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Economic Value of Internet Intermediaries and the Role of Liability Protections

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Summary

The U.S. Internet sector is one of our nation's most dynamic and successful economic performers, doubling its share of the U.S. economy between 2007 and 2014. The sector is driven by Internet intermediaries—companies that connect third parties on the Internet. Many of the Internet intermediaries are among the best known companies in the world, such as Amazon, Facebook, and Google. The rapid growth of these companies and the benefits consumers have gained from their presence have been aided by the availability of what are called Internet "safe harbors." These legal provisions protect Internet intermediaries and others that publish third-party content from being responsible for that content. The principal Internet safe harbors are found in the Communications Decency Act of 1996 and the Digital Millennium Copyright Act (DMCA) of 1998.

The robustness of these safe harbors is continually being challenged in the United States through legislative proposals and litigation. This litigation, originating either in the United States or abroad, has the result of exposing U.S. Internet intermediaries to very large legal liabilities. The legislative proposals have the potential to do the same. Additionally, the U.S. safe harbors are affected by the consequences of litigation or regulation elsewhere in the world, for example, from Europe's "Right to be Forgotten" enforcement.

We have estimated the economic costs of weakening the protections offered by Internet safe harbors as a consequence of legislation or litigation on the U.S. economy by surveying consumers in two areas: first in their use of Internet search engines and second in their use of cloud storage. The surveys measured the decline in consumer demand following an increase in price (in the case of cloud storage) or an increase in the number of advertisements (in the case of Internet search). The results of these surveys were then combined with a study measuring the overall economic contribution of the Internet sector to the U.S. economy to estimate the cost in terms of gross economic output, income, and employment in the United States following a weakening of Internet safe harbors.

The consumer surveys reveal that increases in price for cloud storage and amount of advertising for Internet search will likely reduce revenues obtained by these two services by approximately 7.8 percent. This translates into a loss of over 53,000 jobs. Many of these jobs pay above average wages. Consequently, U.S. gross domestic product (GDP) would decrease by $5 billion annually for the search and cloud services categories alone.

There are many more Internet intermediaries (other than search and cloud services), and a weakening of safe harbor protections would affect most of them. Based on our findings, we estimate that the decline in the U.S. Internet sector would eliminate over 425,000 jobs. The U.S. gross domestic product would decrease by $44 billion annually.

In addition to these more easily measurable direct effects on the U.S. economy, a reduction in safe harbor protections will also have negative secondary effects. In particular, it will reduce the formation of Internet intermediary startups, as well as decrease investment in the Internet more generally.

Introduction

The Internet Association has asked me to measure the potential costs to the U.S. economy if the current safe harbor protections the industry operates under are reduced, in particular, the legislative safe harbors. It is important to note that this study focuses on just two of the many so-called verticals available to consumers (i.e., cloud storage and search services). Internet intermediaries also rely on the safe harbors to provide consumers with online travel booking, the sharing economy, and social media services, among others.

The U.S. economy has benefited tremendously from the growth of the U.S. Internet sector. The sector's success is partially attributable to specific legislation that protects Internet companies from legal prosecution over third-party content. Thus, it follows that a weakening of this legislation carries serious negative repercussions for the U.S. economy. This study assumes that the general structure of a market with safe harbors would remain in place but that changes due to legislation (e.g., mandatory filtering) or litigation (e.g., increased rejection of affirmative DMCA defenses) would weaken the safe harbors and significantly raise the costs of operating as an Internet intermediary, costs that would be borne by consumers. The objective of this study to ascertain the potential impact on the U.S. economy if current legislative protections, safe harbors in particular, are reduced through legislation or litigation. As part of this, we estimate how much Internet intermediaries might be forced to raise prices if safe harbor protections are reduced. We note that although this study focuses primarily on two consumer services protected by safe harbors (i.e., cloud storage and search), we also estimate an effect for overall Internet intermediaries because Internet intermediaries also rely on safe harbors to provide consumers with additional services, among others, with online travel booking, the sharing economy, and social media services.

Internet intermediaries provide platforms for the exchange of information, goods, and services. In addition, Internet intermediaries provide Internet access. According to the Organisation for Economic Co-operation and Development (OECD):

> Internet intermediaries bring together or facilitate transactions between third parties on the Internet. They give access to, host, transmit and index content, products and services originated by third parties on the Internet or provide Internet-based services to third parties.[1]

Examples of Internet intermediaries include some of the most well-known firms in the United States, including Google (operating as Alphabet), Facebook, Amazon, and eBay. It also includes more recent Internet companies such as Airbnb and Uber, as well as less consumer-facing firms such as Dropbox and Salesforce. There are, of course, many more such firms, and new ones are continually entering the marketplace.

