preferences, and Payoffs**

As CEO of Alphabet, Pichai's objective is to protect Google's market position and avoid any restrictive regulatory actions that could harm the company's dominance.

### **Strategies and Ordinal Preferences**

**1. Initiate Action, Pursue Legal Action, Rule in Favor of Google (Payoff = 5)**

- *Outcome:* The DOJ initiates legal action, and Judge Mehta rules in Google's favor.

This is Pichai's ideal scenario, as a court ruling in favor of Google reinforces its market power and deters future regulatory challenges.

**2. Pursue Negotiation, Successful Negotiation (Payoff = 4)**

- *Outcome:* Google and the DOJ achieve a successful negotiation without reaching trial.

Negotiation limits regulatory constraints without court intervention, allowing Google to make manageable concessions.

**3. Initiate Action, Pursue Settlement, Google Settles (Payoff = 3)**

- *Outcome:* After the DOJ initiates legal action, Google settles, avoiding a trial.

Settlement through litigation is a moderate compromise for Google, avoiding the risks associated with a court ruling.

**4. Initiate Action, Pursue Settlement, Breakdown of Settlement (Payoff = -1)**

- *Outcome:* Settlement discussions break down after the DOJ initiates legal action.

While not ideal, this breakdown keeps negotiations open, signaling resistance to excessive regulatory concessions.

**5. Pursue Negotiation, Accept, Breakdown of Negotiation (Payoff = -2)**

- *Outcome:* Both parties accept negotiations, but they ultimately fail.

A failed negotiation suggests Google may face litigation without a resolution, increasing costs and potential risks.

**6. Initiate Action, Pursue Legal Action, Rule in Favor of DOJ (Payoff = -4)**

- *Outcome:* The DOJ initiates legal action, with a court ruling in favor of antitrust enforcement.

An unfavorable ruling imposes strong regulatory constraints on Google, with long-term impacts on market dominance and practices.

**7. Pursue Negotiations, Decline (Payoff = -5)**

- *Outcome:* Pichai declines Garland's negotiation offer, escalating the situation toward legal action.

This is Pichai's least favorable outcome, as refusing negotiations makes Google appear uncooperative and raises the likelihood of a damaging court ruling.

**Judge Amit Mehta's Role, Preferences, and Payoffs**

Judge Mehta's role is to oversee the legal process and ensure the outcome aligns with public interest principles. His primary goal is to reinforce competitive markets, especially if the case proceeds to trial.

**Strategies and Ordinal Preferences**

**1. Initiate Action, Pursue Legal Action, Rule in Favor of DOJ (Payoff = 4)**

- *Outcome:* A court ruling supports the DOJ's case, reinforcing antitrust principles.

Ruling in favor of antitrust promotes market competition and public interest, establishing a legal precedent for future cases.



## 2. **Successful Negotiation Outcome (Payoff = 2)**

- *Outcome:* The DOJ and Google reach a negotiated resolution without court involvement.

Successful negotiation is favorable as it achieves antitrust goals cooperatively, though without formal judicial impact.

## 3. **Settlement Before Trial (Payoff = 1)**

- *Outcome:* A pre-trial settlement between the DOJ and Google.

Settlement allows some regulatory oversight, though without the substantial precedent of a court ruling.

## 4. **Negotiation Refusal by Google (Payoff = 1)**

- *Outcome:* Google refuses to negotiate with the DOJ.

This outcome is neutral for Mehta, as no regulatory action occurs, but it preserves potential intervention options.

## 5. **Initiate Action, Pursue Settlement, Breakdown of Settlement (Payoff = -1)**

- *Outcome:* Settlement discussions collapse, prolonging regulatory uncertainty.

Failed negotiations reflect poorly on regulatory efficiency, making it a suboptimal outcome for Mehta.

**6. Pursue Negotiation, Accept, Breakdown of Negotiation (Payoff = -2)**

- *Outcome:* Both parties initially agree to negotiate but fail to settle.

The failed negotiation lacks progress toward regulatory action, creating uncertainty and inefficiency.

**7. Initiate Action, Pursue Legal Action, Rule for Google (Payoff = -3)**

- *Outcome:* Judge Mehta rules in favor of Google, allowing its dominance to remain unchecked.

This scenario represents a missed opportunity to address monopolistic practices, failing to protect competitive markets effectively.

**Review of Player Preferences and Strategic Implications**

**Garland's Preferences:**

Garland favors outcomes where regulatory goals are achieved either through legal action (favorable ruling) or negotiation. Successful outcomes with substantial regulatory constraints, even without trial, are preferable to breakdowns that imply or directly lead to failure.

**Pichai's Preferences:**

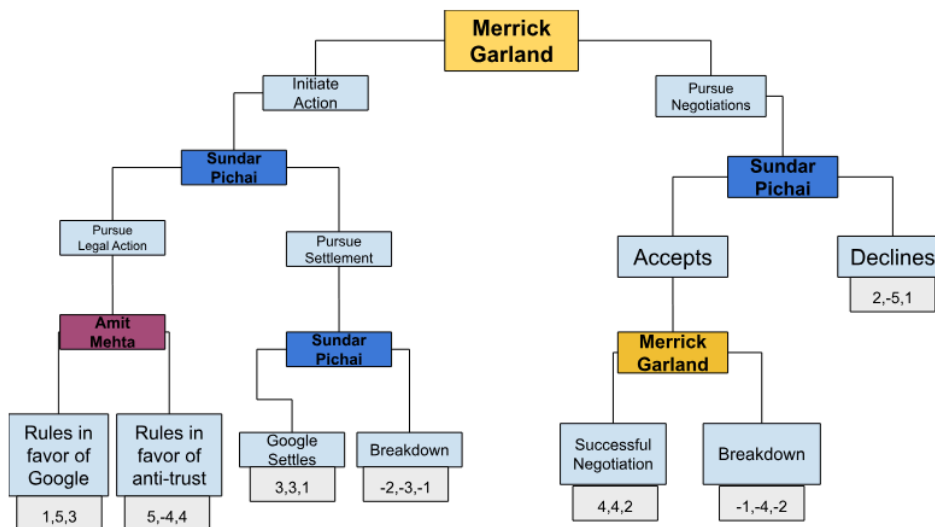
Pichai prioritizes avoiding a court ruling, seeking negotiation or settlement with minimal regulatory interference so as to maximize the preservation of Google's business practices. His least preferred outcomes are, of course, those that lead to ruling against Google and increase costs relative to both finances and perceptions.

