The Economic Costs of Structural Separation, Line of Business Restrictions, and Common Carrier Regulation of Online Platforms and Marketplaces

A Quantitative Evaluation

Christian M. Dippon, Ph.D. and Matthew D. Hoelle, Ph.D.*†
NERA Economic Consulting
Washington, DC, USA

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Abstract

Online platforms and marketplaces are services that bring consumers and producers together via the internet by providing consumers direct and instantaneous access to an extensive array of global goods and services and by enabling producers to reach consumers largely untethered by size and geographic reach. The popularity of online platforms and marketplaces attests to the societal benefits these services offer to consumers and producers alike. However, some US lawmakers and competition authorities believe that the growth of these platforms is a threat to competition. To remedy this perceived threat, some lawmakers in the House of Representatives and the Senate introduced several bills that would effectively subject certain companies to common carrier, structural separation, and line of business restrictions. The proposed bills differ in several important aspects, but they all seek to regulate online platforms and marketplaces larger than a certain size threshold. Although there is extensive media coverage and public debate on these bills, no one has addressed the actual scope and economic impact on consumers, businesses, and the overall US economy. Our analysis demonstrates that if the bills are enacted they would impose $319 billion in costs on Google, Apple, Facebook, Amazon, and Microsoft. These companies, in turn, would pass these costs through to consumers and business users via higher retail prices and reduced service offerings. Consumer effects are analyzed using a consumer survey to measure the lost consumer welfare for one illustrative service, Amazon Prime membership. We find that consumers would lose $22 billion in consumer welfare per year if Amazon would be forced to discontinue or reduce the services presently included in the Amazon Prime membership to comply with the bills. Our analysis also demonstrates that the bills impact far more companies than the primary targets—Google, Apple, Facebook, Amazon, and Microsoft. Rather, the bills would directly constrain at least 13 additional companies that operate online platforms in the short term. The proposed legislation would impact foreign companies doing business in the United States significantly less than US companies given the US-specific nature of the bills' primary size thresholds. Thus, the total economic costs of the bills stand to far exceed the numbers we calculated for the primary targets. Moreover, we find that adjusting the size threshold for inflation does not reduce the bills' economic costs. The market capitalization of the largest US publicly traded companies has historically grown much faster than inflation, which largely obviates any adjustment, and implies that over the next decade there could be well over 100 US companies that must change their strategies and business models because of these bills. The bills would not achieve the stated goals of their proponents as they would have no beneficial effect on inflation and likely deleterious effects on innovation. With regards to inflation, 96 percent of the most influential economists at leading US universities do not agree with the claim that antitrust interventions could successfully reduce US inflation over the next 12 months. The overwhelming consensus among economists is that regulatory measures in the proposed bills would be a poor substitute for fiscal and monetary policy and therefore unlikely to have any significant effect on inflation.

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EXECUTIVE SUMMARY

Online platforms and marketplaces are services that bring consumers and producers together via the internet. They provide consumers direct and instantaneous access to an extensive array of global goods, services, and content. Correspondingly, they enable producers to reach consumers largely untethered by size and geographic reach. Online platforms and marketplaces, including those operated by Google, Apple, Facebook, Amazon, and Microsoft, cover a wide range of different business models. The popularity of many online platforms and marketplaces, and the growth and emergence of new platforms in nearly all industries driven by advances in internet technologies, attests to the societal benefits these services offer to consumers and producers alike.

Recent antitrust legislation targets firms based on size

Some US lawmakers and competition authorities consider the growth of these platforms a threat to competition in certain aspects of the economy. They claim that online platforms monopolize various segments of the economy, including online search, online commerce, social media, mobile app stores, mobile operating systems, digital mapping, cloud computing, voice assistants, web browsers, and digital advertising. To remedy this presumed competition problem, lawmakers in the House of Representatives and the Senate introduced several legislative bills. Although these bills differ in several important aspects, they all seek to regulate online platforms and marketplaces that exceed a certain arbitrary size threshold, which the bills label as "covered platforms." The bills also impose a common set of regulatory measures on the companies that own and operate covered platforms, including structural separation, common carrier regulation, and line of business restrictions. Structural separation requires covered platforms to break up into separate business units. Common carrier regulation prohibits covered platforms from promoting their own products and bans the cross-subsidization that occurs when a firm extracts economic efficiencies between two different lines of business (for example, using revenues from advertising in one service to offer an additional service to users at no incremental cost). With line of business restrictions, lawmakers also attempt to eliminate purported conflicts of interest among a covered platform's entities (for example, if an online platform has a search function and its products or services tend to appear early in search results). Another proposed bill would prohibit covered platforms from participating in mergers and acquisitions.

The proposed bills and the public discourse are largely silent as to the economic repercussions that would ensue if one or more of these bills were to be adopted. The motivating force for lawmakers in support of the bills is the belief that "big is bad" for consumers. These lawmakers offer no specifics as to how the size of a firm by itself harms consumers or how the bills would remedy the alleged competition problem. Moreover, there is a void in the public debate as to how the proposed regulation would affect consumers and small-to-medium businesses, including startup companies. Further, no data or research to date demonstrates that the bills would remedy the alleged problem.

The present study examines and quantifies the economic ramifications of several proposed bills. It examines the reach of the proposed regulation, measures the economic impact, and evaluates the ultimate effects on consumers and small-to-medium businesses. Our assessment of the

economic costs of structural separation, common carrier regulation, and line of business restrictions on online platforms and marketplaces results in the following main findings.

1. **_The bills would force the five targeted companies to incur $319 billion in additional costs_**

The bills would impose approximately $319 billion in additional costs on the five companies—Google, Apple, Facebook, Amazon, and Microsoft—currently targeted by the bills. These cost increases would ultimately be passed through and borne by the consumers and business users of the platforms in the form of higher retail costs and the loss of free and valued services.

2. **_The bills would impact at least 13 US companies in the short term and over 100 companies in the next decade_**

The proposed bills would create significant regulatory risks not only to the five primary targets of the bills—Google, Apple, Facebook, Amazon, and Microsoft—but also to at least 13 additional US companies in the near term and possibly to over 100 US companies over the next decade. These risks emanate from an overly broad definition of an online platform, the extensive regulatory framework that would apply to covered platforms, the broad discretions that would be granted to competition authorities tasked with determining compliance, and the extensive financial penalties that would apply for noncompliance.

3. **_Amazon Prime members would each lose $148.47 in value every year if Amazon were forced to discontinue or reduce services included in the Amazon Prime package, equal to nearly $22 billion per year in aggregate_**

In the case of Amazon Prime, the proposed bills would require Amazon to divest, discontinue, or fundamentally restructure numerous service offerings, and they would force Amazon to incur increased operating costs, which would be passed through to customers and business users. A consumer survey found that the bills would reduce consumer welfare by nearly $22 billion per year for Amazon Prime alone, which is equivalent to a loss of $148.47 for each current Amazon Prime member.

4. **_Small and medium businesses would be negatively affected_**

The proposed legislation would have a negative spillover effects on small-to-medium businesses that are third-party business users of the services provided by the targeted firms. Small businesses, which are the asserted beneficiaries of the proposed legislation, thrive in an ecosystem in which the targeted firms offer an umbrella of free and valued services that allow small-to-medium businesses to reach millions of customers at minimal cost and scale their business.

5. **_Venture capital investment in startup firms would be reduced by 12 percent_**

The proposed bills would jeopardize US technological development because a prohibition on acquisitions would eliminate viable exit options for many US startups and thereby reduce demand to acquire US startups. This would affect not only the purchase prices and number of startups acquired today but would also have long-run implications for the pool of capital funds

that investors have available to invest in startup technology firms. We estimate a 12 percent decrease in venture capital financing for startup firms, which would lead to fewer startup firms being established, and the ones that are established would be diminished competitors in the United States and on the global stage.

6. *The bills would hurt American companies more than foreign-based companies*

The proposed bills would harm US international competitiveness by applying US-specific size thresholds that would cover US-based online platforms and marketplaces long before they cover foreign competitors of a similar size. There exists a global threshold in a recent amendment to the Senate bill, but the global threshold is twenty times larger than the US-specific threshold. Consequently, the US-specific threshold will bind US-based platforms long before the global threshold binds foreign platforms. The application of the extensive and costly regulatory framework and compliance requirements to US firms with structural separation as the most likely consequence risks leaving US platforms as diminished competitors on the global stage.

7. *There are no quantifiable benefits from the bills for consumers or small businesses*

Our analysis demonstrates that the proposed bills are not in the public interest because they create cost inefficiencies not only for the covered platforms but also for many other companies. These additional costs would likely result in both higher retail prices and consumer expenditures as well as lower consumption of valued services. They would also negatively impact small-to-medium businesses, startups, and more generally US competitiveness. There are no offsetting benefits associated with the bills: not price stabilization and reductions in inflation, not increased innovation and entrepreneurship, and not decreased income and regional inequality. With regards to inflation, 96 percent of the most influential economists at leading US universities do not agree that antitrust interventions could successfully reduce US inflation over the next 12 months, according to a new survey released by the Chicago Booth Initiative on Global Markets. Relatedly, 90 percent of that same group of economists do not agree that a significant factor behind today's higher US inflation is dominant corporations in uncompetitive markets taking advantage of their market power to raise prices to increase their profit margins. The overwhelming consensus among economists is that regulatory measures in the proposed bills would be a poor substitute for fiscal and monetary policy, and therefore, unlikely to have any effect on inflation in the economy.

I. INTRODUCTION

Online platforms and marketplaces facilitate a wide range of services by providing tools to search the internet, offer apps for mobile wireless devices, provide forums for social content, bring together buyers and sellers in virtual marketplaces, and allow communication through online texting and videoconferencing. Many of these online platforms and marketplaces have become household names, including those operated by Google, Apple, Facebook, Amazon, and Microsoft. For example, Google assists in bringing together users and content on its Google sites that include more than 270 million unique US visitors per month.[1] Apple's App store clears the demand of the more than 113 million iPhone users in the United States.[2] Facebook has 2.90 billion monthly active users globally on its social network sites.[3] Amazon daily fulfills approximately 1.6 million orders, many of which contain products from small-to-medium sized businesses.[4] Finally, Microsoft has nearly 250 million monthly active users globally on Teams and more than 180 million US members on LinkedIn.[5] The popularity of these and other online platforms attests to the societal benefits their innovative services offer to society. Yet, congressional legislation calls for these popular companies to be split apart.

Some US lawmakers in the Senate and the House allege that leading US online platforms and marketplaces monopolize certain segments of the digital economy. Specifically, in October 2020, the Subcommittee on Antitrust, Commercial and Administrative Law of the House Judiciary Committee (hereinafter Subcommittee) released a report titled "Investigation of Competition in Digital Markets," which analyzed 10 segments of the digital economy, including online search, online commerce, social networks and social media, mobile app stores, mobile operating systems, digital mapping, cloud computing, voice assistant, web browser, and digital advertising.[6] The report concluded:

> To put it simply, companies that once were scrappy, underdog startups that challenged the status quo have become the kinds of monopolies we last saw in the era of oil barons and railroad tycoons. Although these firms have delivered clear benefits to society, the dominance of Amazon, Apple, Facebook, and Google has come at a price. These firms typically run the marketplace while also competing in it—a position that enables them to write one set of rules for others, while they

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[1] See "Top 50 Multi-Platform Properties (Desktop and Mobile) September 2021: Total U.S.–Home and Work Locations," Comscore, https://www.comscore.com/Insights/Rankings.

[2] See "Share of Smartphone Users that Use an Apple iPhone in the United States from 2014 to 2021," Statista, March 31, 2021, https://www.statista.com/statistics/236550/percentage-of-us-population-that-own-a-iphone-smartphone/.

[3] See Facebook, Form 10-Q, July 28, 2021, p. 27.

[4] See "57 Amazon Statistics Sellers Need to Know," LandingCube, November 2, 2020, https://landingcube.com/amazon-statistics.

[5] See Microsoft FY21 Fourth Quarter Earnings Conference Call, July 27, 2021, https://view.officeapps.live.com/op/view.aspx?src=https://c.s-microsoft.com/en-us/CMSFiles/TranscriptFY21Q4.docx?version=d0989578-60df-0600-8b2d-431740b7415a; see also LinkedIn, "Pressroom," https://news.linkedin.com/about-us#Statistics.

[6] See "Investigation of Competition in Digital Markets," Majority Staff Report and Recommendations, Subcommittee on Antitrust, Commercial and Administrative Law of the Committee on the Judiciary, Oct. 4, 2020, https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf?utm_campaign=4493-519 (hereinafter House Competition Report).

play by another, or to engage in a form of their own private *quasi* regulation that is unaccountable to anyone but themselves.[7]

The Subcommittee recommended "a menu of reforms" that include structural separation, line of business restrictions, common carrier and nondiscrimination requirements, and a presumptive prohibition against future mergers and acquisitions.[8]

Attempting to remedy this alleged competition problem and address the Subcommittee's recommendations, the House Judiciary Committee introduced one bill on May 21, 2021, and five bills on June 11, 2021, that were subsequently approved and referred to the full body on June 24, 2021:[9]

- H.R. 3816, the American Choice and Innovation Online Act (ACIOA);[10]

- H.R. 3825, the Ending Platform Monopolies Act (EPMA);[11]

- H.R. 3826, the Platform Competition and Opportunity Act (PCOA) of 2021;[12]

- H.R. 3849, the Augmenting Compatibility and Competition by Enabling Service Switching (ACCESS) Act;[13]

- H.R. 3843, the Merger Filing Fee Modernization Act of 2021;[14] and

- H.R. 3460, the State Antitrust Enforcement Venue Act of 2021.[15]

On October 18, 2021, a related Senate bill was "read twice and referred to the Committee on the Judiciary."[16] That bill is Senate Bill S. 2992, American Innovation and Choice Online Act (AICOA).[17] The Senate AICOA is modeled after the House ACIOA (in fact, the names of the

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[7] House Competition Report, pp. 6–7.

[8] Ibid, p. 19–20.

[9] See House Committee on the Judiciary, "Chairman Nadler Applauds Committee Passage of Bipartisan Tech Antitrust Legislation," House Committee on the Judiciary press release, June 24, 2021, https://judiciary.house.gov/news/documentsingle.aspx?DocumentID=4622.

[10] See *American Choice and Innovation Online Act*, H.R. 3816, 117th Congress, *Congressional Record* 167, no. 102, daily ed. (June 11, 2021): H2709, https://www.congress.gov/bill/117th-congress/house-bill/3816.

[11] See *Ending Platform Monopolies Act*, H.R.3825, 117th Congress, *Congressional Record* 167, no. 102, daily ed. (June 11, 2021): H2707, https://www.congress.gov/bill/117th-congress/house-bill/3825.

[12] See *Platform Competition and Opportunity Act of 2021*, H.R. 3826, 117th Congress, *Congressional Record* 167, no. 102, daily ed. (June 11, 2021): H2707, https://www.congress.gov/bill/117th-congress/house-bill/3826.

[13] See *ACCESS Act of 2021*, H.R. 3849, 117th Congress, *Congressional Record* 167, no. 102, daily ed. (June 11, 2021): H2710, https://www.congress.gov/bill/117th-congress/house-bill/3849.

[14] See *Merger Filing Fee Modernization Act of 2021*, H.R. 3843, 117th Congress, Congressional Record 167, no. 102, daily ed. (June 11, 2021): H2710, https://www.congress.gov/bill/117th-congress/house-bill/3843.

[15] See *State Antitrust Enforcement Venue Act of 2021,* H.R. 3460, 117th Congress, *Congressional Record* 167, no. 89, daily ed. (May 21, 2021): H2659, https://www.congress.gov/bill/117th-congress/house-bill/3460.

[16] See *American Innovation and Choice Online Act*, S. 2992, 117th Congress, *Congressional Record* 167, no. 182, daily ed. (Oct. 18, 2021): S7031, https://www.congress.gov/bill/117th-congress/senate-bill/2992.

[17] See *American Innovation and Choice Online Act*, S. 2992, 117th Congress, *Congressional Record* 167, no. 182, daily ed. (Oct. 18, 2021): S7031, https://www.congress.gov/bill/117th-congress/senate-bill/2992; see also

bills contain the same words, but the Senate version flips the order of the words *innovation* and *choice*), and the Senate bill contains many of the legal features of the House version. The Senate AICOA was referred out of the Senate Judiciary Committee on January 20, 2022.

Although each of the seven proposed bills differ in several important aspects, the House ACIOA, EPMA, and PCOA and the Senate AICOA share a common definition of what constitutes an online platform that is covered by new regulatory measures. The four bills also propose similar competitive remedies designed to split apart online platforms and marketplaces and prevent them from acquiring new businesses.

There is extensive media coverage and public debate with respect to these bills. Nevertheless, we are not aware of any theoretical or empirical studies that assess the practical ramifications and quantify the economic costs imposed on society from the proposed legislation, let alone a study that contrasts these costs to the purported benefits of the bills. To ensure that the proposed legislation is in the public interest, it is critical that the benefits outweigh the costs. Therefore, the objective of this study is to start filling the void in the public debate. Specifically, the present study presents a quantitative evaluation of the economic effects of four proposed bills: the House ACIOA, EPMA, PCOA, and the Senate AICOA. We also offer considerations regarding the impact of ACCESS.

In Section II, we discuss the common regulatory threshold and regulatory features in the House ACIOA, EPMA, PCOA, and the Senate AICOA, and point out similarities in ACCESS. In Section III, we demonstrate that the proposed bills would impact far more companies than the intended targets. In Section IV, we establish that the bills effectively would force covered platforms to structurally separate. Section V applies the inverse relationship between firm scale and costs and estimates the cost increases that would result from the proposed legislation. Section VI discusses how covered platforms likely would pass these costs through to the retail market. Section VII presents our analysis of the loss of consumer welfare due to higher retail prices and loss of services. Section VIII contains our estimates of the increased costs and loss of valued services to third-party business users. In Section IX, we evaluate the diminished technology development that would result from increased costs on startup firms. Section X compares the costs of the proposed legislation quantified in our analysis with certain purported and quantifiable benefits. The online appendices contain supplemental information.

II. THE BILLS TARGET THE SAME COMPANIES AND SHARE COMMON REGULATORY FEATURES

In this section, we analyze the text of the bills and reach the following conclusions:

- *The bills all impose regulatory measures based exclusively on the size of a firm.*

- *The bills all apply even in the absence of evidence of consumer harm.*

United States Senator Amy Klobuchar, "Klobuchar, Grassley, Colleagues to Introduce Bipartisan Legislation to Rein in Big Tech," United States Senator Amy Klobuchar news releases, October 14, 2021, https://www.klobuchar.senate.gov/public/index.cfm/2021/10/klobuchar-grassley-colleagues-to-introduce-bipartisan-legislation-to-rein-in-big-tech.