Internet intermediaries are financed in a number of ways. Many of their services (e.g., Internet search) are paid for through digital advertising and are free to consumers. Other services (e.g., Internet access or cloud storage) are financed through retail revenue. The companies provide enormous consumer benefits by reducing search costs, transaction costs, and communications costs. For instance, there are an estimated 3.5 billion Google searches conducted worldwide per day.[2]

This paper is organized as follows. In Section III, we provide an overview of the safe harbor protections currently in place. Section IV describes some of the challenges to safe harbors. Section V addresses the importance of the Internet intermediaries to the U.S. economy. Section VI describes the survey methodology developed to estimate the impact of reducing safe harbor protections. In Section VII, we estimate the impact on the U.S. economy of the surveyed Internet intermediaries. Section VIII estimates the impact on the overall U.S. economy across all Internet intermediaries. Section IX concludes.

Overview of Safe Harbor Protections

In the United States, there are two main safe harbor protections for Internet intermediaries: the Communications Decency Act (CDA) of 1996 and the Digital Millennium Copyright Act (DMCA) of 1998.

The CDA, Section 230 in particular, was enacted in part to "promote the continued development of the Internet and other interactive computer services and other interactive media."[3] It does so by protecting Internet intermediaries such as Internet Service Providers (ISPs) and other online services that publish third-party content from being legally responsible for that content. The relevant paragraph states:

> No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider.[4]

This bright-line rule has allowed user-generated Internet services like YouTube, Yelp, Reddit, and Facebook to flourish by facilitating consumer access through their ISPs.

The DMCA was enacted to update U.S. copyright laws. Section 512 of the DMCA was designed, in part, to deal with concerns that "without clarification of their liability, service providers may hesitate to make the necessary investment in the expansion of the speed and capacity of the Internet."[5] To alleviate Internet intermediary concerns, Congress created four safe harbors limiting copyright liability. These were for:

a) Transitory Digital Network Communications—… transmitting, routing, or providing connections for material through a system or network controlled or operated by or for the service provider….
b) System Caching—… storage of material on a system or network controlled or operated by or for the service provider….
c) Information Residing on Systems or Networks at Direction of Users—… storage at the direction of a user of material that resides on a system or network controlled or operated by or for the service provider….
d) Information Location Tools—… referring or linking users to an online location containing infringing material or infringing activity, by using information location tools, including a directory, index, reference, pointer, or hypertext link….[6]

Safe harbors do not provide blanket protection to ISPs and other intermediaries. In order to be protected under the four safe harbor provisions within the DMCA, an Internet intermediary satisfies the limitations of liability only if it "has adopted and reasonably implemented, and informs subscribers and account holders of the service provider's system or network of, a policy that provides for the termination in appropriate circumstances of subscribers and account holders of the service provider's system or network who are repeat infringers."[7]

The United States' success in developing the Internet intermediaries sector confirms the legislative reasoning behind the enactment of both the CDA and the DMCA. Industry observers generally indicate that an important reason for the success of U.S. intermediaries on a global scale is due to the space for innovation and application created by these safe harbors. Consequently, any changes that would diminish the robustness of the safe harbors would injure the U.S. economy.

In contrast, the greater uncertainty surrounding safe harbors in Europe has been viewed as one of the limiting factors to Internet intermediary development there. As one observer noted regarding the European context:

> Despite the guarantees offered by the Directive on electronic commerce to businesses which host or passively transmit illegal content, intermediary internet service providers struggle with the legal uncertainty linked to fragmentation within the European Union of the applicable rules and practices which are possible, required or expected of them when they are aware of illegal content on their websites. Such fragmentation discourages those who wish to conduct business online, and hinders its development.[8]

Similarly, as the Internet Association stated in the European Union (EU) context:

> The EU was also quick to recognize the challenges facing the early Internet. The eCommerce directive introduced a similar notice-and-takedown framework to the U.S. system for most content. Since it was a directive that needed to be interpreted by (eventually) 28 EU member states it has resulted in some inconsistency of application that provided somewhat less certainty to Internet companies than the more bright line U.S. safe harbors.[9]

The effects of the greater certainty, among other reasons, contributed to the business success of U.S.-based Internet intermediaries. A number of the U.S. Internet participants are among the most successful and innovative firms in the world. In 2014, the United States accounted for 13 of the 21 largest Internet companies in the world and if China is excluded, 13 of the largest 16. According to a study measuring the U.S. Internet, the sector accounted for 6 percent of GDP in 2014. It has also grown rapidly relative to other industries; its GDP share grew by over 88 percent between 2007 and 2012. It is also a sector where employment has grown rapidly, by almost 16 percent yearly between 2007 and 2012. Importantly, it is a sector with higher wages than the U.S. average, those employed in it earned almost 30 percent more on average in 2012.[10] Thus, U.S. Internet safe harbors function as an important catalyst to the U.S. economy.