## Mehta's Preferences:

Mehta's optimal outcomes involve supporting competitive markets and public interest through antitrust action, with preferences leaning toward successful rulings or negotiated outcomes that indirectly achieve regulatory goals.

## 4. Game-Theoretical Model with Visual Representation

This extended game model outlines the strategic interactions in *United States v. Google* with a specific focus on the choices and subsequent outcomes for Garland, Pichai, and Mehta. The model specifically examines and emphasizes two main paths: that which stems from the initiation of legal action, and that which stems from pursuing negotiations.



## **Garland's Strategic Paths**

Garland can either initiate direct legal action or pursue a pretrial negotiation. The decision to pursue litigation would signal a commitment to producing an efficient regulatory outcome and would likely set a high-impact legal precedent. However, negotiation offers the DOJ a path to moderate regulatory success without the costs of litigation. If legal action is pursued, Garland's payoff depends heavily on whether Pichai chooses to defend Google in court or to seek a settlement of some sort.

## **Pichai's Options if Legal Action is Initiated**

Upon the DOJ's initiation of legal action, Pichai has two main strategies:

1. **Pursue Legal Action and Defend In Trial:** If Pichai pursues a full trial, Judge Mehta's ruling will be decisive as to how Google will operate. A ruling in Google's favor strengthens its market position even further, yielding high payoffs for Pichai and modest gains for Mehta. Conversely, an antitrust ruling against Google would impose regulatory constraints, representing a significant win for Garland and a notable setback for Pichai.
2. **Pursue Settlement:** If Pichai chooses to settle, a mutually acceptable agreement benefits both parties, with each avoiding the potential risks of a trial. Breakdown of settlement talks, however, would negatively impact both Pichai and Garland, as it results in prolonged regulatory uncertainty and, perhaps most importantly, public distrust of both parties.

## **Garland's Preference for Negotiation and Cooperative Outcomes**

Alternatively, Garland can choose to directly pursue negotiations with Pichai and Google in an effort to reach a collaborative and less punitive regulatory solution. Such an approach would allow Pichai the opportunity to avoid trial. A successful negotiation (yielding payoffs of 4 for Garland, 4 for Pichai, and 2 for Mehta) signals mutual gains – Garland's regulatory desires are met, Pichai avoids trial and thus maintains Google's public image without sacrificing its market position too severely, and Mehta lastly remains uninvolved but yields some level of utility from a cooperative, efficient outcome being reached.

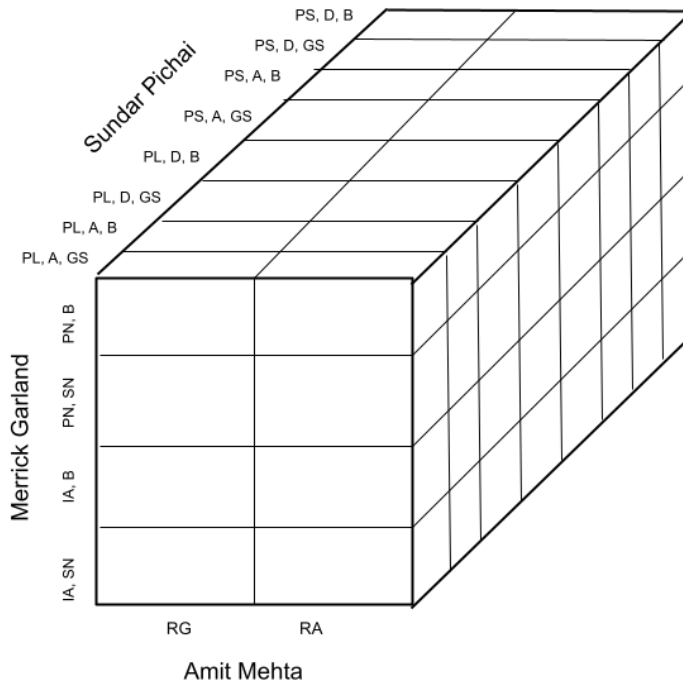
## **Nash Equilibrium and Model Insights**

By means of backward induction, we can identify the pursuit of negotiations which result in a successful negotiation as the Nash Equilibrium. This outcome (yielding payoffs of 4 for Garland, 4 for Pichai, and 2 for Mehta) offers each player a stable outcome with no incentive to deviate. Such an equilibrium underscores the strategic appeal of negotiation, as it allows for regulatory goals and corporate autonomy to be – if even somewhat – optimized and balanced effectively, thus avoiding the costs and unpredictability of litigation.

## **5. Strategic Analysis of the Extended Game Matrix**

By means of a 3D decision matrix representation *United States v. Google*, we can illustrate the strategic choices of Attorney General Merrick Garland (DOJ), Sundar Pichai (Google), and Judge Amit Mehta (judicial authority). The matrix

visualizes sequential decision paths and further highlights the layered interdependencies of each player and their set of actions.



### Matrix Structure and Key Strategic Choices

Each axis of the matrix represents one player's decision-making options: Garland's choices (initiate legal action or pursue negotiation), Pichai's responses (settlement, escalation, or negotiation), and Mehta's potential rulings (favoring Google or antitrust). The matrix clarifies how Garland's initial decisions set the case trajectory. Pichai's responses either move the case toward settlement or increase the likelihood of a judicial ruling, making Mehta's role possibly pivotal if negotiations were to break down. Preferred paths, or equilibrium points, emerge based on the players' mutual interest in a stable resolution without a full trial. As aforementioned, these points underscore negotiation as a primary strategic tool,

allowing the DOJ to pursue regulatory constraints without the uncertainty and expense of litigation.