- *The bills all declare the common business practice of cross-subsidization as unlawful conduct.*

- *The bills all propose conduct requirements that cannot be achieved by behavioral modifications alone.*

A. The Bills Propose Size as the Sole Determining Factor for Regulation

Under the three House bills and the Senate AICOA bill, a *covered platform* is a platform that (1) falls within the definition of an online platform, (2) exceeds the network size threshold, (3) is owned or operated by a company that exceeds the company size threshold, and (4) is deemed a critical trading partner. The four bills define an online platform as a:

> [W]ebsite, online or mobile application, operating system, digital assistant, or online service that (A) enables a user to generate content that can be viewed by other users on the platform or to interact with other content on the platform; (B) facilitates the offering, sale, purchase, payment, or shipping of goods or services, including software applications, between and among consumers or businesses not controlled by the platform; or (C) enables user searches or queries that access or display a large volume of information.[18]

The network size threshold is an online platform that has at least 50 million US-based monthly active users or at least 100 thousand US-based monthly active business users.[19] The company size threshold in the House bills is a firm with net annual sales of at least $600 billion, adjusted for inflation, or a market capitalization of at least $600 billion, adjusted for inflation.[20] The Senate bill AICOA defines the company size threshold at $550 billion for both net annual sales and market cap, also adjusted for inflation.[21]

During markup of the Senate AICOA in January 2022, an additional network size threshold of 1 billion global monthly active users was added.[22] However, the global threshold is twenty times larger than the US-specific threshold and at most stands to impact one additional platform (TikTok).[23]

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[18] See H.R.3816, Sec. 2(g)(10); H.R.3825, Sec. 5(10); H.R.3826, Sec. 3(h); and S.2992, Sec. 3(h)(8).
[19] See H.R.3816, Sec. 2(g)(4)(B)(i); H.R.3825, Sec. 5(5)(B)(i); H.R.3826, Sec. 3(d)(2)(A); and S.2992, Sec. 2(h)(4)(B)(i).
[20] See H.R.3816, Sec. 2(g)(4)(B)(ii); H.R.3825, Sec. 5(5)(B)(ii); and H.R.3826, Sec. 3(d)(2)(B).
[21] See S.2992, Sec. 2(h)(4)(B)(ii).
[22] See "Prepared Statement by U.S. Senator Chuck Grassley: Markup on American Innovation and Choice Online Act," January 20, 2022,
https://www.judiciary.senate.gov/imo/media/doc/Grassley%20Statement%20at%20Markup%20on%20Big%20Tech%20Competition%20Bill.pdf.
[23] Reuters, "TikTok hits 1 billion monthly active users globally," September 27, 2021,
https://www.reuters.com/technology/tiktok-hits-1-billion-monthly-active-users-globally-company-2021-09-27/.
While Tencent, parent company of WeChat, reported 1.26 billion monthly active users in the third quarter of 2021, the corporate distinction between WeChat (the platform for non-Chinese accounts) and Weixin (the platform for Chinese accounts) means that each platform is distinct and each lies below the 1 billion global user threshold. See Tencent, "2021 Third Quarter Results," November 10, 2021,
https://static.www.tencent.com/uploads/2021/11/10/57d32da50c1d7abe221d7f9ca9ec3dcb.pdf.

Under the bills, a critical trading partner "has the ability to restrict or impede (A) the access of a business user to its users or customers; or (B) the access of a business user to a tool or service that it needs to effectively serve its users or customers."[24] This final component of the covered platform definition is the only instance in which the proposed rules apply to firms based on conduct not size. However, the inclusion of this clause is inconsequential because any two-sided platform or two-sided marketplace with business users automatically satisfies the *ability to restrict or impede* clause in the critical trading partner definition. It is exceedingly rare among two-sided platforms and two-sided marketplaces to facilitate interactions among only individual users and no business users.

The four bills grant the relevant competition authority the power to designate an online platform as a covered platform and to remove that designation. The designation as a covered platform can last for 10 years in the House bills and seven years in the Senate bill regardless of changes in business organization and firm size.[25] According to the terms of the House bills, for example, a firm designated as a covered platform in 2022 could subsequently reduce its scale below the company size threshold and still be designated as a covered platform through 2032. Thus, firm size is sufficient but not necessary for legal challenges to be brought against online platforms under the four bills.

B.   The Bills Propose Ignoring the Consumer Welfare Standard

The bills hypothesize that big is inherently bad for consumers. As such, the bills would establish anticompetitive conduct based solely on size without ever considering, let alone demonstrating, consumer harm. The bills offer no affirmative defenses based on evidence of benefits to consumers. Yet, the proper standard for assessing anticompetitive conduct that has been established by 50 years of doctrine and scholarship in US competition law and practice is the consumer welfare standard. Under this consumer-focused standard, the net impact of alleged conduct on consumers is typically assessed by analyzing the impact of specific conduct on economic variables that directly impact consumer welfare: retail prices, product variety, service quality, and availability of goods and services.

Economists have considered and rejected the structural determination of anticompetitive harm contained in the proposed bills. For example, the Structure-Conduct-Performance (S-C-P) paradigm for antitrust economics used to be a classical approach for the economic analysis of competition. The S-C-P dates back to the 1930s and came to prominence in the 1960s and early 1970s.[26] As the order of the concept suggests, the central premise is that the structure of a market has direct implications for the conduct of competitors operating in that market and therefore direct implications for the overall performance of the market (profits and prices).[27] With this logical chain of implications, the theory predicts that concentrated markets are inherently prone to anticompetitive conduct and such conduct ultimately leads to consumer harm.[28] Identical to

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[24] H.R.3816, Sec. 2(g)(6); H.R.3825, Sec. 5(7); H.R.3826, Sec. 3(f); and H.R.3849, Sec. 5(8).
[25] See H.R.3816, Sec. 2(d)(3); H.R.3825, Sec. 6(a)(1)(C); H.R.3826, Sec. 4(a)(1)(C); and S.2992, Sec. 2(e)(3).
[26] See Herbert J. Hovenkamp, "United States Competition Policy in Crisis: 1890–1955," *Minnesota Law Review* 94, no. 311 (2009): 350–367 (hereinafter Hovenkamp).
[27] Ibid, pp. 350, 351.
[28] Ibid, p. 355.

the standard contained in the proposed bills, this determination is based solely on the size of the firms. The efficacy of the S-C-P paradigm was actively debated in the early 1970s. However, the debate was resolved when the available empirical research and market facts strongly rebutted the predictions of the S-C-P paradigm.[29] With the debate settled, the S-C-P paradigm was relegated to obscurity for the past 50 years, and there is no reason to revive it as the current bills attempt to do.[30]

C. The Bills Propose Prohibiting Standard Business Practices Once Firms Reach a Certain Size

The three House bills and the related Senate bill all declare the common business practice of cross-subsidization between two lines of business challengeable in internal administrative adjudicative processes and in court. The economic concept of cross-subsidization refers to the ability of firms to extract economic efficiencies between two lines of business within the same firm or between two lines of business between an acquiring and an acquired firm.[31] For instance, the House ACIOA proposes:

> It shall be unlawful for a person operating a covered platform, in or affecting commerce, to engage in any conduct in connection with the operation of the covered platform that – (1) advantages the covered platform's own products, services, or lines of business over those of another business user; (2) excludes or disadvantages the products, services, or lines of business of another business user relative to the covered platform's own products, services, or lines of business; or (3) discriminates among similarly situated business users.[32]

In addition to the three primary types of discriminatory conduct, the House ACIOA describes 10 additional types of discriminatory conduct that would be declared illegal.[33] The bill's broad definition of discriminatory offenses renders numerous standard business cross-subsidization practices illegal. For example, the common retail practice of giving store brands prominent shelf space, including end caps, is analogous to the discriminatory offenses that would be illegal for covered platforms under the House ACIOA. These prohibitions would not only be limited to practices that subsidize *across* lines of business but also include those that subsidize *within* a line of business. For instance, if a quantity discount (a form of second-degree price discrimination) advantages the covered platform's own products over those of another business user, it would be challengeable as unlawful discriminatory conduct under the House ACIOA. Similarly, customer type-specific pricing for startups or government agencies (a form of third-degree price

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[29] Ibid, p. 359; see also Harold Demsetz, "Industry Structure, Market Rivalry, and Public Policy," *Journal of Law and Economics* 16, no. 1 (1973): 1–9; Harvey J. Goldschmid, H. Michael Mann, and John Fred Weston, *Industrial Concentration: The New Learning* (Boston: Little, Brown Company, 1974); Harold Demsetz, "Two systems of belief about monopoly," in *Industrial Concentration: The New Learning*, ed. Harvey J. Goldschmid, H. Michael Mann, and J. Fred Weston (Boston: Little, Brown Company (1974), 164–183; Sam Peltzman, "The Gains and Losses from Industrial Concentration," *Journal of Law and Economics* 20, no. 2 (October 1977): 229–263.

[30] See Hovenkamp, p. 366.

[31] See H.R.3816, Sec. 2(a); H.R.3826, Sec. 2(a); and S.2992, Sec. 2(a).

[32] H.R.3816, Sec. 2(a).

[33] H.R.3186, Sec. 2(b).

discrimination) would also be challengeable as unlawful discriminatory conduct under the House ACIOA.

Similarly, the Senate AICOA describes 10 types of discriminatory conduct that would be declared illegal, all of which constitute standard business cross-subsidization practices.[34]

D.   The Bills Would Require Covered Platforms to Structurally Separate

Behavior modifications alone would not be sufficient to meet the conduct requirements proposed in the three House bills and the related Senate bill. Instead, covered platforms would have to resort to structural separation, meaning that covered platforms would have to divest certain assets or lines of business or split into smaller independent companies. Several observations confirm that structural separation would be the economic outcome.

First, the proposed illegal conduct is overly broad, which creates a significant risk of noncompliance. Consider, for instance, the PCOA. If implemented, a covered platform would be in violation of the law if it acquired a company that would:

> (A)   compete with the covered platform or with the covered platform operator …;
>
> (B)   constitute nascent or potential competition to the covered platform or the covered platform operator …;
>
> (C)   enhance or increase the covered platform's or the covered platform operator's market position …;
>
> (D)   enhance or increase the covered platform's or the covered platform operator's ability to maintain its market position ….[35]

As written, the PCOA would prohibit covered platforms from acquiring any company.

The EPMA is similarly restrictive. If implemented, a covered platform would be in violation of the law if it were to own or operate a line of business that:

> (1)   utilizes the covered platform for the sale or provision of products or services;
>
> (2)   offers a product or service that the covered platform requires a business user to purchase or utilize as a condition for access to the covered platform, or as a condition for preferred status or placement of a business user's product or services on the covered platform; ….[36]

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[34] See S.2992, Sec. 2.

[35] See H.R.3826, Sec. 2(b)(2)(A–D).

[36] See H.R.3825, Sec. 2(a)(1–2).

It would also be a conflict of interest if the covered platform's ownership or control of that line of business creates the incentive and ability for the covered platform to:

>   (A) advantage the covered platform operator's own products, services, or lines of business …;
>
>   (B) exclude from, or disadvantage, the products, services, or lines of business … of a competing business ….[37]

As written, the EPMA would prohibit a covered platform from owning a related line of business or, at a minimum, would impose significant risks if it were to do so. This would effectively cause structural separation.

The House ACIOA and the Senate AICOA are similarly expansive in their definitions of violations. The House ACIOA defines 13 types of illegal conduct and the Senate AICOA defines 10 types of illegal conduct, as previously described.[38] Under these expansive definitions, standard business practices would be violations for covered platforms.

Second, in addition to broad conduct requirements, the financial penalties in the proposed bills are extensive and detrimental to covered platforms. The three House bills call for penalties for noncompliance that equal 15 percent of total US revenue and 30 percent of the US revenue attributable to the lines of business charged.[39] The Senate AICOA proposes fines up to 15 percent of total US revenue for the duration of the purported violation.[40] Additional remedies are available in the House bills to both agencies and injured third parties, including injunction and treble damages.[41]

Third, the proposed legislation places the burden of proof on the covered platforms, which reverses the established interpretation of antitrust law in the United States. The bills shift the burden of proof by affording covered platforms minimal affirmative defenses. The PCOA and EPMA do not list any affirmative defenses. The Senate AICOA and the House ACIOA narrow affirmative defenses to those necessary to "protect safety, user privacy, the security of non-public data, or the security of the covered platform"[42] and to "maintain or enhance the core functionality of the covered platform."[43]

Considering the expansive conduct requirements, the stiff financial penalties, and the minimal available defenses, firms designated as covered platforms would likely seek to divest certain lines of business or split into smaller independent companies.

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[37] See H.R.3825, Sec. 2(b)(2)(A–B).

[38] See H.R.3186, Sec. 2; see also S.2992, Sec. 2.

[39] See H.R.3816, Sec. 2(f)(1); H.R.3825, Sec. 3(c).

[40] See S.2992, Sec. 2(g)(1).

[41] See H.R.3816, Sec. 2(f)(2); and H.R.3826, Sec. 7. The Senate bill AICOA makes such remedies available to only agencies. See S.2992, Sec. 2(g).

[42] See S.2992, Sec. 2(d)(1)(B) and Sec. 2(d)(2)(B)(ii). The House ACIOA defines a narrower defense. See H.R.3816, Sec. 2(C)(1)(B)(ii).

[43] See S.2992, Sec. 2(d)(1)(C) and Sec. 2(d)(2)(B)(iii). The House ACIOA does not offer a similar defense.

E.   The ACCESS Bill Contains Similar Regulatory Features

The House bill ACCESS has many of the same features as the three other House bills (ACIOA, EPMA, and PCOA) and the related Senate bill (AICOA): (1) violations based primarily on firm size; (2) same size thresholds as the three other House bills; and (3) same civil penalties as the House ACIOA, EPMA, and the Senate AICOA.[44] Although focusing on the economic effects of the three House bills and the related Senate bill, our analysis recognizes the role that ACCESS would play in the broader enforcement and regulatory bureaucracy as envisioned by the sponsors of the House bills. For example, we understand that violations of the three House bills and violations of ACCESS would have the potential to double the financial fines from 15 percent to 30 percent of total US revenue (and from 30 percent to 60 percent of US revenue attributable to the lines of business in violation).[45] In addition, even without the passage of any of the three House bills, lawmakers would achieve the structural changes through the back door under ACCESS.

III.   THE BILLS IMPACT FAR MORE FIRMS THAN THEIR PRIMARY TARGETS

In this section, we analyze the size threshold in the bills and reach the following conclusions:

- *In addition to Google, Apple, Facebook, and Amazon, the bills' size thresholds would designate Microsoft as a covered platform.*

- *The bills would also impact at least 13 other US companies in the next five years.*

- *The bills would impact foreign companies doing business in the United States far less than US companies.*

- *Adjusting the size threshold for inflation has no impact on the economic costs of the proposed bills.*

A.   Five Companies Already Exceed the Thresholds

The relevant competition authority would designate five companies as covered platforms if one or more of the four bills were to be enacted. As shown in Table 1, Google, Apple, Facebook, Amazon, and Microsoft already exceed both the network size threshold and the company size threshold (using either the House threshold or the slightly lower Senate version).

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[44] See H.R.3849, Sec. 5(6)(B); H.R.3849, Sec. 4(b)(2); H.R.3849, Sec. 10(a).
[45] See H.R.3816, Sec. 2(f)(1); H.R.3825, Sec. 3(c); H.R.3849, Sec. 10(a).

Table 1: Bills' Size Thresholds Evaluation

Company	Network Size	Company Size
		---------(USD)--------
Google	270 million	$ 1.658 trillion
Apple	113 million	2.339 trillion
Facebook	2.90 billion	809 billion
Amazon	147 million	1.664 trillion
Microsoft	250 million	2.119 trillion

Notes: Market cap valuations based on closing prices on September 30, 2021. Facebook and Microsoft network sizes are reported as global figures.

Sources: FactSet; "Top 50 Multi-Platform Properties (Desktop and Mobile) August 2021: Total U.S.–Home and Work Locations," Comscore; "Share of Smartphone Users that Use an Apple iPhone in the United States from 2014 to 2021," Statista; Facebook, Form 10-Q, July 28, 2021, p. 27; "Number of Amazon Prime Members in the United States in Selected Quarters from 4th Quarter 2014 to 1st Quarter 2021," Statista; Microsoft, FY21 Fourth Quarter Earnings Conference Call, July 27, 2021.

In the months since our analysis was conducted, the market cap valuation for Facebook (traded under its new corporate name Meta Platforms, Inc., with the same NASDAQ ticker FB) has fallen below the $600 billion threshold.[46] However, the covered platform designation can be applied retroactively to any company that has exceeded the threshold over the past two years.[47] Therefore, Facebook would continue to meet the threshold requirements until February 2024 regardless of future company performance. If the company's stock were to rebound in the intervening two years to the point where the market cap once again exceeded the $600 billion threshold, even for an instant, then the company would continue to meet the threshold requirements from that instant forward another two years.

Microsoft is included among the potentially regulated companies even though the House Competition Report did not investigate purported harms with respect to Microsoft's online platforms Windows, LinkedIn, Xbox, and Teams.

Based on a January 2022 markup of the Senate bill AICOA, a sixth firm (the Chinese platform TikTok) would be included in the group of potentially regulated companies.

B.   The Bills Would Impact at Least 13 Additional Companies in the Next Five Years

These bills would also impact online platforms and marketplaces that currently do not exceed the proposed size thresholds. The broad definitions and wide-ranging prohibitions imply that platforms currently below the size thresholds would take measures to avoid the significant legal risk incumbent upon exceeding the thresholds.

Specifically, the proposed legislation would likely constrain future investments and business decisions of at least 13 additional firms.

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[46] See H.R.3816, Sec. 2(g)(4)(B)(ii); H.R.3825, Sec. 5(5)(B)(ii); and H.R.3826, Sec. 3(d)(2)(B).
[47] Ibid.

- Berkshire Hathaway
- Visa
- JPMorgan Chase
- Walmart
- Mastercard
- PayPal
- AT&T

- Home Depot
- Walt Disney
- Bank of America
- Comcast
- Netflix
- Cisco

Our analysis demonstrates that all these firms operate online platforms or marketplaces and would exceed the inflation-adjusted market cap threshold of $550 billion or $600 billion from the bills in the next 5 to 10 years. Even those that may not exceed the threshold through normal growth would be discouraged from pursuing opportunities for expansion through acquisition due to the threat of exceeding the threshold. Firms would additionally need to monitor their market caps and could be forced to engage in hasty divestitures lest their market caps exceed the market cap threshold at any instant during any trading day because the bills allow for designation if the size thresholds were exceeded in the past even if they are not all exceeded in the present.[48]

In addition, several companies exceed the market cap threshold but do not yet operate an online platform. One example is Tesla with stated plans to introduce an online platform for its network of self-driving cars.[49] If Tesla's introduction of self-driving cars to US consumers rendered it liable to the regulations in the four bills, this would impact its future business plans.

C.   US Companies Would Bear Most of the Economic Costs

The bills theoretically apply to companies globally irrespective of their domicile. In practice, they would only impact companies established in the United States, headquartered in the United States, and traded on US stock markets. This is not surprising because the network size thresholds are specific to US-based users. Given consumer preferences, market shares and user counts are skewed to the geographic markets in which companies were established. Thus, even if Amazon (a US company) and Alibaba (a non-US company) had identical numbers of global users, Amazon would exceed the US-based network size threshold and be subject to the proposed legislation, whereas Alibaba would not. This fact has broader implications for global competition. If Amazon is a diminished competitor in its home country, then it would be a diminished competitor on the global stage. If Alibaba faces no comparable restrictions in the US market and presumably no such restrictions in its home markets in Asia, then it becomes an

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[48] All four bills have a two-year look-back period when evaluating the company size threshold for the covered platform designation. See H.R.3816, Sec. 2(g)(4)(B)(ii); H.R.3825, Sec. 5(5)(B)(ii); H.R.3826, Sec. 3(d)(2)(B); and S.2992, Sec. 2(h)(4)(B)(ii).

[49] See, e.g., Tim Levin, "Elon Musk says Tesla will release its 'full self-driving' feature as a subscription in early 2021," Insider, Dec. 21, 2020, https://www.businessinsider.com/tesla-autopilot-full-self-driving-subscription-early-2021-elon-musk-2020-12.

enhanced competitor on the global stage. Likely, this would mean that Amazon would lose share to Alibaba in both the United States and all global markets in which the two compete.

A January 2022 markup of the Senate AICOA proposes a new threshold of 1 billion monthly active users globally that would render an online platform subject to the regulations of the bill. This threshold is exceeded by TikTok but would not currently affect any other non-US company.

D. The Inflation Adjustment Would Not Mitigate the Economic Costs

Over the past five years (from September 2016 to September 2021), the CPI has grown at an annual rate of 2.6 percent per year.[50] This is consistent with the long-run growth trend of CPI.[51] Using this annual growth rate of 2.6 percent to forecast future CPI growth, the threshold of $600 billion in the House bills is estimated to grow to $615.6 billion one year after bill passage, $631.5 billion two years after bill passage, and so forth.