Challenges to Safe Harbors

In the United States, there have been potential legislative interventions, as well as numerous lawsuits challenging the protection guaranteed by the safe harbors. The potential legislative interventions include proposals for mandatory content filtering, redefining what it means to "materially contribute" to the illegality of posted content, and enacting "Right to be Forgotten" laws. The lawsuits involve claims of damages that at times have been very large. For example, social media platforms have faced claims of providing material support to various terrorist groups in the form of access to their services, with at least one claim seeking $1 billion in compensatory damages.[11]

There have also been several successful lawsuits against Internet intermediaries that tested the legal limits of the safe harbors. In each case, significant damages were awarded against the intermediary involved. In 2014, BMG Rights Group, a music publishing company, sued Cox Communications, an ISP, for copyright infringement on 1,397 musical compositions across Cox's Internet service.[12] Despite Cox's assertion of the DMCA safe harbor as an affirmative defense, a jury found Cox "liable for willful contributory copyright infringement" for not taking appropriate steps to combat repeat infringers. In this case, BMG Rights Management was awarded $25 million in statutory damages.[13]

Another recent copyright infringement suit was filed against MP3tunes under the DMCA. In this case, the plaintiffs alleged that two Internet music services created by MP3tunes (MP3tunes.com and sideload.com) infringed on their sound recordings and musical compositions. One MP3tunes service operated as a locker service for storing digital music and the second allowed users to search for free music on the Internet and upload songs to the locker.[14] The locker storage service charged a fee to store the music on the MP3tunes server.[15] After the trial, which featured a safe harbor defense, the jury returned a verdict for the plaintiffs of $48 million, including $7.5 million in punitive damages against the owner of MP3tunes.[16] Statutory damages were allowed in lieu of actual damages up to $30,000 if MP3tunes acted innocently or up to $150,000 if it acted willfully.[17] The appeals court decision upheld the $41.5 million in damages, as well as the trial court reduction of the punitive damages award to $750,000.[18]

Challenges to intermediary safe harbors have not only occurred in the United States. In particular, there have been several successful ones in Europe, providing a window to the direction in which the United States could conceivably head. In May 2014, the European Court of Justice (ECJ) ruled:

> Individuals have the right - under certain conditions - to ask search engines to remove links with personal information about them. This applies where the information is **inaccurate, inadequate, irrelevant or excessive**….[19]

This "Right to be Forgotten" decision applies to any search engine that is funded by selling advertising space. To reach this conclusion, the ECJ ruled: "Search engines are controllers of personal data."[20] According to *The New York Times*, in the year following this decision, Google received requests to "forget about a million web links" of which it removed about 40 percent.[21] Cases still exist where there is a dispute because Google did not remove the link. In the United Kingdom, people can appeal to the Information Commissioner's Office (ICO), which describes itself as an "independent body set up to uphold information rights."[22] The ICO will support either the search service or the complainant. If the search service disagrees with the ICO's request to delink the item, the search service could face legal action for noncompliance.[23] The first proposed law of its kind in the United States, which required that "search engines, publishers and similar online players remove information that individuals have identified as being 'inaccurate, irrelevant, inadequate or excessive' within 30 days," was introduced in the New York State Senate in February of this year.[24]

The "Right to be Forgotten" case was followed by *GS Media BV v. Sanoma Media Netherlands BV*, a September 2016 ECJ decision on the legality of linking to infringed materials, which found that merely linking (instead of copying) can lead to copyright liability. Although the decision acknowledged how difficult it would be for individuals or entities wanting to post a link to determine if the copyright holders allowed the posting, the court nonetheless imposed a duty to make that determination on those in "pursuit of financial gain," for example, an ad-supported website. Thus, according to an analysis published by *Law360*, the "court imposes a duty, for the first time, on whoever provides links to check the legitimacy of the linked material."[25] Specifically the court wrote:

> Furthermore, when the posting of hyperlinks is carried out for profit, it can be expected that the person who posted such a link carries out the necessary checks to ensure that the work concerned is not illegally published on the website to which those hyperlinks lead, so that it must be presumed that that posting has occurred with the full knowledge of the protected nature of that work and the possible lack of consent to publication on the internet by the copyright holder. In such circumstances, and in so far as that rebuttable presumption is not rebutted, the act of posting a hyperlink to a work which was illegally placed on the internet constitutes a 'communication to the public' within the meaning of Article 3(1) of Directive 2001/29.[26]