### Outcomes When Mehta Rules in Favor of Google

		<u>When Amit Mehta rules in favor of Google</u>									
		<u>Sundar Pichai</u>									
		<u>PL,A,SN</u>	<u>PL,A,B</u>	<u>PL,D,SN</u>	<u>PL,D,B</u>	<u>PS,A,SN</u>	<u>PS,A,B</u>	<u>PS,D,SN</u>	<u>PS,D,B</u>		
<u>Merrick</u>	<u>IA,SN</u>	1,5,-3	1,5,-3	1,5,-3	1,5,-3	3,3,1	3,3,1	4,4,2	3,3,1		
	<u>IA,B</u>	1,5,-3	1,5,-3	1,5,-3	1,5,-3	-2,-3,-1	-2,-3,-1	-2,-3,-1	-2,-3,-1		
<u>Garland</u>	<u>PN,SN</u>	4,4,2	4,4,2	2,-5,1	2,-5,1	4,4,2	4,4,2	2,-5,1	2,-5,1		
	<u>PN,B</u>	-1,-4,-2	-1,-4,-2	2,-5,1	2,-5,1	4,4,2	-1,-4,-2	2,-5,1	2,-5,1		

If Judge Mehta rules in favor of Google, it upholds Google’s practices and solidifies its market position. In this scenario, the equilibrium still favors the alternative of negotiation, with stable outcomes arising when Garland initiates or continues negotiation and Pichai either accepts or allows negotiations to break down. Here, each player’s interests still align with avoiding trial: Garland achieves moderate regulatory success, and Pichai avoids a restrictive court ruling. Mehta’s ruling in favor of Google, therefore, seems unlikely on the basis of payoffs and subsequent equilibrium.

## Outcomes When Mehta Rules in Favor of Antitrust

		<u>When Amit Mehta rules in favor of antitrust law</u>									
		<u>Sundar Pichai</u>									
			PL,A,SN	PL,A,B	PL,D,SN	PL,D,B	PS,A,SN	PS,A,B	PS,D,SN	PS,D,B	
	<u>Merrick</u>	IA,SN	5,-4,4	5,-4,4	5,-4,4	5,-4,4	3,3,1	3,3,1	3,3,1	3,3,1	
	<u>Merrick</u>	IA,B	5,-4,4	5,-4,4	5,-4,4	5,-4,4	-2,-3,-1	-2,-3,-1	-2,-3,-1	-2,-3,-1	
	<u>Garland</u>	PN,SN	4,4,2	4,4,2	2,-5,1	2,-5,1	4,4,2	4,4,2	2,-5,1	2,-5,1	
	<u>Garland</u>	PN,B	-1,-4,-2	-1,-4,-2	2,-5,1	2,-5,1	-1,-4,-2	-1,-4,-2	2,-5,1	2,-5,1	

Alternatively, a hypothetical ruling in favor of antitrust bolsters Garland’s regulatory position, imposing significant constraints on Google’s market practices. Even in this scenario, negotiation remains the preferred path once again. Equilibria occur when Garland and Pichai reach a settlement through negotiation or accept regulatory constraints as part of a broader compromise. Under these conditions, Garland can pursue effective regulation while avoiding the costs of a full trial, and Pichai maintains operational flexibility by settling. The possibility for a favorable antitrust ruling, although extremely unlikely, further incentivizes Garland to seek negotiated outcomes, offering a stable path to regulatory success.

### Insights from Equilibrium Analysis

The matrix further confirms that negotiation serves as the Nash Equilibrium, allowing Garland to secure meaningful regulatory outcomes while Pichai avoids strict judicial constraints. Both players have a shared interest in settling, as it provides a balanced solution that minimizes legal and operational risks. For Pichai, the model highlights that limited concessions through negotiation are preferable to a definitive ruling that could impose extensive constraints. Judge



Mehta's potential rulings, while impactful, do not fundamentally alter the players' preference for a negotiated outcome.

## **6. Assumptions of the Extended Game Model**

### **Garland's Primary Objective: Regulatory Success Without Prolonged Litigation**

Merrick Garland, as Attorney General, leads the Department of Justice with a mandate to enforce U.S. antitrust laws and ensure that markets remain competitive and fair to consumers (Areeda & Hovenkamp, 2021). Given both this responsibility and the high-profile nature of the case, it is assumed and understood that Garland's primary objective is to achieve meaningful and impactful regulatory outcomes that constricts Google's market power and restrains their monopolistic practices. However, securing such an outcome by means of a lengthy, expensive, and resource-intensive litigation process is assumed to be less preferred by Garland in comparison to a mutual negotiation, as negotiation ensures collaborative and more efficient outcome (Kades & Scott Morton, 2021). In totality, Garland is then understood and assumed to prefer more expedient means of regulation, specifically by negotiation or a settlement agreement, such that the resource expenditures of going to court are avoided.

## **Garland's Secondary Objective: Avoiding a Complete Breakdown in Negotiations**

While Garland is prepared for litigation if necessary, he is assumed to view a complete breakdown of negotiations as an inherently undesirable outcome. Such a breakdown implies that both parties – Garland and Pichai – have failed to find common ground, further suggesting a lack of cooperation that could reflect poorly on the Department of Justice as an inefficient and ineffective government agency (House Judiciary Committee Report on Competition in Digital Markets, 2020). This outcome could weaken the DOJ's reputation and deter compliance and cooperation from other firms in the future, further complicating the matter of antitrust law enforcement in the United States. Therefore, Garland greatly prefers to avoid scenarios which result in a breakdown of collaborative efforts, as those outcomes limit and complicate his options, likely leaving him no choice to pursue litigation by means of an all-or-nothing trial.