The CPI adjustments to the market cap threshold are inadequate because they are significantly smaller than the market cap growth rates for the 18 firms that we have identified as being constrained by the covered platform regulations. As displayed in Appendix A, the median market cap growth rate among the 18 firms over the past five years was 21.1 percent. The median market cap growth rate is 8.1 times larger than the CPI growth rate over the past five years.

With this growth disparity, it would only take 4.2 years for a firm's market cap to grow from the level of the CPI-adjusted threshold to twice the level of the CPI-adjusted threshold.[52] For example, if Company A's market cap is currently equal to the CPI-adjusted threshold and Company A grows at the median market cap growth rate, then its market cap in 4.2 years' time would be twice as large as the CPI-adjusted threshold.

This same phenomenon works for firms that are currently below the CPI-adjusted threshold. Specifically, if Company A's market cap is currently equal to one-half of the CPI-adjusted threshold (e.g., PayPal had a market cap of $305.8 billion as of September 30, 2021),[53] and Company A grows at the median market cap growth rate, then that firm's market cap in 4.2 years' time would be equal to the CPI-adjusted threshold.

Extending the analysis further, companies currently at one-fourth and one-eighth of the CPI-adjusted threshold ($150 billion and $75 billion, respectively, for the company size threshold in

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[50] See U.S. Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers: All Items in U.S. City Average [CPIAUCSL], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/CPIAUCSL, Oct. 21, 2021 (hereinafter FRED, CPIAUCSL). The compound annual growth rate (CAGR) is calculated based on the CPI values for September 2016 and September 2021 (a 5-year period). Since CPI values increased from 241.176 in September 2016 to 274.138 in September 2021, the CAGR equals (274.138÷241.176)^(1/5)–1=2.6 percent, where the exponent (1/5) is the CAGR exponent for a 5-year period.

[51] The growth rate over the past 30 years is 2.3 percent and the growth rate over the entire 74-year period since the CPI data was first collected in 1947 is 3.4 percent. See FRED, CPIAUCSL. The quoted compound annual growth rates are calculated based on the CPI values for September 1991 and September 2021 (a 30-year window) and based on the CPI values for September 1947 and September 2021 (a 74-year window), respectively.

[52] The *doubling time* is the number of years that it takes the market cap, at a growth rate of 21.1 percent, to double relative to the CPI, at a growth rate of 2.6 percent. Mathematically, the doubling time equals $\ln(2) \div \{\ln(1 + \text{CAGR, market cap}) - \ln(1 + \text{CAGR, CPI})\}$, where ln is the natural logarithm.

[53] FactSet.

the House bills) would exceed the CPI-adjusted threshold in 8.3 years' time and 12.5 years' time, respectively. Over 100 firms currently trading in US stock markets have market caps above that $75 billion level.[54] Limiting the economies of scale and scope for growth for more than 100 US firms would impose substantial long-run costs on the US economy.

Figure 1 below illustrates the growth disparity by plotting over a 13-year horizon the rate at which the market caps for companies at one-half, one-fourth, and one-eighth of the $600 billion market cap threshold catch up to the threshold. As illustrated in Figure 1, companies currently at one-half of the threshold (Year 0) would exceed the threshold in slightly more than four years (early in Year 5). Companies currently at one-fourth of the threshold would exceed the threshold in slightly more than eight years (early in Year 9), and companies currently at one-eighth would exceed the threshold in approximately 12.5 years (halfway through Year 13).

Figure 1: The Growth Rate for Market Caps Far Exceeds the CPI Adjustments to the Proposed Threshold
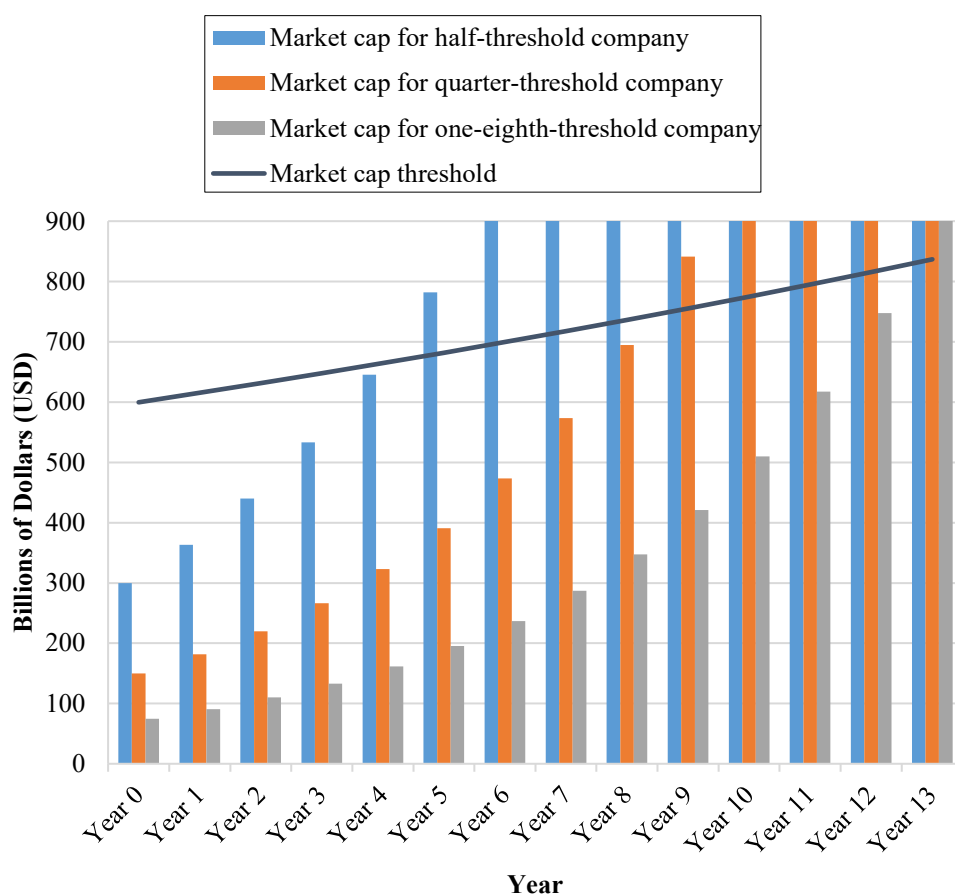
Source: NERA.

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[54] See, e.g., Largest American companies by market capitalization, https://companiesmarketcap.com/usa/largest-companies-in-the-usa-by-market-cap/?page=2 (hereinafter US Companies by Market Capitalization).

IV. THE BILLS WOULD FORCE COVERED PLATFORMS TO SEPARATE INTO INDEPENDENT BUSINESSES

In this section, we apply a law and economics settlement model to determine the economic outcome of the bills and based on that analysis we reach the following conclusions:

- *Google, Apple, Facebook, Amazon, and Microsoft would break up into smaller independent business units that fall well below the size thresholds established in the bills.*

- *In exchange, the federal competition authority would drop the covered platform designation that otherwise would apply to the independent units.*

A. The House Competition Report Recommends Structural Separation

The House Competition Report recommends that covered platforms be forced to structurally separate into smaller entities. The three House bills and the related Senate bill describe a set of violations that closely mirrors the anticompetitive conduct described in the House Competition Report. Thus, the House Competition Report is the sole claimed economic support for the bills. The bills' reliance on this report also reveals that the underlying motivation, if not objective, of the proposed legislation is not behavioral modifications but structural separation. Yet, the House Competition Report never examined consumer harm, rendering its recommendations for structural changes a solution in search of a problem.

B. A Law and Economics Settlement Model Predicts Structural Separation

We assemble the set of possible remedies available to regulators under the proposed terms of the three House bills and the related Senate bill. The remedies available to federal and state competition authorities and private parties represent liabilities to firms designated as covered platforms because a guilty verdict would require the firms to comply with the remedies. Our settlement model evaluates the willingness of two parties, a plaintiff and a defendant, to settle a legal claim prior to the determination of guilt.

In this model, the defendant is a firm facing a legal claim for owning or operating a covered platform and for violating one of the proposed rules in the four bills. The settlement decision and the settlement terms are based on numerous economic factors, including the severity of the penalties the defendant faces, the possible remedies the defendant can offer as settlement terms, and the probability the defendant would be found guilty. We discuss these economic factors in turn.

1. Severity of penalties

The remedies available to plaintiffs are partitioned into three groups based upon their anticipated levels of severity:

- *Feather* remedies: injunctions (behavioral remedies);

- *Hammer* remedies: financial penalties, economic damages, disgorgement payments, including financial fines equal to 15 percent of total US revenue and 30 percent of US

revenue attributable to the lines of business in violation of the proposed law,[55] restitution and disgorgement for federal and state plaintiff claims,[56] and damages including the possibility for treble damages in suits from injured third parties;[57] and

- *Middle of the road* remedies: structural separation including divestitures and spin-offs (structural remedies).

The hammer remedies are the most severe penalties for the covered platforms. The civil penalties alone, based on the most recent four quarters of reported earnings (Q4 2020 through Q3 2021), would total between $100 to $200 billion each year for the five covered platforms. Even at the lower end of the range, the civil penalties represent 33 percent of reported annual net income for the five covered platforms (Q4 2020 through Q3 2021).[58] This does not include restitution and disgorgement for federal and state competition authorities, nor does it include treble damages for injured third parties. Table 2 below shows the calculation used to determine the civil penalties that the covered platforms would be liable for under the hammer remedies.

Table 2: Civil Penalties Under the Bills

Company	Inputs to Calculate Total US Revenue		Range of Civil Penalties	
	Global Revenue, Q4 2020 thru Q3 2021	US Share of Global Revenue	15 Percent Penalty	30 Percent Penalty
	------------------------------($ in billions)------------------------------			
Amazon	$457.97	63%	$43.42	$86.84
Apple	$366.30	34%	$18.42	$36.84
Facebook	$112.33	41%	$6.90	$13.80
Google	$239.27	46%	$16.67	$33.33
Microsoft	$176.25	50%	$13.32	$26.64
Covered Platforms	**$1,352.11**		**$98.72**	**$197.45**

Notes: The estimate of Amazon's US share of global revenue used non-AWS net sales and assumed the US share of North American net sales was 90 percent. The estimate of Apple's share of global revenue assumed the US share of Americas net sales was 80 percent.

Sources: FactSet; Amazon, Form 10-Q for the quarterly period ended September 30, 2021, Oct. 28, 2021, p. 17; Apple, Form 10-K for the fiscal year ended September 25, 2021, Oct. 28, 2021, p. 22; Facebook, Form 10-Q for the quarterly period ended September 30, 2021, Oct. 25, 2021, p. 14; Google, Form 10-Q for the quarterly period ended September 30, 2021, Oct. 26, 2021, p. 12; and Microsoft, Form 10-Q for the quarterly period ended September 30, 2021, Oct. 26, 2021, p. 28.

We distinguish behavioral remedies and structural remedies and analyze them in separate remedy groups based on the text of the four bills and the economic incentives. The four bills are written

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[55] See H.R.3816, Sec. 2(f)(1); H.R.3825, Sec. 3(c). The Senate AICOA only specifies financial fines up to 15 percent of total US revenue. See S.2992, Sec. 2(g)(1).
[56] See H.R.3816, Sec. 2(f)(2); H.R.3826, Sec. 7; S.2992, Sec. 2(g)(2).
[57] See H.R.3816, Sec. 6; H.R.3826, Sec. 7.
[58] FactSet.

with unambiguous definitions of conduct violations that are both expansive and with minimal defenses.[59] The definitions propose to make it unlawful for the defendant to generate profits from cross-subsidization, that is, to make more total profit from two business lines operating together than could be made in total by each business line operating independently. Short of complete compliance with this no cross-subsidization mandate, the defendant would remain liable for potential legal claims from federal competition authorities, state competition authorities, and private parties. If the defendant were to change conduct completely in compliance with the proposed bills, then the outcome is functionally equivalent as a matter of economics to structural separation into independent units. Yet, despite earning identical economic profit as under the case of structural separation, the behavioral modifications would still leave the defendant at significant financial risk from litigation. This is particularly relevant because platform conduct is manifest through computational algorithms, the analysis of which would be prone to *false positives* (i.e., a type I error) under the expansive definitions of violating conduct.

Moreover, certain types of remedies recommended in the House Competition Report and described as behavioral remedies have economic effects that are equivalent to structural remedies. These behavioral remedies include the following.

- **Line of Business Restrictions:** Implementing line of business restrictions necessary to comply with the proposed legislation would sever all cross-subsidization synergies between lines of business. Firms would have the same cost structure and earn the same economic profit if they were to structurally separate the restricted lines of business.

- **Common Carrier Restrictions:** Common carrier restrictions require platforms to avoid discriminating against any of their business users' products or services. Forced to comply with public utility restrictions, yet without being granted a natural monopoly by the government as for the case of public utilities, firms would lose all efficiencies generated by scale and would be no worse off if they were to structurally separate the lines of business on which the common carrier restrictions would be imposed.

- **Prohibiting New Acquisitions:** Although the prohibition on new acquisitions is commonly viewed as a behavioral remedy (i.e., a restraint on what a firm can or cannot do), it is effectively a structural separation of future lines of business that have yet to be realized.

For all these reasons, the set of possible remedies is narrowed from three groups to two: hammer remedies and middle-of-the-road remedies. The narrowing of the outcomes is consistent with statements made by the bills' authors and statements made in the House Competition Report.[60] This is not an indictment of behavioral remedies because economists recognize that behavioral remedies in certain situations can be effective antitrust tools under the current legal framework.[61] It is merely the logical conclusion based on the text of the four bills.

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[59] See, e.g., H.R.3816, Sec. 2(c); see also S.2992, Sec. 2(d).

[60] See, e.g., House Competition Report, p. 379.

[61] See, e.g., Sumit K. Majumdar, "Stick Versus Carrot: Comparing Structural Antitrust and Behavioral Regulation Outcomes," *The Antitrust Bulletin*, published online June 23, 2021, DOI: 10.1177/0003603X211023463; John E. Kwoka and Diana L. Moss, "Behavioral Merger Remedies: Evaluation and Implications for Antitrust Enforcement," *Antitrust Bulletin* 57, no. 4 (Winter 2012): 979–1011; Einer Elhauge, "Disgorgement as an Antitrust Remedy," *Antitrust Law Journal* 76, no. 1 (2009): 79–96; Spencer Weber Waller, "Access and Information

2. Remedies available to covered platforms

The potential remedies for a defendant can be either hammer remedies or middle-of-the-road remedies. Faced with these penalties, a defendant has two available settlement options: reach a settlement agreement with the plaintiff or not reach a settlement agreement with the plaintiff. Under a settlement agreement, the defendant would agree to a certain set of conditions in exchange for the plaintiff dropping the legal claims. These settlement conditions could include some versions of the hammer remedies and the middle-of-the-road remedies. However, as made evident in both the text of the four bills and the House Competition Report, the aim of any legal challenges under the new bills is not to impose a tax on the defendant but to fundamentally alter the structure under which its business operates.[62] Therefore, the settlement terms most likely to occur are structural remedies in which the defendant agrees to proactively implement structural separation via either divestitures or spin-offs. The degree of structural separation is specified according to the two remedy models that we determined to be most likely to occur. Specifically, the choice set available to the defendant facing a legal challenge under the three House bills and the related Senate bill include reaching a settlement agreement in which the defendant agrees to proactively implement one of the following remedy models.

- Minimum units model (MUM): The defendant would proactively split into N independent companies, where the number N is the smallest number such that the market cap of each independent company is below the $600 billion market cap threshold from the House bills (i.e., generating the minimum number of smaller companies).

- Undo past acquisitions model (UPAM): The defendant would proactively divest each acquisition it has made in the past 5, 10, 15, or 20 years.

- Combination of UPAM and MUM: The defendant would proactively divest some recent acquisitions and then split the remaining company into equal-sized units to satisfy the market cap threshold in the House bills.

Alternatively, the defendant can decide not to reach a settlement agreement in which case the defendant implements no proactive structural separation or divestitures and instead opts to present defenses against the legal claims in court.

The UPAM remedy is an unlikely outcome of the litigation settlement for two reasons. First, because the acquired entity has been fully incorporated into the business operations and structure of the parent company, it is not clear, as an accounting matter, which components of the parent company must be divested under UPAM. Second, even if a full divestiture of all prior acquisitions is implemented, the accounting exercise may return a market cap for the remaining parent company that exceeds the market cap threshold. Although the competition authority could choose to remove the covered platform designation for all new companies, including the remaining parent company that exceeds the market cap threshold, a subsequent administration could simply reapply the designation. The defendant would not agree to a settlement without the

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Remedies in High-Tech Antitrust," *Journal of Competition Law & Economics* 8, no. 3 (September 2012): 575–594; Michal S. Gal and Spencer Weber Waller, "Antitrust in High-Technology Industries: A Symposium Introduction," *Journal of Competition Law & Economics*, 8, no. 3 (September 2012): 449–457.
[62] See, e.g., House Competition Report, p. 379.

assurances that all new companies would be inoculated from further scrutiny under the new laws, provided that the new companies do not grow to exceed the threshold once again.

The MUM remedy, by contrast, is guaranteed to generate new companies with market caps below the market cap threshold. In terms of how the MUM remedy is implemented, the knife's edge option is that each new company need only be small enough to fall below the $600 billion threshold in the House bills. However, although this separation satisfies the threshold on Day 1, one of the new companies would likely grow its market cap, exceed the market cap threshold, and subsequently be classified as a covered platform on its own merits. As previously described for the situation of an incomplete UPAM remedy, the competition authority may decide not to apply the covered platform designation on the new company, but it cannot commit a subsequent administration to the same decision. The defendant would be unwilling to agree to a settlement under the MUM remedy if one of the new companies would soon be subject to the same scrutiny under the new laws.

A second option for the MUM remedy provides a growth buffer whereby the structural splits are such that each new company has a market cap below $300 billion, or one-half of the market cap threshold in the House bills. At this level, given the growth dynamics analyzed in the prior section, each new company would have the possibility for 4.2 years of growth at the prevailing technology growth rate without exceeding the inflation-adjusted threshold. Table 3 illustrates the two implementations of the MUM remedy for the five firms likely to be designated as covered platforms. For instance, under the half-threshold implementation, Amazon would have to be split into six independent companies.

Table 3: Structural Separation Predicted under the MUM

Company	Market Cap (9/30/2021)	Minimum Number of Units	
		At Threshold	At Half-Threshold
Google	$ 1,658.3	3	6
Apple	$ 2,339.0	4	8
Facebook	$ 809.0	2	3
Amazon	$ 1,663.7	3	6
Microsoft	$ 2,118.6	4	8

Note: All reported dollar values are in billions USD.
Source: NERA.

If the defendant chooses to offer defenses against the claims in court, it is not relevant whether the defendant modifies its conduct. Any changes in conduct short of complete compliance with the text in the four bills would not end the legal proceeding. Such changes in conduct are insufficient to appease all current plaintiffs and all future potential plaintiffs. Therefore, legal proceedings would continue with the potential that the defendant would be subject to hammer remedies upon a legal finding of guilt. With changes in conduct for complete compliance with the four bills, the defendant would earn identical economic profit as under the case of structural separation but would still retain litigation risk (as previously described).

3. Probability of guilty verdicts

The proposed bills are written with broad definitions of conduct violations that have minimal defenses available. As previously described, the definitions propose to make it illegal for the covered platforms to generate profits from cross-subsidization. Short of structural separation, there is a high probability of a guilty verdict for the defendant.

Under the established competition jurisprudence in the United States, a finder of fact will reach legal conclusions before concluding that a firm has violated an antitrust law. A typical list of such legal conclusions requires rulings on the components of competition analysis:

(1) market definition (although not required for some theories of harm, such as a competitive effects methodology, an understanding of what products and services are at issue is necessary to analyze competition);

(2) conduct consistent with anticompetitive effects;

(3) theory of harm;

(4) harm to competition; and

(5) antitrust injury if the plaintiff is a private party.