As the authors of the *Law360* piece note, the decision implicates any website with a European audience, and it "significantly increase[d] the risk of copyright infringement from linking to third-party material on a website or server that may not be operated by the copyright owner." The decision also leaves unclear what liability, if any, a social media platform operating for profit faces when its users link to websites that may be infringing.[27]

Although overall estimates of the possible litigation costs under a legislative regime offering fewer safe harbor protections are not currently available as far as we are aware, the numbers are potentially very large based on previous court decisions. For example, it has been noted that even the market for litigation funding (i.e., third-party investors funding litigation) in the United States reached an estimated $1 billion in 2010 and was expected to grow.[28]

Internet Intermediaries' Role in the Economy

Internet intermediaries such as eBay, Facebook, Google, IAC, Uber, and Yahoo! are a driving force of the modern U.S. economy. Numerous studies document the importance of these and many other entities both domestically as well as internationally. As referenced previously, a study titled "Measuring the U.S. Internet Sector" describes the growing importance of the Internet sector in detail. The study measures the economic contribution of "the provisioning of Internet backbone facilities, data storage, Internet access, Internet telephony, cloud computing, search activities, social media, Internet advertising, and E-Commerce."[29] It also compares the value added by the Internet sector in 2007 and 2012, as well as provides an estimate for 2014.[30] As can be seen in Table 1, during these periods, the Internet sector has more than doubled, growing at double digit annual rates.[31]

Table 1. **U.S. Internet Sector Growth Rates**

				Annual Growth Rate	
	2007	2012	2014	2007-12	2007-14
Value Added ($ billion)	$438.8	$847.5	$966.2	14%	12%
Direct Employment	1,383,633	2,873,009		16%	
Share of U.S. Economy	2.9%	5.5%	6.0%	14%	11%

Source: Siwek.

As the study explains, not only has direct employment in this sector grown rapidly, the sector also delivers higher per-employee earnings. In 2012, those directly employed in the Internet sector had an average compensation of $79,515 per year, an earnings premium of about 30 percent over the average compensation of all U.S. workers.[32]

The OECD, among others, has also made estimates of the value added contributed by the Internet sector. For a "narrow scope" estimate, which encompasses only the information services sector and the wholesale and retail sectors, it estimated the value added at 3.2 percent of the U.S. business sector value added in 2011. Measured at a "broader scope," which takes into account Internet-related activities across all industries in the business sector for which data are available, it estimated it as up to 13.8 percent of the U.S. business sector value added in 2011.[33] The OECD also notes the claim:

> There is a huge layer of the economy unseen in the official data, and for that matter, unaccounted for in the income statements and balance sheets of most companies. […] the trends in the official statistics not only underestimate our bounty, but in the second machine age they have also become increasingly misleading.[34]

An example would be the efficiency gains from a reduction in discovery costs an Internet user experiences through the ability to search or apps provided by a variety of Internet services. Another example is a "sharing economy" entity like Airbnb. While there was always residential rental business, the creation of an Internet platform like Airbnb, currently having a market capitalization similar to that of the largest hotel chains, has reduced entry barriers, increased market size, and minimized risks (for both the providers and the consumers of the services). It has done this by reducing search costs, increasing the use of the housing stock (e.g., apartments stay unused less frequently in their owners absence), and creating a greater range of prices for consumers to choose from.[35]

The benefits of the Internet intermediaries can be found not only in the domestic economy but also abroad as U.S. companies have "exported" their business models. For example, according to estimates from eMarketer, Facebook had worldwide advertising revenues of nearly $26 billion in 2016 of which 54 percent came from outside the United States.[36] Google had worldwide advertising revenues of over $63 billion of which 53 percent came from outside the United States.[37]

As this brief review shows, Internet intermediaries are crucial to both the U.S. domestic economy and U.S. exports to the rest of the world. In the following sections, we deal with the possible impact of putting limits on safe harbors; that is, limiting safe harbors would lead to a significant rise in the cost of providing access to Internet platforms to U.S. consumers. To estimate the impact on the U.S. economy, we combine consumer surveys regarding the impact of cost increases on two sectors of the Internet economy, search and consumer cloud storage.

Survey Methodologies

As shown above, potential litigation costs from a reduction in safe harbor protection can be significant and include not only claimed economic damages, but also legal fees and potential punitive claims. Consequently, a permanent weakening of Internet safe harbors exposes all Internet companies, large and small, to significant litigation expenses and expenses aimed at minimizing such suits in the first place.