## **Pichai's Primary Objective: Avoiding an Unfavorable Court Ruling**

As CEO of Alphabet Inc., Sundar Pichai is primarily concerned with preserving Google's market dominance while minimizing the regulatory restrictions and sanctions that could alter its current business practices (Hovenkamp, 2020). A court ruling from Amit Mehta in favor of antitrust law, a likely outcome in this scenario given the context, is almost certain to result in restrictions that would significantly impact key streams of revenue for Google. Additionally, an unfavorable court ruling could greatly affect the public's view of Google and their

business practices, including that of their customer base which could further diminish revenue streams (United States Department of Justice, 2020). Moreover, a ruling in favor of antitrust law could set a precedent which invites other countries and their governments to pursue similar suits against Google. Given this, it is assumed that Pichai's strategies and preferred outcomes are centered around avoiding a trial altogether, opting instead for strategies that emphasize settlements and negotiations as pathways to mitigate negative effects.

### **Pichai's Willingness to Make Limited Concessions Through Negotiation**

While Pichai certainly wants to minimize regulatory constraints, it is assumed and understood that he recognized the necessity to make concessions to the DOJ if he is to avoid a trial. By agreeing to some necessary restrictions and adjustments to Google's business practices, Pichai may be able to take on only minor damages to the company's operations while avoiding the stark negative outcomes of going to court. It is assumed as well that the concessions made via settlement or negotiation are far lighter, or at least light enough in comparison that are preferred, than those handed down by a judge in court.

### **Judge Mehta's Priority: Public Interest and Competitive Market Outcomes**

Amit Mehta, as the presiding judicial authority over the case, is assumed to consider the broader implications of his ruling on competitive markets and consumer welfare (Areeda & Hovenkamp, 2021). As the judicial authority in a case pertaining to antitrust law, Mehta's primary concern is in upholding the laws that he is responsible for upholding – including those which Google is alleged to

be violating. Thus, Mehta's commitment is assumed to be not to Google or the DOJ, but to public interest and the most lawful outcome. It is also assumed that Amit Mehta is likely to rule in favor of antitrust law and the DOJ should this case be taken to court, as the DOJ presents a compelling case against Google and their monopolistic practices.

### **Mutual Benefits of Negotiated Settlements for Garland and Pichai**

It is assumed that negotiated settlements are seen by both parties – Google and the DOJ – as mutually beneficial. For Garland, a negotiated settlement is considered a win because it allows him to achieve regulatory success without incurring the time and resource expenses needed for a full trial. For Pichai, a settlement minimizes the risk of a ruling against Google and enables the company to, in some capacity, still maintain the operations and practices that make them so successful. Furthermore, a settlement and negotiated agreement enables Google to avoid the negative publicity and reputational damages that are likely to accompany an antitrust trial, thereby protecting its brand and shareholder value. These mutual benefits make negotiation particularly attractive for both parties, as it – to some degree – satisfies their objectives and individual needs (Blair & Sokol, 2014).

### **Manageable Risks of Breakdown Scenarios for Garland and Pichai**

While breakdowns in negotiation or settlement are suboptimal for both Garland and Pichai, they are not catastrophic because each side has alternative strategies if negotiations fail. For Garland, a breakdown forces him to push the case to trial,

which increases the costs and risks but still leaves open the possibility of a favorable ruling from Judge Mehta. For Pichai, a breakdown raises the risk of a court trial, but Google can still mount a defense and potentially avoid major restrictions. Thus, while both sides prefer an agreement, breakdowns are manageable as they keep the door open for other approaches, including renewed negotiations (Selten, 1975).

### **Mutual Awareness of Preferences and Strategies Between Garland and Pichai**

It is assumed that both Garland and Pichai are equally well-informed about each other's objectives, preferences, and possible strategies. Each player also understands the stakes of the game and has rational expectations about the other's actions. This mutual awareness is central to their strategic decision-making in this case, as it allows each player to anticipate responses and plan accordingly (Kovacic & Shapiro, 2000). For example, Garland knows that Pichai will likely prefer settlement to avoid a trial, so he may choose to pursue negotiation to maximize his leverage. Similarly, Pichai understands that Garland's primary goal is regulatory impact and precedence, which may lead him to consider limited concessions as a means of achieving a mutually acceptable outcome. This assumption closely follows the aforementioned method of backward induction, where each player selects strategies based on an understanding of the opponent's best responses.

### **Rationality and Payoff Maximization by All Players**

Each player – Garland, Pichai, and Mehta – is assumed to act rationally, meaning that they will make decisions that are aligned with and maximize their respective payoffs, as this is a core assumption of game theory (Osborne & Rubinstein, 1994). Rationality, in this context, implies that each player will seek the outcomes which most benefit them, and thus form strategies around that aim. Moreover, each player pursues the outcomes which most closely align with their preferences as those outcomes inherently result in their highest payoff. Rationality also implies that each player will avoid strategies that could lead to less and least preferred outcomes, ensuring the stability of the game.

### **Influence of Public and Market Impacts on Strategy**

As previously suggested, it too is assumed that each player considers the broader impact of this case on public perception and market dynamics. It is assumed Garland's role as a public official implies that he is aware of both the public's interest in regulating monopolistic practices, as well as the public's criticism of him and the DOJ if a breakdown were to occur. Following this, it is also assumed that a successful outcome would strengthen public trust in the DOJ and would further reinforce its role as a capable regulatory authority. It is also assumed that Pichai's role holds him responsible for the public perception, reputation, and shareholder value of Google. Thus, it is then critical that he avoids outcomes which result in negative payoffs as they would also negatively affect all three of the aforementioned for which Pichai is held responsible. Although Amit Mehta is

not directly influenced by public opinion, he is assumed to recognize that his ruling holds significant weight in establishing precedence and could affect the judiciary's role in regulating corporate super powers. Similarly, Amit Mehta is also assumed to understand that making a well-founded ruling based in the enforcement of law bears weight to his career prospects and future promotions or appointments to higher courts.