Under the three House bills and the related Senate bill, the finder of fact is not obligated to reach any rulings on the five listed components of competition analysis. Rather, before concluding that a firm has violated one of the four bills, a finder of fact would only need to address the following four questions.

(1) Does the firm own or operate an online platform?

(2) Is the platform larger than the network size threshold?

(3) Is the firm larger than the company size threshold?

(4) Did the firm engage in any of the dozens of statutorily proposed examples of illegal conduct?

The first three questions are *per se* conditions, which means that they are immediately and easily determined as either affirmative or negative. With expansive definitions of violating conduct and the minimal defenses, the fourth question is also a *per se* condition, and the answer to this question would always be affirmative.

If during the fact-finding stage of the litigation a covered platform changes its conduct to avoid liability, this would have no effect on the answer to the fourth question. As previously described, if the defendant's conduct changed to be in complete compliance with the four bills, then this would be functionally equivalent to structural separation into independent units. Structural separation is a settlement condition, so the court proceeding would never reach the fact-finding stage if the firm were to proactively implement structural remedies. If the change in conduct

were to be anything short of complete compliance with the four bills, then this would in no way prevent the finder of fact from rendering a legal finding that the firm violated the new laws.

4. Repeated games modeling

The incentives to settle a violation claim are driven by the fact that legal challenges against covered platforms can be brought for a period of up to 10 years by any of the following plaintiffs: DOJ and FTC, state competition authorities, and private party plaintiffs.[63] The model is a dynamic model that accounts for the fact that the strategies and settlement decisions made in one legal case are impacted by past strategies and settlement decisions and affect all future strategies and settlement decisions. As an example, if a defendant were to settle the claims in a current litigation with only the federal competition authority, it would still be liable for different claims brought in a different proceeding and even the same claims brought by a different plaintiff. Therefore, a defendant's incentives for settling a current case are not based on a strategy to make the current litigation end but on a longer-term strategy to end 10 years of potential litigation.[64]

Of the potential plaintiffs, only a federal competition authority, including the DOJ, the FTC, or the newly proposed Bureau of Digital Markets,[65] is endowed with the authority to designate an online platform as a covered platform and the authority to remove that designation at any point prior to the expiry of the 10-year designation window.[66] This authority distinguishes the federal competition authority from the other plaintiffs. In terms of the strategies of the litigation settlement model, it is only rational for a defendant to settle with the federal competition authority as this is the only plaintiff with the authority to end 10 years of potential litigation.[67]

5. Predicted outcome of the litigation settlement model

The litigation settlement model is solved by applying the appropriate solution concept for a dynamic game of complete information: subgame perfect Nash equilibrium. The game is defined by the following set of rules.

- The set of players include the covered platform (defendant) and the federal competition authority (plaintiff).

- The severity of the penalties if a guilty verdict is rendered are known to all parties.

- The defendant's choices are either to agree to a settlement or not and the types of remedies that it can implement as settlement terms include both MUM and UPAM remedies.

- The probability of a guilty verdict is high and recognized by all parties.

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[63] In the Senate bill AICOA, the period of covered platform designation last for seven years. The Senate version also does not permit private party suits. See S.2992, Sec. 2(e)(3).
[64] Ibid.
[65] See, e.g., H.R.3816, Sec 4.
[66] In the Senate bill AICOA, the covered platform designation is removed after a period of seven years. See S.2992, Sec. 2(e)(3).
[67] Ibid.

- The game is likely to be repeated with subsequent legal challenges from a different plaintiff.

Within this strategic environment, the plaintiff (federal competition authority) and the defendant (covered platform) would weigh their possible strategies and evaluate their optimal strategy in an equilibrium stability sense. The optimal strategies for the two parties lead to an equilibrium settlement agreement under the following terms: (1) the competition authority agrees to remove the covered platform designation, and (2) the defendant agrees to implement structural change under the MUM remedy. The timing of the outcome of these optimal strategies would necessarily be simultaneous to ensure commitment.

The rationale for this anticipated outcome is straightforward. The settlement would only be acceptable to the defendant if the new spun-off units of the parent company would be immune from further legal challenges provided they remain below the size thresholds. Absent such immunity, once a covered platform designation is applied, it would remain in place for a period of 10 years regardless of whether the defendant structurally separates into new companies below the size thresholds.[68] With the covered platform designation still applied to all new companies, each would be liable to legal challenges from state competition authorities and private party plaintiffs (even if the federal competition authorities agree in the settlement terms not to pursue future legal challenges of the new companies). Such a settlement outcome is untenable for the defendant as the hammer remedies would remain an ever-present legal risk. The only way to remove this risk would be for the federal competition authority to agree to remove the covered platform designation as a condition of the settlement. This settlement outcome is significantly more agreeable for the defendant as it would inoculate the new companies from further scrutiny under the new laws, provided they remain below the size thresholds.

The settlement is agreeable to the federal competition authority as it avoids the costs of prosecuting the claims in court while still achieving the structural objectives that the House Competition Report expressly recommends. The federal competition authority is not looking to collect between 15 to 30 percent of covered platform revenue indefinitely. Based on the most recent four quarters of reported earnings (Q4 2020 through Q3 2021), the US government would collect between $100 to $200 billion in financial penalties each year from the five covered platforms under this strategy.[69] Even at the lower 15 percent level, the financial penalties are more than 65 percent larger than Amazon's annual net income (Q4 2020 through Q3 2021).[70] This means that Amazon's annual net income would decrease from **positive** $26.3 billion to **negative** $17.2 billion after payment of the financial penalties. Further, such an overt tax policy, aimed at just five firms, would be subject to legal challenge.

Under the MUM remedy settlement, the federal competition authority is additionally able to guard against a reconsolidation of the newly formed companies. According to the text of the four bills, any new company that subsequently grows to exceed the size thresholds, including through mergers and acquisitions, would be subject to the covered platform designation on its own merits.

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[68] Ibid.
[69] See Table 2 above.
[70] FactSet.

V. THE BILLS WOULD INCREASE COSTS TO COVERED PLATFORMS BY $319 BILLION

In this section, we analyze the direct effects of the four bills on the targeted companies Google, Apple, Facebook, Amazon, and Microsoft and reach the following conclusions:

- *The companies would implement a structural separation remedy to comply with the bills.*

- *The structural separations would force the companies to incur one-time costs of $319 billion.*

A. Merger Efficiencies Inform About the Cost of Structural Separation

Our empirical methodology is to estimate the efficiencies that were generated by the covered platforms' acquisitions.[71] Economic theory and empirical evidence support the conclusion that a merger between two firms can generate efficiencies, including cost efficiencies that tend to reduce costs and revenue efficiencies that tend to increase revenues. Our empirical methodology tests for the presence of cost and revenue efficiencies and measures the effects of these effects relative to the overall cost base. Mathematically, the two effects take the following form.

$$cost_{A+B} = (1 - cost\_efficiency) * (cost_A + cost_B) \qquad (1)$$

$$revenue_{A+B} = (1 + revenue\_efficiency) * (revenue_A + revenue_B) \qquad (2)$$

where subscripts A and B represent two generic firms (Firm A and Firm B).

As defined in Equation 1, if the cost of the merged firm is smaller than the costs of each independent firm added together, then the cost efficiency represents the percentage by which the cost of the merged firm is smaller. For example, if Firm A and Firm B have separate global headquarters at a fixed amortized cost of $1 million, but the merged firm A + B can fit its global headquarters inside either of the two existing physical spaces, then the cost for the merged firm of one global headquarters ($1 million) is 50 percent smaller than the total cost of the global headquarters for two independent firms ($1 million plus $1 million). Hence, the cost efficiency equals 50 percent.

As defined in Equation 2, if the revenue of the merged firm is larger than the revenues of each independent firm added together, then the revenue efficiency represents the percentage by which the revenue of the merged firm is higher. This revenue efficiency arises from the opening of new revenue streams to the merged firm that were previously unavailable to each firm independently. These new revenue streams represent *pull-through* revenue, which refers to the economic concept by which a firm's sales of Product A (e.g., gas at a gas station) increase its sales of Product B (e.g., chips and snacks inside the gas station).

Appendix B provides the technical equations and discussion that distinguish between cost efficiencies and revenue efficiencies.

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[71] The term merger applies broadly to mergers and acquisitions.

B. An Econometric Model Establishes the Relationship between Scale and Cost

Acquisitions by the covered platforms represent external changes to a firm's scale. Using the estimated relationship between changes in scale and changes in cost, we predict how future changes in scale (i.e., legislatively mandated structural separation) would affect costs.

To illustrate the concepts of the empirical analysis, consider an example merger between Firm A and Firm B that must be unwound via a structural separation remedy. If the merger between Firm A and Firm B generated cost efficiencies equal to 3 percent (i.e., total cost decreased by 3 percent), then the principle of empirical analysis predicts that the structural separation of Firm A + B into independent Firm A and Firm B would increase total cost by 3 percent.

1. Empirical identification strategy

The variable of interest for our empirical estimation is the change in firm scale variable, as defined in the following section. The key identification assumption that we apply, which is supported by the theory of the scale-cost connection and the timing, is that the effects from the change in firm scale variable on cost are lagged by one quarter.

> **Identification Assumption**: The effects of a firm's acquisitions in quarter *t-1* would have an effect, to be determined by the statistical estimation, on firm cost in quarter *t*.

The statistical relationship that we estimate represents a correlation between a change in firm scale and a change in firm cost. We combine this statistical result with our empirical identification strategy (see further details in Appendix B) and our theory of the scale-cost connection to conclude that the relationship in the data represents a causal relationship, specifically a relationship that describes the numerical change in firm cost *caused* by a change in firm scale.

The theory that we consider centers on the timing of when mergers close and when financial data is reported as well as on the incentives of firms that affect both merger decisions and the growth patterns of revenue and cost financial variables.

(1) The timing in the regressions means that it is not possible for cost changes observed and reported for the current quarter (typically not reported until several weeks after the close of the quarter) to cause a merger to close in the prior quarter.

(2) Confounding factors (i.e., observable and unobservable factors that affect both a firm's decision to merge in the prior quarter and its reported cost in that current quarter) are controlled using the AR(1) regression specification. A factor in the prior quarter that affects both a firm's decision to merge in the prior quarter and its cost in the current quarter would be unaffected by a firm's revenue and cost in that same prior quarter. Similarly, a factor two quarters prior that affects both a firm's decision to merge in the prior quarter and its cost in the current quarter is controlled by the modeling of lagged values for revenue and cost on current values for revenue and cost.

2. Cost effects would be larger than predicted by the econometric model

The empirical analysis applies a symmetry assumption under which the percentage cost increase from the structural separation is identical to the percentage cost decrease from the merger. As a matter of mathematics, this symmetry assumption would likely understate the cost increases from structural separation for the following two reasons.

Consider the prior example in which Firm A has a global headquarters at a cost of $1 million, Firm B has a global headquarters at a cost of $1 million, and the two firms decide to merge into a new Firm A + B with the need for only one global headquarters. The cost reduction is 50 percent (i.e., Firm A + B's cost of $1 million is 50 percent smaller than the total cost of $2 million for Firm A and Firm B separately). The predictions of the empirical methodology would then be that a structural separation that unwinds the merger would lead to a 50 percent cost increase.

However, a structural separation of Firm A + B to its original components increases cost from $1 million (for the global headquarters for the merged Firm A + B) to $2 million (for total cost for global headquarters for each independent company). This represents a cost increase in percentage terms equal to 100 percent (i.e., $2 million is 100 percent larger than $1 million).

The actual cost change of 100 percent would be twice as large as the 50 percent cost change that is predicted by the empirical methodology.

The reason for this discrepancy is that the premerger base cost was $2 million, and the post-merger cost is only $1 million. Because the merger effect is estimated in terms of the higher premerger cost and the structural separation effect is estimated in terms of the lower post-merger cost, the definition of a percentage change implies that the empirical predictions would understate the cost increases due to the structural separation.

C.   A Change in Scale Measure is a Necessary Input for the Econometric Model

The empirical methodology requires a regression model and several model inputs. First, we select a benchmark set of firms that includes the five firms likely to be designated as covered platforms under the proposed legislation: Google, Apple, Facebook, Amazon, and Microsoft. Second, we select a sample period. We select Q3 2002 as the start of our data period as this is the quarter in which the Sarbanes-Oxley Act took effect. Our empirical methodology uses one-quarter lagged variables, so the sample period starts one quarter later in Q4 2002. The sample period runs through the most recent quarter of available data (Q3 2021). Third, we apply a statistical measure that assigns a value for each change in firm scale that is observed in the historical database. Fourth and finally, we control for idiosyncratic factors, such as firm-specific factors.

The measure for the change in firm scale must have several algebraic properties.

- Monotonicity: all other factors held equal, a larger change in scale implies a larger value for the change in scale measure.

- Decreasing nominal returns: all other factors held equal, the same nominal change in scale implies a smaller effect on a firm that is already large (smaller value for the change in scale measure) than on a firm that is still small (larger value for the change in scale measure).

- Constant relative returns: all other factors held equal, the same relative change in scale has identical values for the change in scale measure regardless of firm size.

- More heterogeneity in the size distribution reduces the change in scale measure: the merger of a $1 billion value firm and a $9 billion value firm, into a combined $10 billion value firm, has a smaller change in scale measure than the merger of two $5 billion value firm (which also combine into a $10 billion value firm).

- Super-additivity: the change in scale measure for two acquisitions (C and D) is larger than the change in scale measure for acquisition C by itself plus the change in scale measure for acquisition D by itself.

- Intercept at the origin: for quarters without any observed acquisitions (i.e., zero change in firm scale), the change in scale measure also equals zero.

A standard percentage change measure satisfies five of the algebraic properties listed above but does not satisfy the super-additivity property. The acquisitions database includes many quarters in which firms make multiple acquisitions. Consider a hypothetical quarter in which a $6 billion value firm acquires a $4 billion value firm. Next, consider a second hypothetical quarter in which the same $6 billion value firm acquires both a $2 billion value firm and another $2 billion value firm. The percentage change in terms of total acquisition value equals 67 percent in both hypothetical quarters. However, as a matter of economics, there are more potential cost efficiencies when combining three companies into one (a $6 billion, $2 billion, and $2 billion value firm) than when only combining two companies into one (a $6 billion and a $4 billion value firm). This dynamic, which is equivalent to the super-additivity property, is a feature that must be satisfied by our change in scale measure.

Therefore, we adopt a modified percentage change measure that we call the change in scale measure (CSM). This measure is identical to the percentage change measure when only one acquisition is reported but is more robust when two or more acquisitions are reported. The following steps carefully describe the mathematical calculations required to determine the CSM value.

- Step 1: Determine the values of the components to be combined (e.g., $6 billion, $2 billion, and $2 billion)

- Step 2: Calculate the relative size of each component (e.g., 0.6, 0.2, and 0.2)

- Step 3: Calculate the sum of squares of the relative sizes (e.g., $(0.6)^2 + (0.2)^2 + (0.2)^2 = 0.44$)

- Step 4: Compare the sum of squares of the relative sizes to the final combined company (equals 1) (i.e., one less the sum of squares of the relative sizes, for example, $1 - 0.44 = 0.56$)

- Step 5: Normalize by the two-firm merger factor such that the CSM equals the percentage change measure when the only acquisition is a merger of two firms:

  - the two-firm merger factor equals $2 * (0.6)^2 = 0.72$

  - $CSM = 0.56 \div 0.72 = 77.78$ percent

Thus, for the combination of three firms ($6 billion, $2 billion, and $2 billion), the CSM equals 77.78 percent. By comparison, the combination of only two firms ($6 billion and $4 billion) has a CSM value equal to 66.67 percent.[72] This difference represents the additional cost efficiencies that are possible when the parent company acquires two firms as compared to only acquiring one firm.

The CSM is the variable of interest for our empirical estimation of the historical relationship between the change in scale and the change in cost. Values for the CSM are reported as percentages, meaning that each unit of CSM represents one percentage point change in firm scale.

D.   A Change in Scale is Inversely Related to a Change in Cost

The data that we rely upon consist of the following datasets and the following data variables.

- Acquisition dataset: acquiring firm, date, acquisition value (purchase price)

- Financial statement dataset: firm, quarter, revenue, COGS, gross profit, SG&A costs, operating costs, operating profit, net income

- Market cap valuations: firm, date, market cap valuations reported at daily frequency and with most recent value as of September 30, 2021

- Stock market indices: date, values for NASDAQ 100 Index and NASDAQ Composite Index reported at daily frequency and with most recent value as of September 30, 2021

- Proposed statutory market cap threshold for covered platforms: $600 billion (House bills) and $550 billion (Senate bill)

The empirical database is organized as a panel database stratified by firm and calendar year quarter. The acquisition dataset contains the necessary date information to organize the data at quarterly frequency. The financial statement dataset is reported at quarterly frequency. The market cap valuations are reported at daily frequency (the closing value at the end of each trading day), which are easily compiled into the maximum, average, and final market cap values in each quarter. Similarly, the stock market data, which includes the NASDAQ index values, are reported at daily frequency (the closing value at the end of each trading day), which are easily compiled into the maximum, average, and final index values in each quarter.

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[72] The values $6 billion and $4 billion correspond to relative sizes 0.6 and 0.4. The sum of squares is $(0.6)^2 + (0.4)^2 = 0.52$, and $1 - 0.52 = 0.48$. The 2-firm merger factor equals $2 * (0.6)^2 = 0.72$, and $CSM = 0.48 \div 0.72 = 66.67$ percent.

The dependent variable in all regressions is a measure of accounting cost, where the following three cost variables are considered:

(1) COGS (i.e., cost of goods sold, cost of revenue, cost of sales): direct or variable costs;

(2) SG&A costs (i.e., sales, general, and administrative costs): indirect or fixed costs; and

(3) Operating Costs (i.e., operating expenses or OpEx) = COGS + SG&A: sum of direct (variable) and indirect (fixed) costs.

The regression models are specified in accordance with the marginal effects methodology, which means that the effects of the variable of interest (CSM) on cost are isolated. The marginal effects methodology delivers as its main predictive variable an estimated ratio of the change in cost relative to a change in firm scale. The ratio can be expressed with the change in cost in the numerator and the change in firm scale (CSM) in the denominator. This ratio is multiplied by the predicted change in firm scale to predict the change in cost in the future. For example, the ratio $\frac{-3}{1}$ means that a one-unit increase in firm scale would lead to a three-unit decrease in cost. That same ratio is equivalent to $\frac{3}{-1}$, which means that a one-unit decrease in firm scale would lead to a three-unit increase in cost. The ratio is also applicable for larger and smaller unit changes in firm scale. For example, the same ratio implies that a two-unit increase in firm scale would lead to a six-unit decrease in cost.

The marginal effects methodology requires that the change in firm scale variable (CSM) is included in the regression specifications as an explanatory variable and the change in cost variable is included in the regression specifications as the dependent variable. Table 4 provides an example of how the CSM values are calculated. The example in Table 4 considers a firm in three parts. At the end of the quarter, the combined firm has a market cap of $100 billion that includes the acquisition values of $3 billion and $2 billion. Pre-acquisition, we view the firm in three parts, which means that the value of the acquiring company was $95 billion. The three parts premerger values of $95 billion, $3 billion, and $2 billion correspond to relative sizes of 95 percent, 3 percent, and 2 percent, respectively. The sum of squares equals 0.904, and one less the sum of squares equals 0.096.[73] The two-firm merger factor equals 1.805, and CSM (represented as a percent) equals 5.33.[74] This is equivalent to a 5.33 percent increase in scale.

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[73] The sum of squares is $(0.95)^2 + (0.03)^2 + (0.02)^2 = 0.904$, and $1 - 0.904 = 0.096$.