To ensure that these costs will not cripple them, Internet intermediaries would need to increase their prices or their volume of advertising or both to cover the additional litigation-related expenses that would result from a reduction in safe harbor protections. Given that all Internet intermediaries would be impacted by the weakening of safe harbors, it is reasonable to assume that a large part of these additional costs would be passed on to end users. Naturally, an increase in price usually results in a decrease in demand. To measure the decrease in demand as a result of a price increase, we conducted two consumer surveys. The first survey measured a demand decrease for Internet search (e.g., fewer searches conducted), whereas the second survey measured the demand decrease for cloud storage. We note that these are only two of many services offered by Internet intermediaries and are meant to illustrate the impact of a reduction in safe harbor protection.

We assume that the essential structure of the two types of service which we surveyed would not change; that is, Internet search still would be free to the user. To estimate the drop in demand for Internet services due to an increase in price or the volume of advertising, we conducted two consumer surveys. One survey focused on demand for cloud storage services and the other focused on Internet search. Each survey was designed as a choice-based conjoint analysis, which is a statistical technique that allows market researchers to determine the value that consumers place on the features of a product or service. Choice-based conjoint analysis asks consumers to select their most preferred product from sets of hypothetical products made up of "bundles" of attributes. This survey approach is common in market and academic research and allows researchers to estimate how consumers value a particular attribute by observing how they make tradeoffs between the attributes of the various products they consider. In our study, we are interested in how consumers will balance consumption of a service (cloud storage or Internet searches) with an increased cost of the good (price or advertising). The details of each survey are provided below.

Cloud Storage

Cloud storage consists of services that allow a user to upload and store digital data in a remote server, which can then be accessed, edited, and shared via a cloud storage application such as iCloud or Dropbox. According to a 2013 survey, cloud storage is overwhelmingly used for music.[38] The cloud storage survey was administered to an online panel of 300 individuals. The survey was limited to individuals who stated that they used or were considering using a cloud storage service.

After qualifying for the survey, respondents were presented with descriptions of six attributes of cloud storage service plans they might consider when choosing a service. These attributes were (1) does the service automatically back up one or more devices, (2) are stored files encrypted, (3) are there options to allow others to view, download, or edit files, (4) what is the maximum size of an individual file that can be uploaded, (5) the monthly price of the service, and (6) the amount of monthly storage included in the plan. These attributes and the levels of each attribute were selected to reflect the characteristics of real-world cloud storage services. A detailed description of the attributes and the levels of these attributes are presented in Appendix A.

The survey respondents were asked to make a series of choices from sets of hypothetical cloud storage services. Each choice scenario shown to the respondents presented three hypothetical cloud storage services with a distinct combination of the six attributes described above. Respondents were asked to select the service they would be most likely to purchase or to state if they would not purchase any of the three services presented. An example of one choice scenario presented to respondents is shown in Table 2.

Table 2. **Example of a Choice Scenario in the Cloud Storage Conjoint Analysis**

Assuming that these three cloud data storage services are the only ones available to you, which cloud data storage service are you MOST likely to purchase? If you would not purchase any of these cloud data storage services, please select "I would not choose any of these services" below.

For additional information about each feature, hover your mouse over or tap the bolded words.

Scenario 2 of 12 *(Select one)*

	Plan 1	Plan 2	Plan 3
Automatic Backup	No	Multiple devices	One device
Encryption	No	Yes	Yes
File Sharing	View or download only	View, download, and real-time editing	No file sharing
Fite Size Restrictions	Unlimited	250 MB	2 GB
Price	$24.99	$1.99	$9.99
Storage	5 GB	1000 GB	100 GB
Your Choice	❑	❑	❑

❑ I would not choose any of these services

Each respondent was presented with 12 different choice scenarios in total, giving us a total of 3,600 choices from among these hypothetical cloud storage services.

We analyzed these choices with a conditional logit model, which allowed us to determine how each attribute influences the probability that an individual will purchase a cloud storage service.[39] The results were sensible; that is, a desire for more storage, larger file upload sizes, encryption, and the ability to back up multiple devices lead to higher probabilities of purchasing the service, whereas higher prices reduce the probability of purchasing the service. File sharing and the ability to only back up one device did not have a statistically significant effect on choice. The results of estimating this conditional logit model are presented in Table 3. These estimates are used to simulate the drop in demand from a hypothetical price increase in cloud storage services in the following section.