### **All Outcomes Result in Non-Zero Payoffs**

Another key assumption in this extended game model is that each player bears the potential for gain or loss at each hypothetical stage, therefore meaning that no outcome results in a zero payoff. This non-zero payoff assumption implies that each player derives some level of value – whether in the form of regulatory progress, reputational impact, or strategic positioning – from every possible outcome. For Garland and the DOJ, even in the absence of a negotiated settlement or court victory, advancing the case itself could yield incremental benefits, such as reinforcing the DOJ's commitment to antitrust enforcement, deterring other monopolistic behavior, and heightening public awareness of regulatory issues. Similarly, Pichai and Google experience varying degrees of impact in every scenario; even a favorable settlement or court outcome could involve concessions or increased compliance demands, affecting Google's market control and operational flexibility. Judge Mehta, presiding over the case, is particularly influenced by the outcome in terms of reinforcing judicial oversight in antitrust matters and maintaining public trust in the judiciary's commitment to fair market principles. For Judge Mehta, the case represents not only a legal decision but an

opportunity to set a powerful precedent in the balance between corporate power and consumer protection. His ruling – whether supportive of the DOJ’s claims or not – carries substantial implications for public perception of the judiciary’s role in safeguarding competitive markets and ensuring corporate accountability.

Additionally, Amit Mehta derives some payoff from outcomes in which he is seemingly uninvolved, as his history of ruling in favor of antitrust law implies a judicial preference; thus, Mehta derives higher utilities from outcomes in which Google yields lower payoffs than those in which Google yields higher payoffs.

## **7. Implications for Future Antitrust Regulatory Strategy**

### **Broader Antitrust Law Implications**

The DOJ's case against Google, as stated, is an inflection point in the history of antitrust law that will almost certainly reshape our conception of enforcement pertaining to this legislation in the United States. It too will influence how regulators approach future cases against major tech firms like Amazon, Apple, Meta, and Microsoft (House Judiciary Committee Report on Competition in Digital Markets, 2020). A victory by trial for the DOJ could set a reupholstered, concrete legal foundation for challenging monopolistic practices in digital and technological markets – all of which have been historically difficult to regulate and sanction. Even since the onset of the DOJ's lawsuits against Google, other pursuits have been taken up by the FTC against Meta (branded as Facebook at the time) for their acquisitions of Instagram and WhatsApp. In these newer developments, the FTC argues that Meta's acquisitions have long-stifled



competition in the social media market. Conversely, if the DOJ is able to reach a negotiated settlement or other agreement with Google, it could offer a roadmap for resolving antitrust cases quickly and efficiently, setting a stronger precedent for flexible, targeted agreements with large firms. These agreements, in turn, could then address the extraneous issues which arise from monopolistic practices while facilitating lower-friction outcomes with reduced legal and regulatory costs.

Any outcome of this dispute could also prompt similar actions in international jurisdictions. For instance, the European Union has already fined Google an amount exceeding \$9 billion for their anti-competitive business practices pertaining to exclusive contracts with Android, and advertising monopolization – thus demonstrating perhaps an even larger appetite for regulation against Big Tech in Europe. By advancing remedies such as negotiations and settlements, the U.S. may signal to the EU that efficient outcomes can be achieved without fines and litigation, thereby causing a pivot in the European strategy to regulation. If the DOJ were to win in court, however, and more-heavily restrict Google, this may very likely further reinforce the European strategy, therefore subjecting Google to even more possible fines and a continued pursuit of heavier regulation on behalf of the EU.

### **Implications for Emerging Technologies and AI**

The DOJ's approach to Google's case is likely, as well, to have wide-reading implications for emerging technologies, particularly artificial intelligence (AI) – where monopolistic business practices are all too common. Moreover, the AI

industry is characterized by high barriers to entry, with firms like Google, Microsoft, and OpenAI all leveraging immense computational resources, proprietary data and intellectual properties, and complex infrastructures to maintain and concentrate market shares. For instance, the estimated costs of training OpenAI's GPT-4 model were estimated to be \$63 million, and the technological resources to do so were only available to a small handful of firms with the necessary financial backing. This has led to consolidation of this market, as it is only that same small handful of firms that are truly competitive and delivering to a wide consumer base. Furthermore, acquisition is commonplace in this sector, as both Microsoft and Google have participated in aggressive acquisition practices (Microsoft purchasing \$10 billion of equity in OpenAI and Google purchasing DeepMind for \$400 million).

In order to address these monopolistic practices in the AI sector, regulators may base their claims and pursuits in the DOJ's approach to restricting Google, utilizing measures that focus on maintaining competition such as strict data-sharing requirements, equitable access to computational resources, and algorithmic transparency (often referred to as "open sourcing"). Such an approach would serve to prevent dominant players from monopolizing the AI market, thus ensuring a competitive system where innovation is rewarded and where mid-sized firms can meaningfully contribute.

In totality, monopolistic control of artificial intelligence could yield severe consequences beyond simple market dynamics, affecting essential public services and consumer quality of life if AI use cases are executed in the manner that one

might expect. Moreover, a few large companies' dominance in sectors like healthcare could limit improvements and innovations in critical areas such as medical diagnostics, where a diversified approach is needed to avoid biases and maintain fairness. For instance, if a single AI model dominates the field of medical diagnostics, training data and subsequent diagnostics could be biased and ineffective – thus reducing the quality of care for consumers, and perhaps even further impacting patient care for marginalized populations. Thus, future antitrust regulations may also need to account for the ethical and societal risks that are inherently consequential of current monopolistic AI practices.

### **Why Garland Chose to Pursue Litigation**

Ultimately, Attorney General Merrick Garland chose to take Google to court, despite the aforementioned model suggesting that negotiating or settling were equilibrium outcomes – so why? In theory, a negotiated settlement would be the most efficient solution, Garland has – however – chosen to pursue litigation to send a stronger, and perhaps more radical message. Doing so demonstrates the DOJ's stark commitment to dismantle, on all fronts, the rampant monopolistic behavior in the technology sector by setting a clear, judicially backed precedent, as has historically been expected (Areeda & Hovenkamp, 2021). Such a significant position and push for precedence was not initially accounted for in the model, as it was – at the time – not understood the degree to which Garland would not be willing to collaborate or cooperate with Pichai, Google, and their lawyers. In sum, Garland was much more aggressive and unrelenting than was perhaps anticipated.