[74] The parent company has relative size 0.95, so the 2-firm merger factor equals $2 * (0.95)^2 = 1.805$. CSM = $0.096 \div 1.805 * 100 = 5.33$.

Table 4: Example Calculating CSM from Acquisition Dataset

	Line Item	Value	Equation
		---($ in billions)---	
[1]	End of Quarter Market Cap	$100.00	Given
[2]	Value, Acquisition 1	$3.00	Given
[3]	Value, Acquisition 2	$2.00	Given
[4]	Value w/o Acquisitions	$95.00	= [1] - [2] - [3]
[5]	Relative Sizes	(0.95, 0.03, 0.02)	= ([4] ÷ [1], [2] ÷ [1], [3] ÷ [1])
[6]	Sum of Squares	0.904	= [5a]^2 + [5b]^2 + [5c]^2
[7]	One Less Sum of Squares	0.096	= 1 - [6]
[8]	2-Firm Merger Factor	1.805	= 2 * ([4] ÷ [1])^2
[9]	CSM (in %)	5.33	= [7] / [8] * 100

Source: NERA.

In addition to the variable of interest (CSM), our empirical regression models include several control variables consistent with our identification strategy:

▪ revenue variable to control for firm size and growth;

▪ lagged cost variable to control for omitted variables that affect both CSM and the current-quarter cost variable and to identify the sum of cost efficiencies and revenue efficiencies; and

▪ lagged revenue variable to control for omitted variables that affect both CSM and the current-quarter cost variable and to identify the sum of cost efficiencies and revenue efficiencies.

Additional control variables include dummy variables to control for firm and seasonal fixed effects:

▪ dummy indicator variable for each firm to control for firm-specific effects; and

▪ dummy indicator variable for each quarter of the year (Quarter 1, Quarter 2, Quarter 3, Quarter 4) to control for seasonal effects that are common to all firms.

The revenue and cost variables account for firm growth across both internal and external channels. The change in scale variable measures firm growth from just the external channel. The estimated coefficient on the CSM variable captures the effects of external growth on cost.

Consistent with statistical practices in econometrics, the regression specifications include the natural logs of the cost and revenue variables. The regression specifications are implemented using the Ordinary Least Squares (OLS) model, which in its simplest form is represented by the mathematical equation:

$$ln(cost_{i,t}) = c + a(CSM_{i,t-1}) + \beta\, ln(revenue_{i,t}) + \gamma\, ln(cost_{i,t-1}) + \delta\, ln(revenue_{i,t-1}) + \theta_i + \sigma_{s(t)} + \epsilon_{i,t} \quad (5)$$

The constant is represented by the variable c and the error term is represented by the final term $\epsilon_{i,t}$. Under the OLS modeling assumptions, we assume that the error term is normally distributed. The index i represents the company and the index t represents the time period (or quarter). The firm dummy variable takes value 1 for firm i and 0 for all other firms. The season dummy variable takes value 1 for quarter of the year $s(t)$ and 0 for all other quarters of the year (either quarter 1, 2, 3, or 4).

The regression coefficients are represented by Greek letters, and the outcome of the regression estimation are the mean and standard deviation for all coefficients. For ease of exposition, the mean value of a coefficient is referred to as the coefficient value. The coefficient values are jointly determined as the set of parameters that best fit the underlying data under the OLS econometric model.

The explanatory variable of interest is lagged CSM and the coefficient value of interest is the coefficient value associated with lagged CSM. The coefficient value for lagged CSM has a natural interpretation: for each one percentage point increase in firm scale, the coefficient value represents the approximate relative increase in cost. For example, a coefficient of –0.01 corresponds to a cost increase equal to $(exp(-0.01) - 1) = -0.995$ percent.[75] The cost increase of –0.995 percent is equivalent to a cost decrease of 0.995 percent. Symmetrically, the same coefficient value of –0.01 predicts that a one percentage point decrease in scale leads to a cost increase of 0.995 percent.

Table 5 reports the empirical results for our primary empirical specification with operating costs as the dependent variable on the left-hand side of the regression equation. In each of the three models, the left-hand side dependent variable remains the same (natural log of current operating costs) and the main explanatory variables on the right-hand side of the regression equation remain the same (lagged CSM, natural log of current revenue, natural log of lagged cost, natural log of lagged revenue). The three models differ based upon whether fixed effects for the company and the season (quarter of the year) are included. Regression 1 does not include company fixed effects nor seasonal fixed effects. Regression 2 includes company fixed effects. Regression 3 includes both company and seasonal fixed effects. In each cell, coefficient values are reported on top and standard errors (bracketed in parentheses) are reported just below the coefficient values.

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[75] The coefficient value –0.01, which corresponds to –1 percent, approximates this true value.

**Table 5: Regression Results for Three Econometric Specifications
with Operating Costs as the Dependent Variable**

	DEPENDENT VARIABLE: LN CURRENT COSTS		
	(1)	(2)	(3)
VARIABLES	Regression 1	Regression 2	Regression 3
Lagged CSM	-0.011***	-0.007***	-0.008***
	(0.003)	(0.002)	(0.002)
Ln Lagged Costs	0.880***	0.557***	0.568***
	(0.022)	(0.035)	(0.034)
Ln Current Sales	0.921***	0.927***	0.869***
	(0.022)	(0.019)	(0.031)
Ln Lagged Sales	-0.801***	-0.491***	-0.443***
	(0.030)	(0.038)	(0.044)
Constant	-0.034***	0.003	-0.014
	(0.012)	(0.011)	(0.013)
Observations	333	333	333
R-squared	0.996	0.997	0.997
Company Fixed Effects	NO	YES	YES
Quarter of Year Fixed Effects	NO	NO	YES
Sample Period	2002:Q4-2021:Q3	2002:Q4-2021:Q3	2002:Q4-2021:Q3

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: NERA.

Regression 3 is our selected econometric specification and, as displayed in Table 5, the coefficient for lagged CSM is statistically significant at the 1 percent confidence level (note the three asterisks) and equal to –0.008. Comparing Regressions 1 and 2, we conclude that the inclusion of company fixed effects slightly dampens the effect of lagged CSM and has a significant effect on the coefficients for the other explanatory variables, particularly the lagged variables. As a matter of econometrics, it is appropriate to include company fixed effects in a panel data regression. Comparing Regressions 2 and 3, the subsequent inclusion of the seasonal fixed effects has negligible effects on the regression overall and on the mean value and precision of the coefficient for lagged CSM. Thus, although we select Regression 3 as the appropriate econometric specification, there is no qualitative difference and very little quantitative difference between Regressions 2 and 3.

Table 6 reports more detailed statistical results for the three regressions described above with total operating costs as the dependent variable. The coefficient values and the standard error (SE) were previously reported in Table 5 for the lagged CSM coefficient. The Z-score, relative to a null hypothesis that the coefficient value is equal to 0, is equal to the coefficient value divided by the standard error. The p-value is obtained from a t-table based on a two-tailed null hypothesis for the normal distribution of the error term and the degrees of freedom (i.e., number of observations less the number of explanatory variables less one). The percentage cost effect (Scale-Cost %) is determined as (exp(coefficient value) $- 1$) and connects the estimated coefficient values to the percentage change in cost (for each one percentage point change in firm scale) that we apply in our predictive model.

Table 6: Focused Regression Results for Lagged CSM

	Coefficient (Lagged CSM)				
Regression	Coefficient Value	SE	Z-score	P-value	Scale-Cost (%)
1	-0.011	0.003	-3.69	0.0%	-1.1%
2	-0.007	0.002	-2.91	0.4%	-0.7%
3	-0.008	0.002	-3.11	0.2%	-0.8%

Source: NERA.

As reported in Table 6, lagged CSM is statistically significant at the 0.2 percent confidence level for Regression 3 (our selected specification with both company and seasonal fixed effects). For the hypothesis test of whether the coefficient for lagged CSM is statistically different from 0, statistical significance at the 0.2 percent confidence level means that out of 1,000 random draws from a normal distribution for the error term of Regression 3, there are only two instances in which the estimated coefficient would be positive. In the remaining 998 instances, the estimated coefficient would be negative. In economics, empirical estimation with statistical significance below the 5 percent confidence level is accepted as strong empirical evidence, and statistical significance below the 1 percent confidence level is unassailable statistical support.

Additionally, as reported in Table 6, the percentage cost effects range from –0.7 percent to –1.1 percent. This implies both that a one percentage point increase in firm scale would lead to an operating cost decrease of between 0.7 and 1.1 percent and that a one percentage point decrease in firm scale would lead to an operating cost increase of between 0.7 and 1.1 percent. We use the marginal effect result of 0.8 percent (corresponding to our selected specification Regression 3) when applying the historical statistical relationship to the remedy models for the proposed legislation.

Separate econometric models with SG&A expenses and COGS as the dependent variables were implemented and the results of these regressions are reported in Appendix C. The economic significance (i.e., the sign and value of the coefficient for the lagged CSM) is confirmed in all regressions with SG&A and COGS as dependent variables. In terms of statistical significance, the coefficient for lagged CSM is statistically significant in the SG&A regressions (at the 5 percent confidence level for Regression 1 and at the 1 percent confidence level for Regressions 2 and 3) but not in the COGS regressions. This result is intuitive as we would expect changes in firm scale to have a more significant statistical effect on SG&A expenses (fixed costs) than on COGS (variable costs).

In addition, sensitivity econometrics models with total operating costs as the dependent variables and varying sample period lengths were implemented and the results of these regressions are reported in Appendix C. Both the economic significance (i.e., the coefficient value for the lagged CSM) and the statistical significance (at the 1 percent confidence level) remain unchanged under variations of Regression 3 from Table 5 above.

E. Structural Separation Creates Significant Additional Costs for Covered platforms

Applying the estimated inverse relationship between scale and costs to the MUM and UPAM models reveals that the proposed bills would create significant additional costs for the covered platforms.

1. Cost effects under MUM

Under MUM, the proposed bills would create direct economic costs of at least $260 billion and the likely cost effects would be nearly $319 billion. We estimate the cost effects under two implementations of the MUM remedy: (1) structural separation into the smallest number of equal-sized independent companies such that the market cap of each is below the market cap threshold, and (2) structural separation into the smallest number of equal-sized independent companies such that the market cap of each is below one-half of the market cap threshold.

The first option, by definition, yields the smallest number of independent companies in compliance with the market cap threshold. Any smaller number of units is not possible without leaving at least one of the units with a market cap that exceeds the market cap threshold. The second option is just one of many intermediate structural remedies consistent with the MUM philosophy that allows a buffer for future growth. Stronger implementations of the MUM remedy are possible, including structural separation into the smallest number of equal-sized independent companies such that the market cap of each is below one-fourth of the market cap threshold. These alternative, stronger implementations would allow for more years of growth before one of the new independent companies would exceed the inflation-adjusted market cap threshold.

For each of the two implementations of the MUM remedy, we first calculate how each version of MUM translates into CSM values. Second, we apply the CSM values to the estimated scale-cost effect from the regression analysis to predict the change in cost.

The algebraic calculation of the CSM values under the MUM remedies is analogous to the calculation of the CSM values using the historical acquisition data with two differences. First, firm scale is being reduced not increased, so the CSM values would be negative not positive. Second, the CSM normalization factor for MUM must be chosen to account for the symmetry of our empirical methodology. Namely, because the merger of a $5 billion value firm and a $5 billion value firm in the historical data lead to a CSM value of 100 percent, then the structural separation of a $10 billion value firm into a $5 billion independent company and another $5 billion independent company must have a CSM value of *negative* 100 percent.

With these two principles, the algebraic steps to compute the CSM value under the MUM remedies are described below.

- Step 1: Determine the number of equal-sized units that the parent company would be split into, which will be denoted N (e.g., a market cap of $2.4 trillion requires N=4 units under full-threshold MUM and N=8 units under half-threshold MUM), whereas a market cap of $2.5 trillion requires N=5 units under full-threshold MUM and N=9 units under half-threshold MUM.

- Step 2: Calculate the relative size of each component (e.g., 1/N, 1/N, 1/N, …)

- Step 3: Calculate the sum of squares of the relative sizes (e.g., $(1/N)^2 + (1/N)^2 + (1/N)^2 = 1/N$)

- Step 4: Compare the pre-split parent company (equals 1) to the sum of squares of the relative sizes, that is, the sum of squares of the relative sizes less one (e.g., $1/N - 1 = -(N-1)/N$)

- Step 5: Normalize by the *equal-sized merger symmetry factor* such that the CSM equals the inverse of the percentage change measure when two equal-sized companies are being combined:

  - The equal-sized merger symmetry factor equals $(N-1)/N = 0.5$ (for $N = 2$)

  - $CSM = -(N-1)/N \div 0.5 = -2(N-1)/N$

This is based upon applying the market cap threshold of $600 billion from the House bills. For a covered platform with a market cap of $2.4 trillion, then division into four equally sized units of $600 billion each satisfies the full-threshold MUM requirement, but a market cap of $2.5 trillion requires division into five equally sized units of $500 billion to satisfy the full-threshold MUM requirement. It is not possible to do fractional divisions of companies. The market cap threshold is only $550 billion in the Senate bill.[76] Therefore, more structural splits may be required for the application of MUM under these terms of the Senate bill.

Thus, for a split into two firms, the CSM equals –100 percent. For a split into three firms, the CSM equals –133 percent.[77] For example, a covered platform with market cap $1.5 trillion would be forced to split into three equal-sized companies under the full-threshold MUM remedy and would therefore have a CSM value equal to –133 percent, as shown in Table 7.

Table 7: Example Calculating CSM under Full-Threshold MUM Remedy

Line Item	Value	Equation
	----($ in billions)----	
[1] Current Market Cap	$1,500.00	Given
[2] Threshold	$600.00	Statutory
[3] Minimum Units (N)	3	= Round Up ([1] ÷ [2])
[4] Relative Sizes	(1/3, 1/3, 1/3)	= (1 ÷ [3], 1 ÷ [3], 1 ÷ [3])
[5] Sum of Squares	1/3	= [4a]^2 + [4b]^2 + [4c]^2
[6] Sum of Squares Less One	-2/3	= [5] - 1
[7] Equal-Sized Merger Symmetry Factor	1/2	= 1 - [(1/2)^2 + (1/2)^2]
[8] CSM (in %)	-133.33	= [6] / [7] * 100

Source: NERA.

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[76] See S.2992, Sec. 2(h)(4)(B)(ii).
[77] With $N = 3$, the equation $-2(N-1)/N$ equals $-4/3$, which is expressed as a percent as –133 percent.

For the same firm with a market cap of $1.5 trillion, a structural split under the half-threshold MUM remedy requires five equal-sized companies, which leads to a CSM value equal to –160 percent, as shown in Table 8.

Table 8: Example Calculating CSM under Half-Threshold MUM Remedy

Line Item	Value	Equation
	-----($ in billions)-----	
[1] Current Market Cap	$1,500.00	Given
[2] Half-Threshold	$300.00	One-Half of the Statutory Threshold
[3] Minimum Units (N)	5	= Round Up ([1] ÷ [2])
[4] Relative Sizes	(1/5, 1/5, 1/5, 1/5, 1/5)	= (1 ÷ [3], 1 ÷ [3], 1 ÷ [3], 1 ÷ [3], 1 ÷ [3])
[5] Sum of Squares	1/5	= [4a]^2 + [4b]^2 + [4c]^2 + [4d]^2 + [4e]^2
[6] Sum of Squares Less One	-4/5	= [5] - 1
[7] Equal-Sized Merger Symmetry Factor	1/2	= 1 - [(1/2)^2 + (1/2)^2]
[8] CSM (in %)	-160.00	= [6] / [7] * 100

Source: NERA.

Both examples above are based upon applying the market cap threshold of $600 billion from the House bills. The market cap threshold is only $550 billion in the Senate bill.[78] Therefore, more structural splits may be required for the application of MUM under these terms of the Senate bill.

Table 9 tabulates the results when applying the CSM values for the MUM remedies (under the House's version of the market cap threshold) to the estimated coefficient for the CSM variable from the operating cost regression (our selected empirical specification is Regression 3 from Table 5). The final row of Table 9 reports the cumulative effects summed across all five firms. As shown in Table 9, the cost increases for operating costs range from $260 billion to $319 billion, which represent one-time cost increases to the five target firms. This upper estimate represents up to 1.38 percent of US GDP, according to the most recent quarter of available data (i.e., Q3 of 2021).[79]

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[78] See S.2992, Sec. 2(h)(4)(B)(ii).

[79] The cost effect of $319 billion relative to nominal GDP of $23.17 trillion for Q3 2021 (FRED Economic Data) corresponds to a ratio of 1.38 percent. See U.S. Bureau of Economic Analysis, Gross Domestic Product [GDP], retrieved from FRED, Federal Reserve Bank of St. Louis, November 2, 2021, https://fred.stlouisfed.org/series/GDP.

Table 9: Operating Cost Increases under MUM Remedies

Company	Cost Increases under MUM At Threshold		Cost Increases under MUM At Half-Threshold	
	----------------($ in billions)----------------			
Amazon	$	106.43	$	133.04
Apple		67.31		78.53
Facebook		14.00		18.67
Google		44.28		55.35
Microsoft		28.34		33.06
Covered Platforms		**260.36**		**318.64**

Note: Dollars in billions.
Source: NERA.

The market cap threshold is smaller in the Senate bill. Therefore, larger cost increases would be likely under the terms of the Senate bill.[80]

The nominal GDP benchmark is the reported annualized economic output based on the most recent quarter of economic activity, whereas the empirical estimates under the marginal effects methodology mathematically imply that the cost increases are captured entirely within one quarter. However, given structural changes of this size, the cost effects for a single firm would likely be spread across more than one quarter. This prediction is consistent with the observations from many prior large mergers. Further, the combined cost effects for all five covered platforms would only hit in a single quarter if the litigation settlements all took effect in the same quarter. We therefore anticipate that the total cost effects for all covered platforms would be spread out over a period of several years both due to firms spreading the cost effects across many quarters and the differences in the enforcement timing. If the upper estimates of the total cost effects of $260 billion to $319 billion were spread over three to four years, then the cost increases would represent up to 0.46 percent of US GDP over a three-year period and 0.34 percent of US GDP over a four-year period.

The cost effects are nominally quantified specific to the most recent quarter of available data and represent an immediate implementation of the structural remedies. Delayed implementation would increase the nominal costs incurred by the firms and would therefore increase the nominal cost effects (i.e., applying the same cost percentage to a larger cost base would generate a larger nominal cost effect). Comparison to nominal economic output (nominal GDP) is useful because any delayed implementation of structural remedies would increase not only the nominal cost effects but also the nominal economic output. Under the assumption that firm costs increase at approximately the rate of nominal GDP, the ratio of nominal cost effects to nominal economic output would be a reliable prediction that is independent of the quarter in which the structural remedy is implemented.

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[80] See S.2992, Sec. 2(h)(4)(B)(ii).

2. Cost effects under UPAM

We estimate the cost effects under four possible implementations of the UPAM remedy based on how far into the past the regulators are required to look to identify acquisitions of the covered platforms that must be unwound. We consider lookback periods of either 5, 10, 15, or 20 years. For longer lookback periods, the accounting challenge is that many of the acquisitions have been fully incorporated into the parent company's corporate structure and it may not make sense to separate the business lines that can be traced back to the very old acquisitions.

Even if divestitures of all acquisitions could be implemented cleanly, as a matter of accounting, the divestitures may still leave the parent company with a market cap above the market cap threshold. Such an outcome of a UPAM remedy is untenable, given its inconsistency with the proposed bills and the legal remedies available to competition authorities and private party claimants. The competition authority would have the option to drop the covered platform designation even if the post-UPAM parent company's market cap remained above the threshold. However, there is no commitment device to prevent a different competition authority or the same competition authority in future years and under a different presidential administration from reapplying the designation. This means that any post-divestiture market cap distribution in which any unit's market cap exceeds the threshold would be unstable and inconsistent with the predictions of our litigation settlement model. An incomplete UPAM remedy would need to be followed by a MUM remedy to bring the market cap for the post-divestiture parent company below the market cap threshold.