Table 3. **Conditional Logit Analysis of Cloud Storage Service Choices**

Attribute	Coefficient	Standard Error	Z-Score
Automatic Backup for One Device	-0.0588	0.0599	-0.98
Automatic Backup for Multiple Devices	0.5152	0.0478	10.77
Encryption	0.3662	0.0437	8.38
File Sharing: View or Download Only	0.0134	0.0545	0.25
File Sharing: View, Download, and Real-Time Editing	0.0597	0.0534	1.12
File Size Restrictions (TB)	0.0002	0.00001	2.99
Price	-0.0641	0.0027	-23.72
Storage (TB)	0.6942	0.0547	12.68

The market simulations to estimate the drop in cloud storage demand are discussed in Section C below.

Internet Search

The structure of the Internet search survey differs from that of the cloud storage survey—most Internet users would not opt out of Internet search and are unfamiliar with the concept of paying for it. Further, companies that provide Internet search have found it profitable to offer search for free and generate revenue through advertising. This means that the more standard approach of examining the tradeoff between price and demand for the service is unlikely to yield useful results.[40] Thus, in this survey, we examined the tradeoff between exposure to advertising and frequency of searches. Following increased exposure to the risk of litigation, firms offering search functions will have to increase the amount of advertising displayed on the search result pages. Our assumption here is that more prevalent or intrusive advertising on a search engine will reduce the number of searches individuals will undertake. Thus, in this survey we presented individuals with hypothetical search engines with varying levels of advertising and varying levels of maximum searches per day. We set the survey up in this way in order to measure the tradeoff between frequency of search and exposure to advertising—we do not assume that search engines will in fact impose a maximum number of searches in the future.

As with the cloud storage survey, the Internet search survey was administered to an online panel of 300 individuals who stated that they had used an Internet search service in the last week. After qualifying for the survey, respondents were presented with descriptions of seven attributes of Internet search engines they might wish to consider when conducting an Internet search. These attributes were (1) accuracy of the search results, (2) amount of advertising that must be viewed in order to see the search results,[41] (3), whether the search engine suggests search terms as the search query is entered, (4) the ability to filter results, (5) whether the search engine collects and shares search history, (6) the maximum number of searches per day, and (7) whether the search results are displayed in a mobile friendly way. A detailed description of the attributes and the levels of these attributes are presented in Appendix B.

Survey respondents were asked to make a series of choices from sets of hypothetical search engines, selecting the search engine they would be most likely to use. Each choice scenario shown to respondents presented three hypothetical search engines with a distinct combination of the seven attributes described above. Respondents were not given the option to decline to select a search engine under the assumption that Internet users will not abandon Internet search. An example of one choice scenario presented to respondents is shown in Table 4.

Table 4. **Example of a Choice Scenario in the Internet Search Conjoint Analysis**

Assuming that these three internet search engines are the only ones available to you, which internet search engine are you MOST likely to use?

For additional information about each feature, hover your mouse over or tap the bolded words.

Scenario 1 of 12 *(Select one)*

	Option 1	Option 2	Option 3
Accuracy	70%	90%	90%
Advertising	5 seconds	20 seconds	10 seconds
Autocomplete Capability	No	Yes	Yes
Categorization	No	Yes	Yes
Data Sharing	No	Yes	Yes
Maximum Searches per Day	25	5	1
Mobile Friendly	Yes	No	No
Your Choice	❑	❑	❑

As with the cloud storage survey, each respondent was presented with 12 different choice scenarios in total, giving us a total of 3,600 choices from among these hypothetical search engines.

We analyzed these choices with a conditional logit model, which allowed us to determine how each attribute influences the probability that an individual will use a given search engine. Again, the results were sensible—more accuracy, autocomplete capability, categorization of search results, mobile friendly results, and a higher number of maximum searches per day lead to higher probabilities of using the search engine, whereas advertising and sharing of search history reduce the probability of using the search engine. The results of estimating this conditional logit are presented in Table 5. These estimates are used to simulate the drop in demand for searches due to a hypothetical increase in advertising on search engines in the following section.

Table 5. **Conditional Logit Analysis of Internet Search Choices**

Attribute	Coefficient	Standard Error	Z-Score
Accuracy (%)	6.1578	0.2409	25.56
Advertising	-0.0334	0.0022	-14.99
Autocomplete Capability	0.2372	0.0427	5.56
Categorization	0.1161	0.041	2.83
Data Sharing	-0.2513	0.0393	-6.4
Maximum Searches per Day	0.0499	0.0024	20.55
Mobile Friendly	0.3672	0.0408	9

The market simulations to estimate the drop in search function demand is discussed in Section C below.