Garland's inflexible strategy is most supported by bipartisan public and political pressure to hold tech companies accountable, citing the tense congressional testimonies of tech leaders such as Pichai, Meta's Mark Zuckerberg, and Twitter's Jack Dorsey in the last 5 years. By electing to take Google to court, the DOJ essentially makes the statement that they will take on any costs to ensure regulations are upheld and competitive markets are maintained. Furthermore, Garland's choice closely aligns with the DOJ's most recent rhetoric and proposed strategy under antitrust chief Jonathan Kanter, who voiced strong skepticism about the effectiveness of negotiated settlements with tech firms, suggesting that the resulting agreements often make too many concessions to the firms and, in turn, fail to bring about any sort of meaningful, long-term changes.

## **8. Conclusion**

In sum, *United States v. Google* marks a historic effort to redefine the regulatory landscape to an extent far beyond that of a single company. This case has already and will continue to establish a critical precedent for future antitrust law enforcement, ensuring that digital and tech markets dominated by a single firm or a small handful of firms are held accountable, as they should be, under United States law. As of August 5th 2024, Judge Amit Mehta ruled against Google – stating that "Google is a monopolist, and has acted to maintain its monopoly." While the DOJ, Google, and legal officials are still deliberating as to what the fallout of this decision should entail, the outcome relative to strategic-legal

precedent is clear – Merrick Garland has sent a clear message about what will happen to those who act with monopolistic interests, just as he had intended.

As for emerging industries, most notably that of artificial intelligence, these regulatory proceedings aim to slow the acceleration of monopolistic practices within that field, ultimately with the aim to reduce barriers to entry for less-established firms and foster a more inclusive, competitive economic environment with extraneous space for innovation. By imposing such foundational operational constraints with the purpose of safeguarding the welfare of consumers, the Department of Justice hopes to shape a future where technology serves the public interests as much as it serves the wallets of corporate innovators.

Ultimately, the *United States v. Google* case is much more than another legal battle; it is a long-coming societal reckoning with the role of how tech corporations ought to exist and operate within the context of the modern digital economy.

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<https://www.justice.gov/opa/press-release/file/1328941/download>

## **Appendix 1:**

*Project #2*

*Modeling an Antitrust Dispute*

*Thomas Bentley and Jordan Flink*

In recent years, the rise of tech giants has been a cause of great contention between corporations, government bodies, and the American people at large. These giants of the industry – those of the likes of Google, Apple, and Microsoft – have been under increased scrutiny not just from American legislators, but regulatory bodies across the globe in an effort to maintain competitive markets and in response to rising concerns of monopolization. A prominent, and perhaps the most relevant example of this is the 2023 (and still ongoing) case of the United States Justice Department against Google, in which the tech behemoth stands accused of leveraging its grasp on the search and advertising markets to unfairly suppress competition (Department of Justice, 2023). This battle between regulatory body and tech giant presents an intricate and complex net of strategic decisions and responses, from which the ultimate outcome bears to set a strong precedent for future antitrust tech cases (Feiner, 2023). Within the context of Game Theory, this scenario can be best modeled as an extended game, wherein the sequential decisions and strategic choosings of each player – in this case, the DOJ, Google, a judge, and a presiding mediator – are understood to make rational choices such that they facilitate their own preferred outcomes, thus exemplifying their pursuit of individual payoff maximization (Al Jazeera, 2023).



This dispute and subsequent case between The United States Department of Justice and Google came to be in the midst of 2023, when the DOJ began to express its growing concerns pertaining to monopolistic practices within the tech industry that may limit competition and thereby disallow innovation (Nakashima & Timberg, 2023). The DOJ's lawsuit against Google, which resulted from these concerns, directly accuses Google of utilizing its market dominance to create unfair advantages – specifically citing agreements between Google and phone and internet providers to prioritize the use of their search engine over others (National Public Radio, 2023). Google, in response, argued that its practices were, in fact, lawful and the reason for the prolonged market dominance was due to the superior product they offered to consumers (Nicas & Wakabayashi, 2023). While the case and suit have not yet been resolved nor decided, the final determination and outcome are set to lay a foundation for how similar cases will proceed and be decided. As this game, and the real-world scenario which it aims to model, unfold, the framework provided by game theory will allow for an understanding of how each player may and should act, as well as critical insights into the broader consequences of their individual actions on the antitrust-regulatory landscape, and the tech industry in the modern era (Roxborough, 2020).

As is the case in any game-theoretical model, there are players, actions which those players can take, and the subsequent preferences of those players. The players, as outlined in the model, are Merrick Garland – Attorney General of

the United States and head of the Department of Justice; Sundar Pichai – CEO of Google; Amit Mehta – United States district judge in the District of Columbia; and an unnamed hypothetical mediator – responsible for overseeing and resolving the dispute should it be privately negotiated (Feiner, 2023; Federal Judicial Center, n.d.). Each player also has a set series of actions which they can choose from, and each of these sets can be contextualized via the individual which is choosing those actions. Merrick Garland (DOJ), who represents the empty set in this model, can choose (at the onset of the game) to initiate antitrust action or seek a negotiation with Sundar Pichai (Google). Subsequently, under the condition that Garland chooses to seek negotiation, Pichai can then choose to either accept the negotiation or refuse and seek legal proceedings. Under the condition that Garland chooses to initiate antitrust action, Google can choose to either fight the case in court or seek a settlement with the Department of Justice. Furthermore, under the condition Garland initiates antitrust action from which Google then chooses to seek a settlement, Sundar Pichai (Google) can choose to either seek a favorable or unfavorable outcome. As for the judge, Amit Mehta, he is only responsible for making a decision under the condition that Garland (DOJ) chooses to initiate antitrust action, from which Pichai (Google) then chooses to fight the action in court. Given these presumed conditions, Mehta – as the presiding judge over this case – can then choose to rule in favor of Google, or against Google and then require that the company restructure. As for the mediator, they are only responsible for making a decision under the condition that Garland (DOJ) chooses to seek negotiation, from which Pichai (Google) then chooses to accept the