For each of the four implementations of the UPAM remedy, we first calculate how each version of UPAM translates into CSM values. Second, we apply the CSM values to the estimated scale-cost effect from the regression analysis to predict the change in cost.

The algebraic calculation of the CSM values under the UPAM remedies is analogous to the calculation of the CSM values using the historical acquisition data with two differences. First, firm scale is being reduced not increased, so the CSM values would be negative not positive. Second, the acquisition values, as reported in the purchase prices, must be adjusted from the acquisition date to the present to account for growth within the parent company. The growth model uses a growth adjustment under the assumption that the value of each acquisition grows at the same rate as the value of the entire company (as measured by its market cap). As an example of the growth adjustment, consider Apple's acquisition of Beats Headphones for $3 billion in August 2014 when Apple's market cap was $700 billion and consider that Apple's market cap is currently $2.5 trillion. Under our applied growth adjustment, the Beats purchase price of $3 billion is assumed to grow at the same rate as Apple's market cap from August 2014 to present (e.g., 357 percent growth).[81] Under this adjustment, the value of Beats Headphones as of today is estimated at $10.7 billion.[82]

We apply the growth adjustment to each acquisition over the relevant lookback period and then calculate the CSM values by requiring that all acquisitions within that lookback period are divested. Specifically, as shown in Table 10, consider a firm that has the exact same history of

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[81] The growth adjustment is ($2.5 trillion) / ($700 billion) = 357 percent.
[82] Beats growth-adjusted purchase price = ($3 billion) * ($2.5 trillion) / ($700 billion) = $10.7 billion.

acquisitions as considered in the example in Table 4. The example firm has a current market cap of $100 billion, and after applying the growth adjustment it has two acquisitions in the lookback period of values $3 billion and $2 billion, respectively. Post divestiture, the parent company would have market cap equal to $95 billion.[83] The three components of the firm post divestiture have values of $95 billion, $3 billion, and $2 billion. These components correspond to relative sizes of 95 percent, 3 percent, and 2 percent, respectively. The sum of squares equals 0.904, and the sum of squares less one equals –0.096.[84] The two-firm merger factor equals 1.805, and CSM (represented as a percent) equals –5.33.[85] This is equivalent to a 5.33 percent decrease in scale.

Table 10: Example Calculating CSM under UPAM Remedies

Line Item	Value	Equation
	----($ in billions)----	
[1] Current Market Cap	$100.00	Given
[2] Value, Divestiture 1 (Growth Adjusted)	$3.00	Given
[3] Value, Divestiture 2 (Growth Adjusted)	$2.00	Given
[4] Value of Remaining Parent Company	$95.00	= [1] - [2] - [3]
[5] Relative Sizes	(0.95, 0.03, 0.02)	= ([4] ÷ [1], [2] ÷ [1], [3] ÷ [1])
[6] Sum of Squares	0.904	= [5a]^2 + [5b]^2 + [5c]^2
[7] Sum of Squares Less One	-0.096	= [6] - 1
[8] 2-Firm Merger Factor	1.805	= 2 * ([4] ÷ [1])^2
[9] CSM (in %)	-5.33	= [7] / [8] * 100

Source: NERA.

The calculated CSM value in Table 10 is symmetric to the 5.33 percent increase in scale calculated in Table 4 for a $95 billion firm that acquires a $3 billion firm and a $2 billion firm. The logic behind this symmetry is intuitive because the divestitures in Table 10 are simply the inverse of the acquisitions in Table 4.

Table 11 tabulates the results when applying the CSM values for the MUM remedies to the estimated coefficient for the CSM variable from the operating cost regression (our selected empirical specification is Regression 3 from Table 5). The final row of Table 11 reports the cumulative effects summed across all five firms. As shown in Table 11, the operating cost increases range from $4 billion to $31 billion, which represent one-time cost increases to the five covered platforms.

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[83] The remaining parent company has market cap equal to the difference between the current market cap and the growth adjusted values of all acquisitions in the look-back period. For this example, remaining parent company market cap = $100 billion - $3 billion - $2 billion = $95 billion.

[84] The sum of squares is $(0.95)^2 + (0.03)^2 + (0.02)^2 = 0.904$, and $1 - 0.904 = 0.096$.

[85] The parent company has relative size 0.95, so the 2-firm merger factor equals $2 * (0.95)^2 = 1.805$. CSM = $0.096 ÷ 1.805 * 100 = 5.33$.

Table 11: Operating Cost Increases under UPAM Remedies

Company	Cost Increases under UPAM 5 Years		Cost Increases under UPAM 10 Years		Cost Increases under UPAM 15 Years		Cost Increases under UPAM 20 Years	
	($ in billions)							
Amazon	$	3.33	$	5.13	$	9.64	$	10.16
Apple		0.13		0.47		0.75		1.52
Facebook		0.06		4.88		4.88		4.88
Google		0.26		1.17		7.77		8.89
Microsoft		0.53		2.74		4.98		5.30
Covered Platforms		**4.31**		**14.39**		**28.03**		**30.76**

Note: Dollars in billions.
Source: NERA.

Table 12 tabulates the market cap valuations of the remaining parent company after having divested all the acquisitions (with purchase prices scaled by the growth adjustment as previously described) within a lookback period. The requirement for any MUM or UPAM remedy is to deliver structural separation such that all new companies, including the remaining parent company, have market caps below the market cap threshold. Anything short of this is inconsistent with the text of the proposed bills and the legal remedies available to competition authorities and private party claimants. As shown in Table 12, the UPAM remedies are incomplete because they fail to meet the market cap threshold requirement for the remaining parent company even when the UPAM remedy is applied to require the divestiture of all acquisitions over a 20-year lookback period. Amazon, Apple, and Microsoft remain at nearly $1.5 trillion, $2.3 trillion, and $1.7 trillion, respectively, in market cap, which far exceeds the $600 billion market cap threshold from the House bills. Facebook's value of $612 billion gets close to the $600 billion threshold from the House bills but still exceeds it. Google remains at more than $1.3 trillion in market cap, which far exceeds the $600 billion market cap threshold from the House bills.

Table 12: Market Cap Valuations of Remaining Parent Company under UPAM Remedies

Company	Remaining Value after UPAM 5 Years		Remaining Value after UPAM 10 Years		Remaining Value after UPAM 15 Years		Remaining Value after UPAM 20 Years	
	($ in billions)							
Amazon	$	1,597.66	$	1,565.28	$	1,491.94	$	1,484.13
Apple		2,332.48		2,314.87		2,300.75		2,263.40
Facebook		805.34		612.23		612.23		612.23
Google		1,645.62		1,602.56		1,361.81		1,331.29
Microsoft		2,061.07		1,861.76		1,709.00		1,690.33

Note: Dollars in billions.
Source: NERA.

The market cap threshold in the Senate bill is only $550 billion, so the UPAM remedies are even further from compliance under the terms of the Senate bill.[86]

VI.   THE $319 BILLION IN COST INCREASES WOULD BE PASSED THROUGH TO CONSUMERS

The $319 billion in cost increases would directly harm customers and business users of Google, Apple, Facebook, Amazon, and Microsoft for two reasons:

- *The independent units would face increased costs without the possibility to cross-subsidize or use diversification across multiple lines of business to bear long-term risks.*

- *The independent units would pass through increases in incremental costs to a greater extent than the original companies.*

A.   The Independent Units Would Pass Through Costs to Remain Independently Profitable

The independent units would be smaller than the original companies and would be restricted to operating only a single line of business without the possibility to cross-subsidize or use diversification across multiple lines of business to bear long-term risks. The business strategies of the independent companies would be completely reworked relative to the original covered platform. Further, to remain viable, they must be independently profitable. Thus, burdened with their respective shares of the $319 billion increase in incremental costs, the independent units would pass these costs through to consumers and business users.

B.   The Independent Units Would Pass Through Costs to a Greater Extent than the Original Companies

Companies that sell a product or service that is widely preferred over all comparable products and services have either a technology-cost-price advantage or a brand advantage. The former advantage derives from a technological advantage in production processes that affords the company to incur lower costs and sell at lower prices relative to companies selling comparable products and services. Regardless of the origin of the strong consumer preference, the company with the widely preferred product or service can implement two broad business strategies. First, it can keep the price low and retain the advantage in consumer demand. Second, it can increase price to extract higher profit.

The second business strategy permits the company to earn higher profit because it stands to gain more from the price increase imposed on its remaining customers than it stands to lose in overall sales from customers that switch to comparable products and services. The price increase represents a movement along the demand curve. At the optimal price point, further increases in price would cause the company to lose more profit from lost customers than it stands to gain from charging its remaining customers a higher price. This property is only satisfied for elastic demand.

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[86] See S.2992, Sec. 2(h)(4)(B)(ii).

Following a structural separation, the independent units would lose the entirety of the technology-cost-price advantage that was held by the original companies. A company without that advantage does not determine where along the demand curve it sells its products and services. If the original company had adopted the second business strategy of pricing in the elastic region of the demand curve, its price would now be in the inelastic region of the demand curve. If the original company had adopted the first business strategy (low price), it would remain in the inelastic region of the demand curve. Economic theory dictates that pricing in the inelastic region of the demand curve would have a higher pass through than pricing in the elastic region of the demand curve. Intuitively, because customers are less likely to switch to comparable products and services in the inelastic region of the demand curve, companies can pass through a greater share of cost increases without fear of losing customers.

In an economic model of monopolistic competition, which nests both markets with perfect competition and markets with monopoly as special cases, if the demand elasticity is perfectly inelastic, meaning that no customers would switch for a small price change, then economic theory dictates that the pass-through elasticity would be equal to 100 percent. In other words, a company would take each 1 percent increase in cost and pass this through as a 1 percent increase in price.

Pass-through elasticity is defined in terms of the ratio of relative changes. The measure that we seek to evaluate is (nominal) pass through, which is defined in terms of the ratio of absolute changes. For example, if a company would take each $1 increase in cost and pass this through as a $1 increase in price, then the (nominal) pass through equals 100 percent.

Because price exceeds cost, the economic conclusion under perfectly inelastic demand of a 100 percent pass-through elasticity necessarily implies that the (nominal) pass through is greater than 100 percent. For example, if price equals $100 and cost equals $50, which corresponds to a 50 percent profit margin, then 100 percent pass-through elasticity translates to 200 percent (nominal) pass through.[87]

Thus, the $319 billion increase in operating costs incurred by the independent companies created from the structural separation of Google, Apple, Facebook, Amazon, and Microsoft would lead to a pass through of at least $319 billion onto those companies' customers, including consumers and small-to-medium businesses. This pass through would capture both increases in prices to be paid by the customers and the loss of valued services.

VII. THE LOSS OF SERVICES WOULD REDUCE CONSUMER WELFARE

In this section, we analyze the consumer effects of the loss of services using the results of a consumer survey that measure the value of a popular service (Amazon Prime) that stands to be impacted by the bills. From that analysis, we reach the following conclusions:

- *If the consumer effects of the bills would lead to the loss of services in the Amazon Prime membership, consumer welfare would decrease by $21.8 billion per year.*

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[87] A 1 percent increase in cost amounts to $0.50 and a 1 percent increase in price amounts to $1, so the (nominal) pass through equals $1 increase in price for each $0.50 increase in cost, or 200 percent.

- *If the consumer effects of the bills would lead to the loss of services in the Amazon Prime membership, current Amazon Prime members would lose $148.47 of value every year.*

A. Survey Design

We conducted a survey of 1,000 US consumers of the Amazon Prime membership package to estimate the willingness of US consumers to pay for the set of services included in Amazon Prime. The survey consists of three general parts. The first part screens the respondents and retains only current Amazon Prime subscribers and individuals who are considering subscribing to Amazon Prime. The second part of the survey collects data on consumption characteristics. The third part is the conjoint analysis section of the survey. The survey presented respondents with descriptions of seven attributes of the Amazon Prime membership. These attributes were: (1) the monthly subscription price of the service, (2) delivery options for free delivery, (3) products eligible for free delivery, (4) Prime Gaming, (5) Prime Video, (6) Prime Music, and (7) Prime Reading. These attributes and the levels of each attribute vary around the actual values for the Amazon Prime membership as it currently exists in the United States.

The survey respondents had to make a series of choices from sets of hypothetical Amazon Prime membership plans. Each choice scenario offered to the respondents contained three hypothetical membership plans, each with a distinct combination of the seven attributes described above. Respondents had to select the membership plan they would most likely purchase from among those combinations. A follow-up question after each choice allowed respondents to state if they would not purchase the selected membership plan. Figure 2 is an example of one choice scenario presented to respondents.

Figure 2: Sample Choice Scenario, Amazon Prime Membership Conjoint Analysis

Thinking about the options you see here, which membership plan would you be most likely to select if you were renewing your Amazon Prime membership?

For more information about the features shown, click on any of the ? icons next to the features.

	Plan 1	Plan 2	Plan 3
Monthly Subscription Price [?]	$16.99	$20.99	$24.99
Prime Gaming – online gaming benefits [?]	Included	Not Included	Included
Prime Reading – eBook and magazine reading benefits [?]	Not Included	Not Included	Included
Prime Music – music streaming benefits [?]	Included	Not Included	Not Included
Prime Video – video, TV, and movie streaming benefits [?]	Not Included	Included	Not Included
Products Eligible for Free Delivery [?]	Both Products Sold by Amazon and Third-Party Products Delivered by Amazon	Only Third-Party Products Delivered by Amazon	Only Products Sold by Amazon
Delivery Options for Free Delivery [?]	Same day ($35 minimum order), 2-Day (no minimum order)	No Rush Shipping (4-5 Day Shipping)	2-Day Shipping (no minimum order)
	○	○	○

Source: NERA survey.

Each respondent had the option of selecting from 11 different choice scenarios in total. Dynata, an international independent market research firm, administered the survey and collected the data between October 19 and November 2, 2021. The survey consisted of 847 valid respondents.

B. Survey Results

Active Amazon Prime members make up 81 percent of the respondents, whereas the remaining 19 percent are individuals considering becoming an Amazon Prime member. Approximately one-half of the current Amazon Prime members pay their membership fees annually, and the remaining one-half pay their fees monthly.

To ensure that the survey respondents accurately represent US consumers, the sample demographics were compared to data from the US Census Bureau and data from Statista for the age distribution of Amazon Prime subscribers. As shown in Appendix E, the survey sample generally represents the US population and the subpopulation of Amazon Prime members well.

The data from the conjoint exercise were analyzed using a mixed logit model. This regression model examines the trade-offs that individuals made when selecting their preferred Amazon Prime attributes, and it determines the influence that each attribute has on the probability that an individual would select. Table 13 summarizes the attribute weights (coefficients) of the model.

Table 13: Mixed Logit Analysis of Amazon Prime Membership Attribute Choices

Attribute	Coefficient	Standard Error	Z-Score
Mean Coefficient			
Price	-2.2178	0.0411	-53.98
Same Day w/ $35+, 1-Day o/w	0.3964	0.0615	6.45
Same Day w/ $35+, 2-Day o/w	0.4327	0.0621	6.97
1-Day Delivery	0.6244	0.0573	10.90
2-Day Delivery	0.3908	0.0621	6.29
Amazon Retail Only	-0.6271	0.0465	-13.47
Third-Party Products Only	-0.8569	0.0482	-17.77
Prime Gaming	0.2698	0.0372	7.25
Prime Video	1.2984	0.0454	28.63
Prime Music	0.4061	0.0372	10.92
Prime Reading	0.3397	0.0370	9.17
No Purchase	-1.2911	0.0949	-13.61
Std. Dev. Of Coefficient			
Price	1.4322	0.0374	38.28
Same Day w/ $35+, 1-Day o/w	0.3141	0.1182	2.66
Same Day w/ $35+, 2-Day o/w	0.0161	0.1644	0.10
1-Day Delivery	0.1935	0.1303	1.49
2-Day Delivery	0.0685	0.1603	0.43
Amazon Retail Only	0.5248	0.0797	6.59
Third-Party Products Only	0.7804	0.0715	10.91
Prime Gaming	0.5055	0.0664	7.61
Prime Video	1.3744	0.0542	25.36
Prime Music	0.6142	0.0607	10.11
Prime Reading	0.4208	0.0665	6.33
No Purchase	2.4898	0.0781	31.86

Source: NERA survey.

The top part of Table 13 indicates the mean importance of each Amazon Prime attribute. A negative coefficient indicates that if the attribute increases in amount the probability of purchasing the Amazon Prime membership decreases, holding everything else equal. Based on our analysis of the survey responses, we find:

- faster delivery speeds are important (i.e., respondents prefer one-day delivery over two-day delivery, and prefer two-day delivery over standard no-rush shipping);

- goods eligible for free delivery are important (i.e., respondents value both Amazon retail products and third-party retail products delivered by Amazon); and

- Prime Gaming, Prime Video, Prime Music, and Prime Reading are important (i.e., respondents favor inclusion of all four services in the Amazon Prime membership with Prime Video being the most preferred followed by Prime Music, Prime Gaming, and Prime Reading).

Based on the demand drivers identified by the mixed logit model, a baseline scenario forecasts the probability that a US subscriber purchases the Amazon Prime membership as currently offered in the US market. We then evaluate alternative scenarios by eliminating certain attributes from the baseline scenario and *keeping all else constant*. The difference in probabilities between the baseline and alternative scenarios is the percentage of subscribers that would no longer subscribe to the Amazon Prime membership if the given change was made to the baseline package.

The baseline scenario calculates the average probability that an existing Amazon Prime subscriber would renew his/her membership or that a prospective Amazon Prime subscriber would purchase a subscription. To calculate this probability, all model variables are set at the actual values for an Amazon Prime membership in the United States. This calculation yields an average probability of 61 percent for the likelihood that current or potential subscribers would purchase a subscription of this type. The estimates for the updated purchase probabilities and the change in purchase probabilities for each one-off modification to the baseline Amazon Prime package are reported in Table 14 below.

Table 14: Simulations for Loss of Amazon Prime Membership Attributes

Baseline and Alternative Scenarios	Probabilities	Change in Probabilities
	----(percent)----	----(percent)----
Baseline Scenario	61.06 %	
Alternative Scenarios		
Standard No-Rush Delivery	58.51	2.55
Only Amazon Retail Products	56.31	4.75
Only Third-Party Products	54.31	6.75
No Prime Gaming	59.29	1.77
No Prime Video	52.58	8.48
No Prime Music	58.41	2.65
No Prime Reading	58.83	2.23

Source: NERA survey.

The simulations for the various alternative scenarios match economic intuition and give significant effects:

- faster delivery speeds are important (i.e., a slower delivery speed decreases average purchase probability);

- goods eligible for free delivery are important (i.e., the removal of either Amazon retail products or third-party products delivered by Amazon decreases average purchase probability); and

- Prime Gaming, Prime Video, Prime Music, and Prime Reading are important (i.e., the removal of any of the four services decreases average purchase probability with the greatest change when Prime Video is removed, the second greatest change when Prime Music is

removed, the third greatest change when Prime Reading is removed, and the fourth greatest change when Prime Gaming is removed).

An individual's willingness to pay for an attribute is determined by the ratio of the weight (coefficient) for an attribute relative to the weight (coefficient) for each one dollar change in the price attribute. The estimates for consumers' willingness to pay are based on evaluating the median values of these ratios across a sample of 10,000 randomly drawn individuals from the mixed logit coefficient distribution. The median willingness to pay values, represented as the amount of additional dollars for each month of the Amazon Prime membership, are reported in Table 15 below.