Market Simulations to Estimate Drop in Demand

Required price increase with a reduction in safe harbor protection

We begin with estimates of how much Internet intermediaries might be forced to raise prices if safe harbor protections are reduced. In these simulations, we assumed that any price increase would be solely used to cover the additional legal costs and potential liabilities that would emerge with a reduction in safe harbor protection.

These market simulations are a partial equilibrium analysis, only considering the increase in price and the resulting decrease in demand. We did not consider other steps that companies might take in response to decreased demand (such as cloud storage services offering less initial free storage space).

For consumer oriented cloud storage services, we used the MP3Tunes case as the basis for illustrating the magnitude of a potential price increase. The ultimate judgment against MP3Tunes was $41.5 million for infringements of music copyrights for offering music storage facilities. The infringement took place over approximately seven years, and MP3Tunes had approximately 125,000 users.[42] This judgment cost about $4.00 per customer per month.

For Internet search, we estimate the increase in revenue following greater exposure to advertisements. Price increases in this market simulation are measured as seconds of advertising. Each additional advertisement is expected to bring in approximately $0.002 cents in revenue.[43] Thus, if each ad takes about one second to view,[44] to raise an additional $1 per customer per month, this hypothetical search engine would need to add approximately five seconds of advertising per search. Although this would potentially raise significant revenue, about $400 million per month based on the number of searches in the United States, it needs to be kept in mind that the search services market is significantly larger than that of consumer cloud services. On a per-customer basis, the revenue generated is also lower than that awarded in the MP3Tunes litigation.

We used $4.00 per customer per month for consumer cloud services and five seconds of additional advertising for search services as our main approximations for the additional costs of a reduction in safe harbor protection. We also considered lower figures ($3.00 for cloud services and three seconds for search services) to represent scenarios where Internet intermediaries anticipate lower risks from the reduction in safe harbor protection.

Changing demand for cloud storage

From the conditional logit results for the cloud storage survey, we were able to undertake a market simulation to determine how demand for this Internet service would drop if the price was increased. Given the variety of cloud storage services available to consumers, this market simulation could grow quite complicated. Thus, we simplified the market to a single "average" cloud storage service.[45] In our market simulation, consumers choose between this average service and no service.

Thirty-two percent of respondents to our survey reported having a cloud storage service. Using the coefficients from the conditional logit model presented in Table 1, we calculated the probability that a consumer would select this average cloud storage service, adding a constant term to calibrate this predicted market share to the observed market share of 32 percent.

We then calculated how this market share would decline as the price of cloud storage increased. As explained in the previous section, we considered increases in price of $3.00 and $4.00. This gave us the drop in demand for cloud storage under various scenarios for price increases due to a reduction in safe harbor protection. The results of this market simulation are presented in Table 6.

Table 6. **Market Simulation for Cloud Storage Services**

Price	Market Share	% Change
$9.99 (baseline)	32.2%	--
$12.99 (+ $3.00)	28.1%	-10.7%
$13.99 (+ $4.00)	26.8%	-14.7%

In our calculations, we assumed that revenue was linear in demand and used these declines in demand as our figures for declines in revenue due to price increases. Note that in this market simulation demand for cloud storage service as estimated by the conditional logit model is relatively inelastic (approximately 0.37).

We discuss the impact of using an average drop of 14.7 percent on sector revenue and employment below. The impact of a 10.7 percent drop is shown in Appendix B.

Changing demand for Internet search

We also undertook a market simulation using the conditional logit results for the Internet search survey. In this case, we determined how demand for this Internet service would drop if the amount of advertising increased. Unlike cloud storage services, Internet search services are typically free, and it is unlikely that individuals would give up this service entirely. Thus, we conducted this simulation in a different way and examined the tradeoff that consumers would make between the maximum number of searches and seconds of advertising in our conjoint analysis.

By the properties of the conditional logit model, we can estimate the relative values of two attributes by examining the ratio of their coefficients. The ratio of the maximum searchers per day coefficient to the advertising coefficient is approximately –1.5. This demonstrates that, on average, consumers are willing to trade 1.5 searches to avoid one second of advertising. We then calculated the percentage drop in Internet searches as the seconds of advertising that must be viewed increases.

We considered the effect of an additional three seconds and additional five seconds of advertising. This gave us the drop in demand for Internet search under various scenarios for advertising increases due to a reduction in safe harbor protection. The results of this market simulation are presented in Table 7.

Table 7. **Market Simulation for Internet Search Services**

Advertising	% Change
Baseline	--
+ 3 seconds	-4.6%
+ 5 seconds	-7.6%

We discuss the impact of using an average drop of 7.6 percent on sector revenue and employment below. The impact of a 4.6 percent drop is shown in Appendix B.