opportunity to negotiate. Given these conditions, the mediator can then choose from outcomes which either result in a successful negotiation, or unsuccessful negotiations (negotiation breakdown). These actions can also be isolated in terms of possible paths down a decision tree, known most commonly as terminal histories. These terminal histories stemming from the initiation of antitrust actions are possible in the following structures: initiate, fight, win; initiate, fight, restructure; initiate, settle, favorable; initiate, settle, unfavorable. Other terminal histories, instead stemming from seeking out negotiations, are possible in the following structures: seek, accept, success; seek, accept, breakdown; seek, refuse. These terminal histories ultimately outline the possible courses of action which stem from initial decisions and subsequent responses, thereby creating a framework of expected outcomes based on the possibility of each decision being made (Al Jazeera, 2023; Department of Justice, 2023).

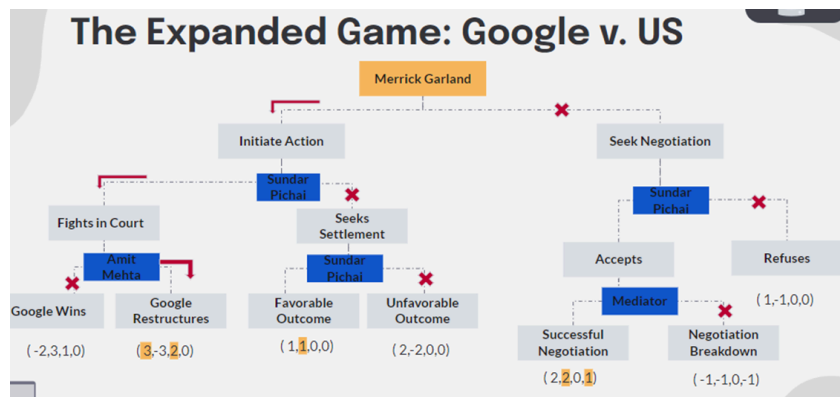
Much in the same manner that every game-theoretical model has players and actions, each of those players has preferences which stem from the possible set of actions they can choose from. These preferences can be outlined in terms of what each player historically, for lack of a better term, cares about and values. Merrick Garland, as Attorney General of the United States, prefers actions which enforce and maintain the already-existing antitrust laws such that the Department of Justice is able to address their concerns pertaining to Google's anti-competitive actions (Feiner, 2023). Sundar Pichai, as CEO of Google, prefers actions that protect the business and financial interests of Google, as well as (secondarily)

those which protect and maintain the public perception of Google such that the company's market position is not significantly impacted (Nakashima & Timberg, 2023). Amit Mehta, as presiding judge over the case, prefers actions that ensure an efficient and just legal process such that his and the court's reputation as fair enforcing are maintained and further expanded (Federal Judicial Center, n.d.). Lastly, the mediator, as a presiding third party over the private negotiations between Google and the DOJ, prefers actions that facilitate a mutually beneficial agreement thus resulting in an efficient legal outcome. These preferences are based not only on each player's assumed preferences pertaining to this case, but also their revealed preferences as exemplified by their previous actions (Roxborough, 2020).

As a preliminary step to modeling this dispute, each player can also be represented via their individual set of choices by means of player functions. Those player functions are as follows:  $P(\emptyset) = \text{Merrick Garland}$   $P(\text{initiate}) = P(\text{seek}) = \text{Sundar Pichai}$   $P(\text{fight}) = \text{Amit Mehta}$   $P(\text{settle}) = \text{Sundar Pichai}$   $P(\text{accept}) = \text{Unnamed Mediator}$

Merrick Garland, as Attorney General, is represented by his initial decision to initiate legal action or seek negotiations, thus pinning him as the empty set in this extended game (represented by  $P[\emptyset]$ ). Sundar Pichai, as CEO of Google, can be represented by two different player functions based on two separate series of conditions. Pichai's function as a response to Garland's decision

to either initiate action or seek negotiation is represented by  $P(\text{initiate}) = P(\text{seek})$ , thus indicating Pichai's decision as subsequent to Garland's. Pichai, given that Garland initiates action from which Pichai can then choose to either fight the accusations in court or privately settle, can be represented by the function  $P(\text{settle})$ , thus indicating that his subsequent choice to settle favorably or unfavorably is a result of his choice to settle should he choose to. Amit Mehta, as the overseeing judge of the resulting trial, can be represented by the function  $P(\text{fight})$ , indicating that his subsequent choice to either rule in favor of or against Google is a result of Pichai's choice to fight should he choose to. Lastly, the mediator can be represented by the function  $P(\text{accept})$ , indicating that his choice of outcome between a successful negotiation or negotiation breakdown is a result of Sundar Pichai choosing to accept the opportunity to negotiate with Garland (DOJ). These functions, overall, represent the means by which these choices come to fruition – that being as subsequent, resulting decisions stemming from previously made and determined decisions of other – and in some cases, opposing – players (Nicas & Wakabayashi, 2023; National Public Radio, 2023).