Table 15: Willingness to Pay for Amazon Prime Membership Attributes

Attribute	Median Willingness to Pay
Same Day w/ $35+, 1-Day o/w	$ 2.04
Same Day w/ $35+, 2-Day o/w	2.24
1-Day Delivery	3.22
2-Day Delivery	2.00
Amazon Retail	4.41
Third-Party Products	3.26
Prime Gaming	1.38
Prime Video	6.67
Prime Music	2.07
Prime Reading	1.75

Source: NERA survey.

As a result of the three House bills and the related Senate bill, the structural separation that we forecast for Amazon would require the Amazon Prime membership package to only include free delivery for Amazon retail products and without any of the entertainment services. This package would be required as the bills would not permit Amazon to include any further attributes in the membership package. Such an Amazon Prime membership package is comparable to the Walmart+ subscription and is identical to the original Amazon Prime membership package that was offered starting in February 2005.[88] For these reasons, we evaluate the consumer effects if the Amazon Prime membership price after structural separation remained at $12.99 per month.

According to our mixed logit model with the attributes ascribed to this smaller Amazon Prime package, 58 percent of current members would continue to purchase the smaller Amazon Prime package, and the remaining 42 percent of current members would no longer purchase the smaller Amazon Prime package. Under these ratios, the total number of current Amazon Prime members (147 million according to Statista) would be split into 85 million members that stay with Amazon Prime and 62 million consumers that end their membership (see Table 16 below).

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[88] George Hatch, "Amazon Prime: A Timeline from 2005 to 2020," Aug. 20, 2020, https://pattern.com/blog/amazon-prime-a-timeline-from-2005-to-2020/.

For the members that continue to purchase the package, at the same monthly price of $12.99, the remaining attributes of the Amazon Prime membership, including the ability to purchase and receive free delivery for third-party products, Prime Gaming, Prime Video, Prime Music, and Prime Reading, are valued at $15.13 (see Table 15). As reflected in Table 16 below, consumers' willingness to pay for these eliminated attributes, multiplied by 12 months in a year and multiplied by the 85 million remaining Amazon Prime members in the United States, yields a consumer welfare loss of $15.5 billion per year.

For the members that decide to no longer purchase the Amazon Prime membership, their options include purchasing a substitute product or purchasing no replacement product(s) at all. The entirety of the attributes that they previously consumed, including two-day delivery, the ability to purchase and receive free delivery for both Amazon retail products and third-party products delivered by Amazon, Prime Gaming, Prime Video, Prime Music, and Prime Reading, are valued at $21.54 (see Table 15). These consumers previously paid $12.99 for a package with these attributes. The set of products required to replace the entirety of Amazon Prime membership would include at a minimum a free-delivery subscription service (e.g., Walmart+) and a streaming video service (e.g., Netflix), two services by themselves whose costs would exceed the total willingness to pay of $21.54. This suggests that the replacement services purchased à la carte would exceed the willingness to pay for Amazon Prime and result in further loss of consumer welfare. For the consumers that no longer purchase Amazon Prime, the consumer welfare loss is at least $8.55 as members were willing to pay $21.54 less the price of $12.99 and they cannot purchase replacement services à la carte for less than $21.54. As reflected in Table 16 below, this loss, multiplied by 12 months in a year and multiplied by the 62 million former Amazon Prime members in the United States, yields a consumer welfare loss of $6.3 billion per year.

In total, the loss of services that would be caused by Amazon's structural separation would reduce consumer welfare by $21.8 billion per year, which is equivalent to a loss of value equal to $148.47 for each current Amazon Prime member.

Table 16: Consumer Welfare Loss if the Consumer Effects of the Bills Would Lead to Loss of Amazon Prime Membership Attributes

Attributes Potentially Eliminated Under Structural Separation	Total	Remaining Amazon Prime Members	Consumers that Left Amazon Prime
Amazon Prime Members, at Baseline	147 million		
Remaining and Lost Amazon Prime Members		85 million	62 million
2-Day Delivery			$ 2.00
Amazon Retail			4.41
Third-Party Products		$ 3.26	3.26
Prime Gaming		1.38	1.38
Prime Video		6.67	6.67
Prime Music		2.07	2.07
Prime Reading		1.75	1.75
Total Willingness to Pay		**$ 15.13**	**$ 21.54**
Amazon Prime Price			$ 12.99
Lost Consumer Welfare/Sub/Month		**$ 15.13**	**$ 8.55**
12 Months Per Year		12	12
Lost Consumer Welfare/Year	**$ 21.8 billion**	**$ 15.5 billion**	**$ 6.3 billion**

Sources: NERA survey; Statista, "Number of Amazon Prime Members in the United States in Selected Quarters from 4th Quarter 2014 to 1st Quarter 2021."

VIII. SMALL-TO-MEDIUM BUSINESSES WOULD FACE INCREASED COSTS

In this section, we analyze the economic effects on small-to-medium businesses and reach the following conclusions:

▪ *First, small-to-medium businesses would face increased costs as customers of Google, Apple, Facebook, Amazon, and Microsoft.*

▪ *Second, small-to-medium businesses would lose free and valued services that would no longer be offered by Google, Apple, Facebook, Amazon, and Microsoft.*

The proposed legislation would increase the costs of the five targeted firms with harmful effects for small-to-medium businesses that are third-party business users of the services provided by the targeted firms. Small-to-medium businesses thrive in an ecosystem in which the targeted firms offer an umbrella of free and valued services that allow small-to-medium businesses to reach millions of customers at minimal cost.

More important, small-to-medium businesses would face additional costs from the loss of marketplaces that allow them to generate revenue without incurring higher sales, marketing, and advertising costs that would otherwise be required to connect to consumers. For example, many small-to-medium businesses selling on Amazon's marketplace benefit from services like FBA where Amazon stores, packs, and ships orders to customers.

Small-to-medium businesses would face increased costs due to the loss of free and valued services currently provided directly by firms likely to be designated as covered platforms (Apple, Amazon, Google, Facebook, and Microsoft) or by other third-party firms for which one of these five firms is a supplier. An example is cloud-based data storage provided to startup firms at reduced cost by cloud-based storage providers, including AWS (Amazon), Microsoft Azure (Microsoft), Google Cloud Platform (Google), and additionally third-party value-added resellers that purchase their cloud services from one of these three companies.

Under the proposed legislation, products and services from the covered platforms would either no longer be offered or must necessarily be offered at a price point under which the relevant line of business would be independently profitable. Without the benefit of price discrimination for the small size and short tenure that works to the benefit of startup firms, at such a price point, the products and services would simply be unaffordable to the startups.

IX. THE BILLS WOULD DECREASE TECHNOLOGICAL DEVELOPMENT

In this section, we analyze the effects of the bills on the technological development markets and reach the following conclusions:

▪ *The proposed legislation would distort the dynamic incentives and cost structure for both established technology firms and startup technology firms.*

▪ *By preventing and limiting acquisitions, the bills would depress startup exit values by 22 percent.*

▪ *Venture capital investment in startups would decrease by 12 percent.*

A. Empirical Estimates of the Exit Value of Venture Capital Financed Startups

To illustrate the potential long-run effects, we incorporate facts about the venture capital market, specifically the distribution of returns that venture capitalists have historically collected across all companies that they fund.[89] The data set contains 12,000 companies that received venture capital funding and exited the final stage of venture capital financing between August 2002 and the first quarter of 2020.[90]

Each of the 12,000 startups in the database is allocated into one of four exit groups based on the terms in which it exited the final stage of venture capital financing. The first group, IPO Startups, consists of all startups that exited the final stage of venture capital financing via an IPO. The distribution of exit values for startups in this first group is depicted in orange in the figures below. The second group, Profitable Acquired Startups, consists of all startups that exit via acquisition and generate a nonnegative return on venture capital investment. The distribution of exit values for startups in this second group is depicted in the light shade of blue in the figures below. The third group, Unprofitable Acquired Startups, consists of all startups that exit via

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[89] See Susan Woodward, "Irreplaceable Acquisitions: Proposed Platform Legislation and Venture Capital," Sand Hill Econometrics, http://www.sandhillecon.com/pdf/Woodward_Irreplaceable_Acquisitions.pdf (hereinafter Woodward Report).

[90] See Woodward Report.

acquisition and generate a nonpositive return on investment. The distribution of exit values for startups in this third group is depicted in the medium shade of blue in the figures below. Finally, the fourth group, Failed Startups, consists of all startups that do not generate any exit value for their venture capital investors. The exit value of startups in this fourth group equals $0, and this distribution is depicted by the dark shade of blue in the figures below.

Figure 3 illustrates the distribution of exit value across the four groups by firm count. The x-axis contains brackets of startup exit value and the y-axis reports the percentage of startups, by firm count. For example, Failed Startups comprise 35 percent of all startups and all startups in this exit group have zero exit value and are therefore depicted in the $0 value bracket in Figure 3 below.

Figure 3: Count Distribution of Startup Value By Exit Group, Pre-Legislation
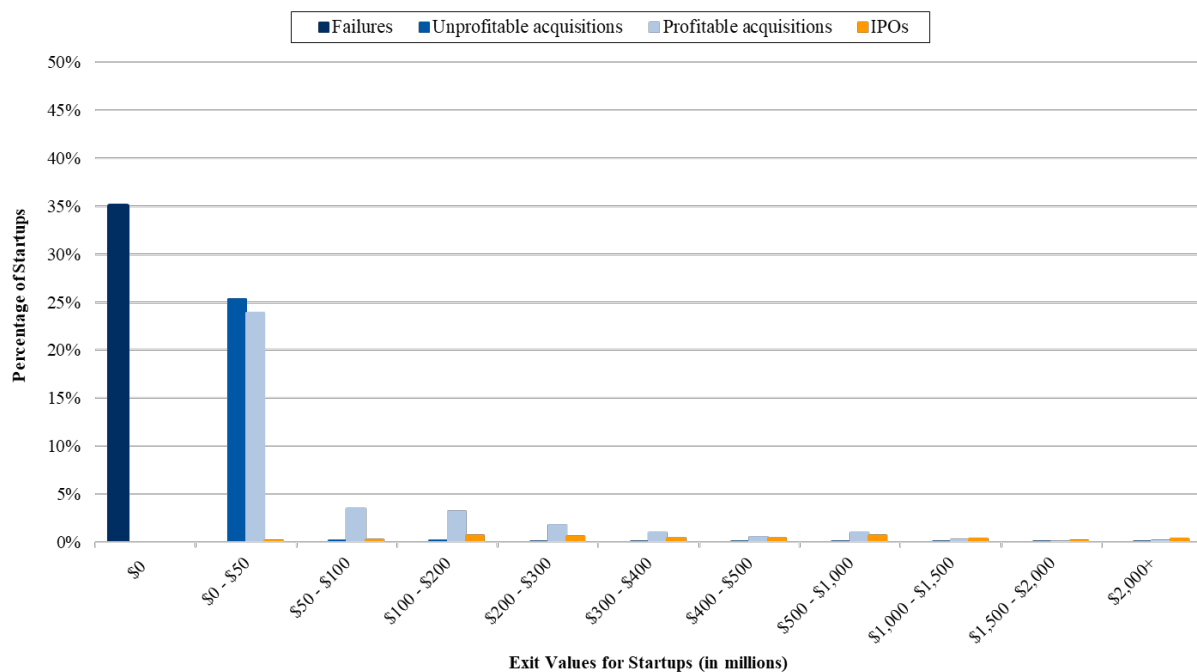
Sources: NERA, Woodward Report.

Figure 3 displays the entire distribution. Given the clustering of counts at the left-side of the distribution, Figure 4 displays the distribution with count percentages capped at 3.5 percent. This zoomed-in graphic illustration cuts off the columns for Failed Startups in the $0 value bracket and for both Profitable Acquired Startups and Unprofitable Acquired Startups in the $0–$50 value bracket, but the remaining points of the distribution are more easily compared with this zoomed-in depiction of the distributions by exit group.

Figure 4: Count Distribution of Startup Value By Exit Group, Pre-Legislation (zoomed in)
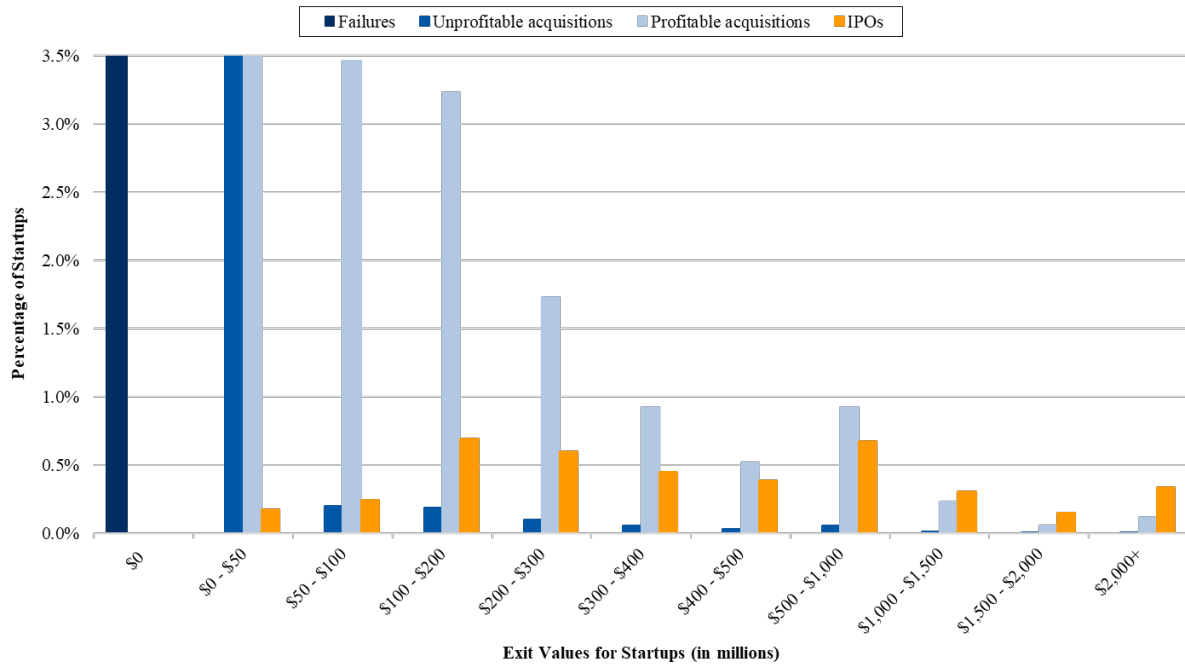
Sources: NERA, Woodward Report.

Instead of reporting the distribution in terms of the percentage of startups by firm count, an alternative illustration of the distribution can be made based on the value of each startup relative to the total value of all startups. For example, each startup in the value bracket $1,500–$2,000 million contributes only one unit to the total firm count but contributes $1,750 million (the midpoint of the value range) to the total value. Midpoint values are similarly applied to the other brackets with a value of $2,250 million applied to the upper value bracket $2,000+ million. Figure 5 displays the distribution under this alternative representation of the startup value distribution.

Figure 5: Value Distribution of Startup Value By Exit Group, Pre-Legislation
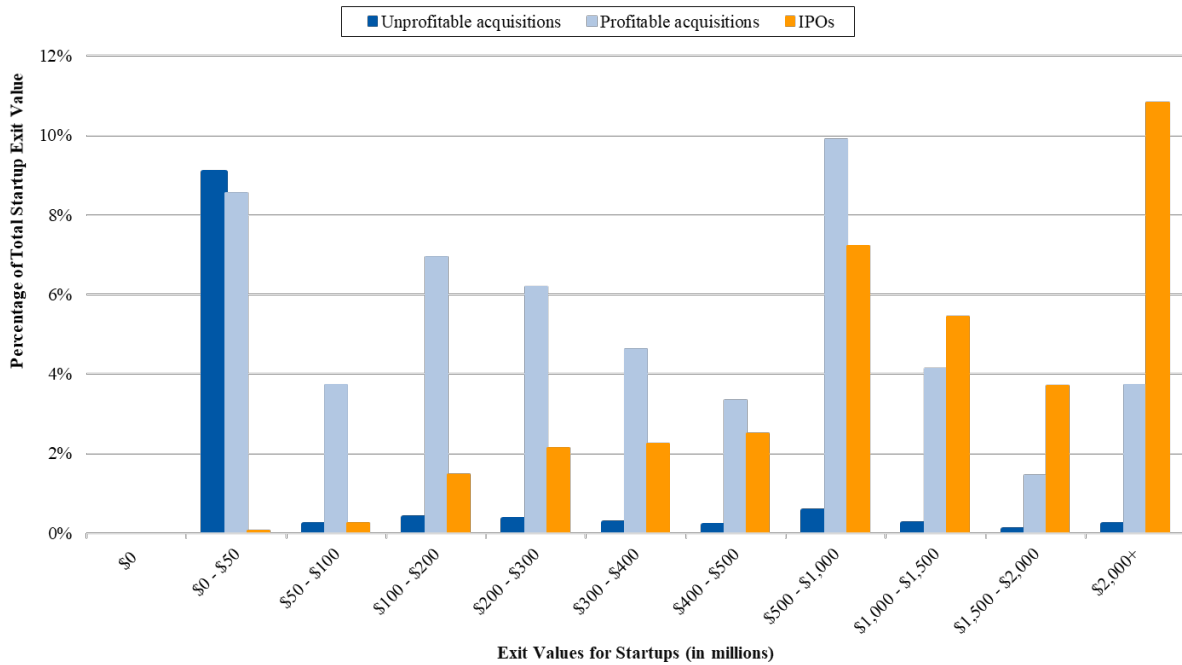
Sources: NERA, Woodward Report.

By focusing on the distribution in terms of value, rather than count, the distribution is more evenly distributed among the IPO Startups, Profitable Acquired Startups, and Unprofitable Acquired Startups (compare Figure 5 and Figure 3). Failed Startups contribute zero percent to the total value and therefore accounts for zero percent of the distribution. For this reason, they do not appear in Figure 5.

B.   The Proposed Legislation Would Destroy 22 Percent of the Exit Value of Venture Capital Financed Startups

The proposed legislation would reduce venture capitalists' returns and therefore the supply of available capital that can be invested in startup technology firms in two ways. First, the four bills would prevent the five covered platforms from acquiring startup technology firms and would strongly discourage an additional 13 firms from acquiring startup technology firms. Second, the market cap threshold used to define covered platforms would effectively cap the long-run growth potential for all startup firms, which would depress IPO values for the most successful ones.

These ex-post effects would be recognized by venture capitalists, would reduce the returns that they would be able to promise to investors, and would ultimately affect the ability of venture capitalists to raise capital. Therefore, the ex-post effects for current startups have ex-ante consequences for future startups. Ex ante, that is, before the uncertainty about a startup's future profitability is realized, the distorted venture capital incentives would diminish the amount of venture capital financing available for startup firms, which would therefore depress the overall rate of technological development.

1. Startup acquisition demand would decrease by 21 percent

From the available data set of 12,000 companies that received venture capital funding and exited the market between August 2002 and the first quarter of 2020,[91] the 18 firms that would be constrained by the covered platform regulations (i.e., the five firms likely to be designated as covered platforms and the 13 additional firms whose future growth prospects are constrained by the proposed legislation) account for 21 percent of the total acquisition value spent on startups.[92] The loss of 21 percent of the possible acquiring firms (in value) would have effects on both the startups seeking to be acquired and on the returns that venture capitalists are able to generate for their investors.

Ex post, the market has identified which startups are winners and losers. For a certain market, consider an example with five firms with the necessary capital to acquire a startup. The proposed legislation would eliminate 21 percent of the possible acquiring firms, which can be represented as the loss of one out of the five potential acquiring firms in our example. Absent the proposed legislation, five profitable startups would have been acquired with the most profitable receiving the highest price and the least profitable receiving the lowest price. Under the four bills, there would only be four potential acquiring firms in the market. The most profitable startup would still be acquired, but the competition among acquiring companies would be diminished (with only four competitors instead of five) and the resulting acquisition price would be lower. A similar effect would occur for the second, third, and fourth most profitable startups. The fifth most profitable startup would not be acquired at all and would shift into the Failed Startup exit group. The loss of one-fifth of the startup acquisition demand would have a profound effect on the values of all acquired startups, even on the startups that are determined to be the most profitable ex post.

Startups that exit the venture capital financing stage through an acquisition are valuable firms with the potential for future profitability but without cash or the ability to generate profit independently in the near term. Such firms are not good candidates for an IPO. By reducing the demand to acquire startups, the proposed legislation would eliminate 21 percent of the medium blue (Unprofitable Acquired Startups) and light blue (Profitable Acquired Startups) acquisitions.

2. The exit values of the most successful IPO startups would be depressed

The value for the most successful startup technology firms, specifically those that exit the financing stage through an IPO, would necessarily be capped because the long-run potential values of such startups is capped at the inflation-adjusted $550 billion or $600 billion threshold, lest severe financial penalties and value-destroying structural remedies be imposed. For example, Google, Facebook, and Amazon issued IPOs in the past 25 years, which means that they transitioned from startups to successful companies with market caps exceeding the threshold in a period no greater than 30–35 years. Although venture capitalists cannot predict which startups today will be the next Google, Facebook, or Amazon in 30–35 years, the ability to generate super high returns on a very small share of IPOs drives the pool of available venture capital funds.

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[91] See Woodward Report.
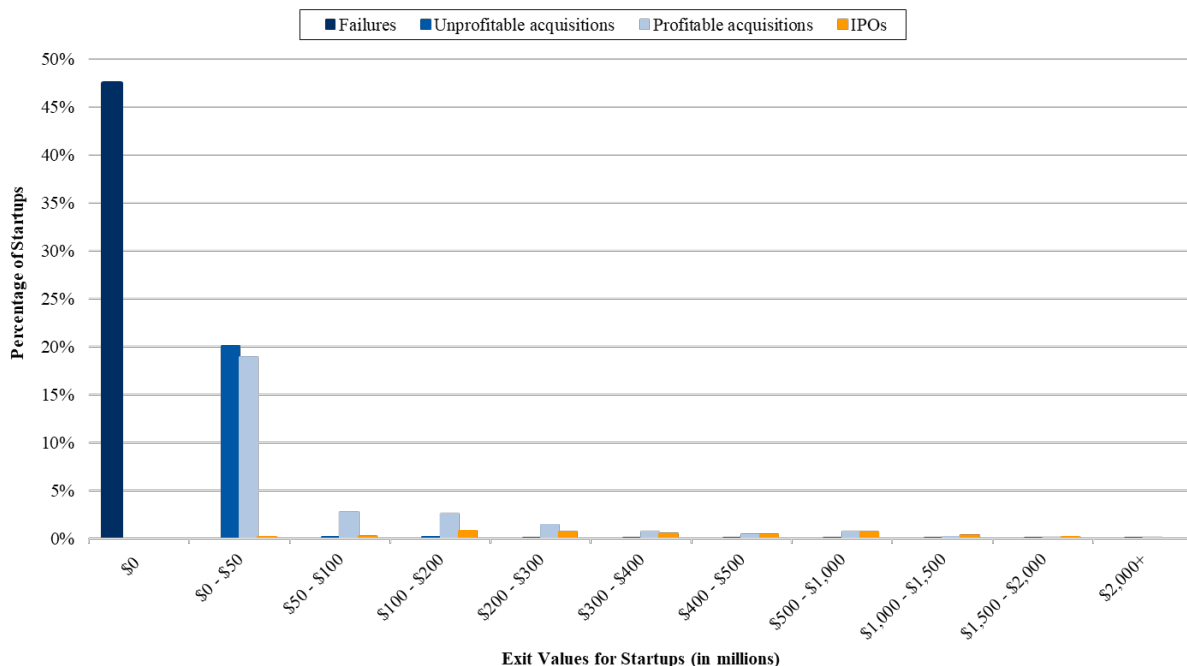[92] Woodward Report, Figure 6.

3. The exit value of venture capital financed startups would be reduced by 22 percent

The first effect, which is the reduced demand for Profitable Acquired Startups and Unprofitable Acquired Startups, represents a 21 percent decrease in the number of such acquisitions across the entire distribution for these exit groups. The startups that are no longer acquired would shift to the Failed Startups exit group. This represents a shift in the overall value distribution to lower exit values.

The second effect, which is the loss of high-value IPO Startups at the far-right tail of the exit value distribution, is represented by the elimination of all IPO Startups in the value bracket $2,000+ million, while holding fixed both the total count of IPO Startups and the relative distribution for the other 10 smaller value brackets. This too, via a different mechanism, represents a shift in the overall value distribution to lower exit values.

Figure 6 displays the distribution in terms of the number of startups in each exit group and each value bracket that would be observed if any of the four bills were to be enacted. Relative to Figure 3, there is a significant shift in the distribution for all exit groups to lower exit values (a shift to the left in the figure). For example, Failed Startups have historically accounted for only 35 percent of the total number of startups but would account for more than 47 percent of the total number of startups under the proposed legislation.

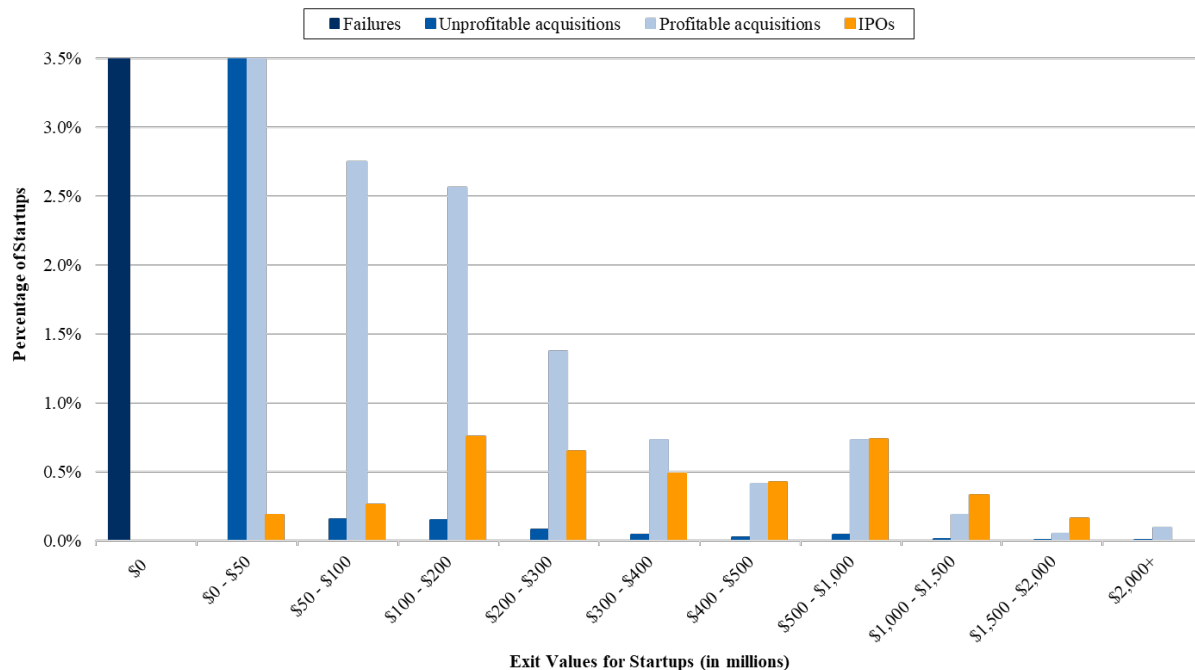**Figure 6: Count Distribution of Startup Value By Exit Group, Post-Legislation**

Sources: NERA, Woodward Report.

Figure 6 displays the entire distribution. Given the clustering of counts at the left-side of the distribution, Figure 7 below displays the distribution with count percentages capped at 3.5

percent. Relative to Figure 4, there is a significant shift of the distribution for all exit groups to lower firm values (to the left in the figure).

Figure 7: Count Distribution of Startup Value By Exit Group, Post-Legislation (zoomed in)
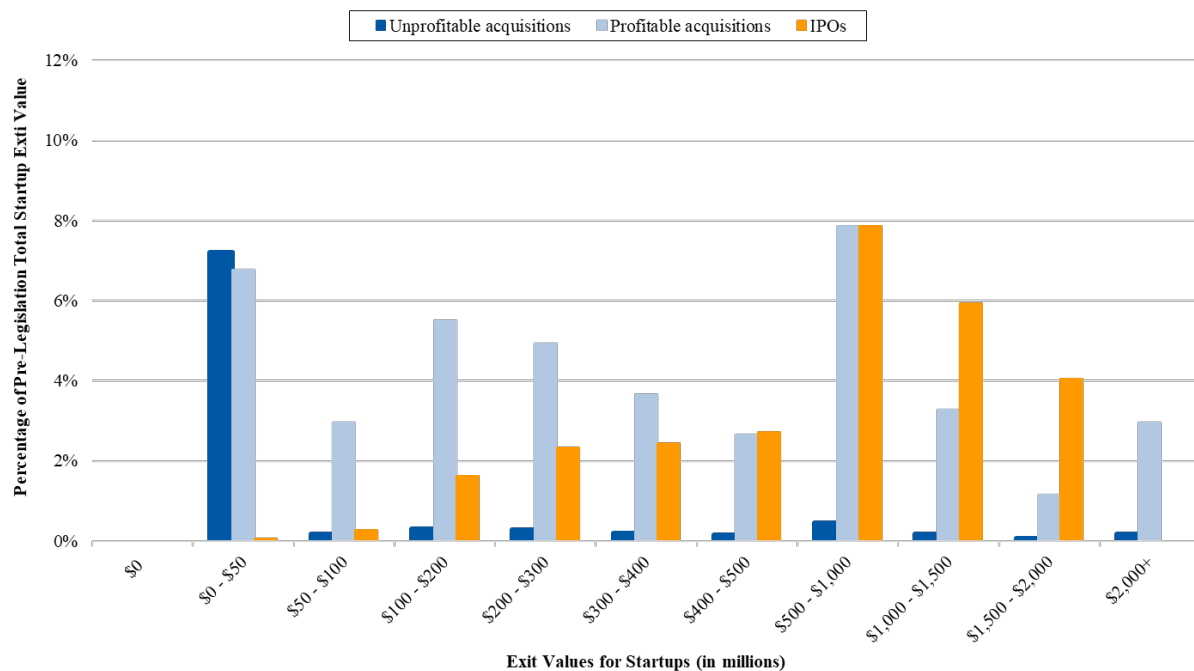

Sources: NERA, Woodward Report.

Comparing Figure 6 (the distribution of startup exit values post-legislation) and Figure 3 (the distribution of startup exit values pre-legislation), the average exit value for startups decreases by $15.2 million, from an average value of $69.9 million pre-legislation to an average value of $54.7 million post-legislation. This decrease amounts to a 21.7 percent reduction in average exit value for startups relative to the average exit value for startups historically (pre-legislation).

To implement the alternative distribution of startup value that displays the value of each exit group and value bracket relative to the total value of all startups, we recognize that the proposed legislation has two statistical effects on the distribution: (1) it reduces the total exit value for all startups and (2) it shifts the distribution to the left (i.e., lower firm values). To account for both effects, the *post-legislation* value of each exit group and value bracket is compared to the total exit value for all startups *pre-legislation*.

Figure 8 displays the distribution under the alternative representation of the startup distribution in terms of the relative value. Relative to Figure 5, there is a significant shift of the distribution for all exit groups to lower firm values (to the left in the figure).

Figure 8: Value Distribution of Startup Value By Exit Group, Post-Legislation

Sources: NERA, Woodward Report.

C. Venture Capital Financing Would Be Reduced by 12 Percent

As a direct result of the proposed legislation, operating via the two economic mechanisms that we previously described and quantified, the value of startups that exit the final stage of venture capital financing would be reduced by 21.7 percent. The exit value of startups directly corresponds to the returns that venture capitalists can collect from institutional investors. With lower expected returns to investors, the venture capitalists would be unable to raise the same pool of capital.

To estimate the relationship between investor returns and the supply of funds that venture capitalists invest in startups, we analyze the effects from one comparable and recent economic event: the 2007-2009 recession. In a recent working paper, Howell et al. (2021) use the Refinitiv VentureXpert database to estimate change in venture capital financing resulting from recessions, including the 2007–2009 recession.[93] The authors find that venture capital financing reduced by 32.9 percent.[94] The Woodward Report estimated that the effects of the 2007–2009 recession reduced startup exit values by 58.9 percent for technology startups and 57.4 percent for all other startups.[95] Both results imply that each one percentage point decrease in startup exit value reduces venture capital financing by 0.6 percentage points.

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[93] Sabrina T. Howell, Josh Lerner, Ramana Nanda, and Richard Townsend, "How Resilient is Venture-Backed Innovation? Evidence from Four Decades of U.S. Patenting," Harvard Business School Working Paper, No. 20-115, May 2020 (Revised January 2021), p. 43, https://www.hbs.edu/faculty/Pages/item.aspx?num=58126.

[94] Ibid, Table 7.

[95] Woodward Report, Figure 9. The average exit multiples for 2008 and 2009 was compared to the exit multiple for 2007 for both technology and other startups.

We apply this historical estimate to analyze the effects of the bills. We previously determined that the bills would decrease startup exit values by 21.7 percent. Using the ratio of 0.6 from the 2007–2009 recession, we estimate that the four bills would decrease venture capital financing by 12 percent. Table 17 below contains our calculations.

Table 17: Decrease in VC Financing

		Technology Startups	All Other Startups	Source/Equation
[1]	Decrease in exit values for startups	21.7%	21.7%	Above
[2]	Decrease in VC financing, 2007-2009 recession	32.9%	32.9%	Howell et al., p. 43.
[3]	Decrease in exit values for startups, 2007-2009 recession	58.9%	57.4%	Woodward Report, Figure 9
[4]	Decrease in VC financing relative to decrease in exit values for startups, 2007-2009 recession	0.56	0.57	= [2] / [3]
[5]	Decrease in VC financing	12.1%	12.5%	= [1] * [4]

Source: Howell et al. (2021); Woodward Report, Figure 9.

In addition, the reduced pool of available funds for venture capitalists to invest in startups would affect important qualitative decisions, including which startups to invest in and how much monitoring to implement to safeguard the investment. With a smaller pool of available funds and a lower mean return on its investments, venture capitalists would likely make qualitative decisions that reduce the risk profile of the portfolio of investments. This could involve investing in safer startups or increased monitoring. Both qualitative decisions would likely further depress the rate of technological development in future years.

D.   Additional Costs Imposed on Startups

Startup technology firms would additionally face increased costs due to the loss of free and value services, as previously described for small and medium businesses. Finally, startup technology firms would face additional costs from the loss of a two-sided marketplace that currently allows them to generate revenue and grow a customer base before having established the demand and brand recognition required for revenue and growth in a one-sided marketplace. These two cost increases would be significant, specifically increases in operating costs and increases in marketing and advertising costs. Combined with the previously quantified increases in funding costs, the effects of the four bills on the cost structure of startups would cause fewer startups to be established, and the ones that are established would be diminished competitors in the United States and on the global stage. This serves to reduce technological growth and innovation in the United States and to shrink the potential size of the US economy in the future.

X. THE BILLS FAIL TO MEET OBJECTIVES AND OFFER NO QUANTIFIABLE BENEFITS

The stated objectives of the proposed legislation are "to promote competition and economic opportunity," to "eliminat[e] the conflicts of interest," and "to provide that certain discriminatory conduct by covered platforms shall be unlawful."[96] In this section, we analyze these objectives and the purported benefits of the bills and reach the following conclusions:

- *Nothing in the public record, including the House Competition Report and statements and scholarship from sponsors and supports of the bills, provides any economic evidence or analysis as to whether the bills would in fact promote competition and how the purported increase in competition would benefit consumers and businesses.*

- *The bills would not stabilize prices or decrease inflation as some have claimed.*

- *The bills would not increase innovation and entrepreneurship as claimed.*

- *The bills would not reduce income and regional inequality as claimed.*

A.   The Bills Would Not Stabilize Prices or Decrease Inflation

Recently, responding to the economy's struggle with high inflation and upward pricing pressure, proponents of the bills have argued that enactment of the bills would be effective in stabilizing prices and decreasing inflation.[97] However, the overwhelming consensus among economists is that such a regulatory measure would be a poor substitute for fiscal and monetary policy and therefore unlikely to have any effect on inflation in the economy.[98] Our own research predicts that $319 billion in additional costs would be passed through to consumers. Economists do not generally consider regulations that increase operating costs for companies and prices for consumers to be effective anti-inflation measures.

B.   The Bills Would Not Increase Innovation and Entrepreneurship

Some proponents of the bills have claimed that the bills would increase innovation and entrepreneurship.[99] Our research indicates that the proposed legislation would reduce innovation and entrepreneurship by distorting two incentives that are crucial for the development of startup firms and new businesses. First, the direct effects of the proposed legislation on startup firms are twofold: (1) the proposed legislation increases the funding costs on such startup firms to access the necessary capital that they require in early-stage development; and (2) the proposed legislation makes it more costly for startup firms to reach a customer base or otherwise monetize their innovative ideas. Second, the economic causes and mechanisms that lead to these cost

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[96] See H.R.3816, Preamble; H.R.3825, Preamble; H.R.3826, Preamble; and S.2992, Preamble.

[97] See, e.g., Jim Tankersley and Alan Rappeport, "As Prices Rise, Biden Turns to Antitrust Enforcers," The New York Times, December 25, 2021, https://www.nytimes.com/2021/12/25/business/biden-inflation.html.

[98] Chicago Booth, "Inflation, Market Power, and Price Controls," January 11, 2022, https://www.igmchicago.org/surveys/inflation-market-power-and-price-controls/.

[99] Letter from Public Citizen, et al. to Speaker Pelosi and Republican Leader McCarthy, September 2, 2021, https://www.publicknowledge.org/wp-content/uploads/2021/09/09.02.21-Letter-to-Pelosi-and-McCarthy-on-Big-Tech-Bills.pdf.

effects are on the supply side of the markets as determined by the proposed legislation's destruction of certain dynamic incentives: (1) venture capitalist investors' returns from investing in tech startup firms are reduced making it harder to raise capital and making the investors more selective about which firms to invest in; and (2) large online platforms that heretofore have enhanced small businesses' efforts to reach a customer base and otherwise monetize their innovation would be prevented by regulation from operating such a two-sided platform going forward. Therefore, on the issue of innovation and entrepreneurship, the proposed legislation would decrease venture capital financing by 12 percent and would fail to generate any quantifiable benefits.

C.   The Bills Would Not Reduce Income and Regional Inequality

Some proponents of the bills have claimed that the bills would decrease income inequality and regional inequality.[100] Our research quantifies the costs of the proposed legislation on three groups: US consumers, US small businesses, and US startup firms (i.e., firms that potentially start in the United States and develop into small businesses). Profits from small businesses and startup firms flow upward as income to the owners of the business. Moreover, the owners of small businesses are typically households (under the sole proprietorship ownership structure) or small groups of households (under the partnership ownership structure).

Our analysis demonstrates that these three groups would be harmed by the proposed legislation, which specifically implies that the household income of owners of affected small businesses and startups would be reduced. Moreover, we determined that there is an overall reduction in the total income of the US economy (i.e., the size of the pie in terms of aggregate economic output or GDP would be decreased). Although it is not clear where the small business household owners lie on the income distribution chart or what effect the reduction in total output would have on the distribution, the economic facts all point to the conclusion that the proposed legislation would exacerbate, not reduce, income inequalities.

The scope of our research was on geographic markets that include the entire United States. It is unclear what regional inequalities are affected by the proposed legislation. It is true that the firms likely to be designated as covered platforms have global headquarters on the West Coast. However, if the aims of the proposed legislation are realized, it is not clear how industry sales would shift from the West Coast to a different geographic region in the United States.

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[100] Ibid.