The model pictured above illustrates the extended game Sundar Pichai and Merrick Garland partake in in the case of Google v. United States. The yellow box is where the empty set is, and the game initiates here with Merrick Garland making the first move. Then, the blue boxes indicate when a new decision is being made, and who is making the decision. The gray boxes outline what each decision the decision maker can make is. Finally, the payoffs of the players are listed after the final decisions in the game. These payoffs are listed in the order of (Garland, Pichai, Mehta, Mediator). To find the most likely outcome in this case, we must engage in backwards induction. First looking at the side of negotiation and at the mediators payoffs as they are the last player to move you see that they have a higher payoff when a successful negotiation occurs. So, the branch leading to a negotiation breakdown is crossed out. Then we look at the decision of Pichai, and see that it is more favorable for him to accept negotiation rather than refuse negotiation. Now, we must look at the other side of the decision tree. When choosing between a favorable outcome and unfavorable outcome Pichai will choose a favorable outcome as this has a higher payoff. So, an unfavorable outcome will be crossed out. When choosing between Google winning the case or Google restructuring Mehta will choose to have Google restructure as this is associated with a higher payoff for Mehta. We then cross out Google wins as this decision won't be made. Then we compare the payoffs of Mehta again between Google fighting and restructuring and a favorable settlement, and we will cross off the branch of settlement as Mehta has a higher payoff when Google fights in

court, and thus will not want them to settle. Finally, we compare (Initiate, fight, restructure) to (negotiate, accept, success) and we find that for Garland the higher payoff lies within Google restructuring, and this negotiation is also crossed off. We then draw arrows to illustrate that the most likely outcome is for Garland to initiate action, google to choose to fight the action in court, and Mehta will likely rule that google must restructure. To come to this conclusion, and to be able to make these decisions in the model, some key assumptions have to be made. The first assumption that is made is that Garland only has two decisions that can be made, which are initiating legal action or opening a negotiation at the first stage of the scenario. This means that doing nothing is not an option that is viable to Garland. In reality there probably are many more options available for Garland to pursue, but isolating these choices allows for a more condensed and digestible analysis of this scenario. The second assumption made is that both parties are open to negotiation rather than just taking legal action from the beginning. The final assumption made is that both the mediator and judge will derive some utility from efficient outcomes. The judge derives utility both in google winning and google restructuring. This is because when Google wins other large corporations will look favorably at the judge, and when Google is forced to restructure they have a slightly higher payoff because they are allowing for more competition in the marketplace, and they are sticking to the laws preventing monopolies. The mediator also derives utility from a favorable outcome as it can be assumed that both parties will look favorably on the mediator with this outcome and are likely to get more work after the conclusion of the negotiation. However, when there is a

breakdown of negotiation the mediator is looked upon unfavorably and thus has negative utility since they were unsuccessful (Nakashima & Timberg, 2023; Department of Justice, 2023).

Each individual player also has their own end goals. However, these goals are not all in line with what the true likely outcome is. Garland and the DOJ will want to take Pichai to court, and ultimately force them to restructure and demonopolize. This is their highest and most preferred outcome. Through the process of backwards induction this is also the most likely outcome. Pichai and Google will want to fight the case in court, and they would like to win so that they do not have to restructure their company, and can continue operating as normal. However, this is not a likely outcome as the judge has a greater payoff when he rules in favor of google restructuring. The Judge Mehta will want to rule in favor of google restructuring as this has a higher payoff for him. There is a higher payoff because he will be setting precedent for what is considered monopolization in webspace. In addition, it will be holding to the standard of not allowing monopolies, and allowing for fair competition in the market space (Federal Judicial Center, n.d.). The mediator will want Pichai and Garland to negotiate and have a successful negotiation because if they negotiate there is an assumption that both parties will look favorable on the mediator, and this will give them more credibility which can get them brought on for more negotiation cases. Thus, this is their highest payoff as it creates more favorability for them. However, this is not a



likely outcome as Garland and Pichai both have higher payoffs when they take the case to court (Roxborough, 2020).

If each player is acting in accordance with rational choice and their revealed preferences we would expect to see them push towards their desired end goals of the game. Garland, if acting rationally will make choices that prioritize the enforcement and maintenance of already existing anti-trust law. With this idea in mind we know Garland will choose to initiate action against google, and will want the final decision to be google restructuring as this will enforce antitrust law, and they will not create room for other large corporations to try and take advantage of negotiation. If Pichai is acting rationally, he will want to act in a way that will minimize the fines and repercussions google will face all while preserving their public image. By doing this they would try and push to fight the case in court and win as this would limit the damage to their company as they would not need to restructure, and could continue on with business as usual. If Mehta is acting rationally, he will act as a neutral party and make decisions which are most in-line with the set of antitrust laws by which he is responsible for deploying and enforcing. In addition, when looking at past cases that Mehta has taken part in you can see that he has a revealed preference for ruling against companies that are close to becoming monopolies or show monopolistic tendencies. He also makes rulings that are anti big business. Since these are repeated actions that are consistent with one another we can assume that Mehta will rule in favor of Garland and against Pichai forcing Google to restructure.

Finally, the mediator when acting rationally will act as a neutral third party and is likely to make decisions that are efficient and have a mutually beneficial outcome as this will positively contribute to their reputation. This aligns with their desired outcome of both parties negotiating and having a successful negotiation (Nicas & Wakabayashi, 2023; National Public Radio, 2023).

This model has two major implications that are revealed. The first implication that is revealed is that both parties are more likely to go to court because they will not reach an efficient outcome through negotiation. In addition, it implies that Garland is not willing to negotiate with Pichai, and thus negotiation is not truly an option that Garland will consider. Another implication of the model is that Mehta has a greater payoff and thus more of an incentive to rule that google must restructure. This is associated with his rational choice to rule against large monopolistic companies, and holding strict to antitrust law (Feiner, 2023; Al Jazeera, 2023).

This extended game, as an overarching game-theoretical model of the dispute between the United States Department of Justice and Google, illustrates not only the strategic complexity that are inherent to antitrust cases, but also underscores the broader implications of this case's decision to the tech industry's future pertaining to the government's regulation of it. Through the process of backwards induction, this model highlights the preference for a trial and reluctance towards negotiation, as both parties inductively view negotiation as an

unlikely means by which an efficient outcome can be achieved. Ultimately, this model and subsequent analysis provide a framework for understanding this dispute, a deeper insight into the interactions between government regulatory bodies and corporations, and how those interactions will shape the competitive market landscape of the future (Roxborough, 2020; Department of Justice, 2023).