Reducing Safe Harbors Will Hurt Search and Cloud Service Segments

The "Measuring the U.S. Internet Sector" study calculated the Internet industries' receipts in 2012 as totaling $352.1 billion using the North American Industry Classification System (NAICS), the standard used by the U.S. government.[46] Within the larger NAICS categories, the study selected those codes related to the Internet based on descriptions of their function, as well as the details contained in the "Product Line" Receipts published by the Census Bureau. From these numerous NAICS code subcategories, we selected the two categories previously discussed for further analysis, namely, Internet Publishing and Broadcasting, and Web Search Portals (NAICS code 51913) with the description "Publishing - Sale of advertising space - Internet" and Data Processing, Hosting, and Related Services (NAICS code 581210) with the description "Data storage services."

In 2012, the last year for which the "Measuring the U.S. Internet Sector" data are available, Internet advertising receipts reached $44.8 billion.[47] This compares well to the $36.6 billion of Internet advertising revenue estimated by the Interactive Advertising Bureau (IAB) for 2012. The IAB estimated that in 2015, Internet advertising revenue reached $59.6 billion.[48] "Measuring the U.S. Internet Sector" reports that consumer oriented data storage service receipts totaled $1.8 billion in 2012.[49] This compares to a 2013 estimate of $1.2 billion based on Dropbox's 17 percent share of storage services and its $200 million revenue.[50] This segment, although currently relatively small, is forecasted to grow rapidly with, for example, global consumer oriented storage services forecasted to grow by 40 percent per year between 2012 and 2018.[51]

The U.S. Internet Sector study estimates multipliers for entire NAICS codes. The multipliers are for gross output,[52] value added,[53] employee earnings, total employment, direct employment, and direct employee earnings. For the purposes of this report, which is trying to establish orders of magnitude, we assumed that the multipliers applicable to an entire NAICS category were also applicable to the subcategories within that NAICS category. Although the increase in litigation-related costs following any weakening of the current safe harbor protections would have a significant negative impact on the revenue and employment levels of these two categories, we assumed modest revenue impacts based on relatively small changes in costs modeled in the surveys.

The approach to measuring the impact of increased litigation exposure assumes that the Internet segments analyzed would retain their current business structure and deal with the additional liability expenses by passing the cost through to the user, either in the form of higher prices or increased advertising. Thus, for example, the search function would continue to search the entire Internet and would not limit itself to preapproved sites.

The Economic Impact on Internet Search

The results from the Internet survey showed a likely 7.6 percent reduction in Internet advertising receipts following the reduction in U.S. safe harbor protections. As shown in Table 8, such a reduction in receipts translates into a drop of about $8 billion in gross output annually, more than 51,000 in overall employment (of which 18,000 are direct employees), and $2.9 billion annually in overall employee earnings (of which direct employee earnings are $1.6 billion annually). In total, U.S. GDP (value added) would drop by $4.7 billion annually. These results do not pick up the impact of any diminution in international revenues that would likely follow as the result of the reduction in U.S. safe harbor protections, as other countries likely would feel emboldened to enact similar laws.

Table 8. **Assumed Reduction in Receipts: Publishing–Sale of Advertising Space–Internet**

Internet Publishing and Web Search Portals
NAICS 51913
2012
Publishing–Sale of Advertising Space–Internet

Estimated Reduction in Receipts *7.6%*

	Base	Impacted ($ million)	Difference
Final Demand			
Gross Output	$104,675	$96,720	$(7,955)
Employee Earnings	$38,208	$35,304	$(2,904)
Employment	673,992	622,769	(51,223)
Value-Added	$61,896	$57,192	$(4,704)
Direct Employment			
Final Demand Total Employment	673,992	622,769	
Direct Effect Multiplier	2.85	2.85	
Direct Employment	236,489	218,515	(17,973)
Direct Employee Earnings			
Total Earnings	$38,208	$35,304	
Direct Effect Multiplier	1.86	1.86	
Direct Earnings	$20,542	$18,981	$(1,561)

The Economic Impact on Cloud Storage

The results from the consumer oriented cloud data storage survey showed a likely 14.7 percent reduction in receipts following the reduction in U.S. Internet safe harbor protections.[54] As shown in Table 9, such a reduction in receipts would translate into a drop of over $500 million annually in gross output, about 2,300 in overall employment (of which around 670 would be direct employees), and $110 million annually in overall employee earnings (of which direct employee earnings would be $43 million annually). In total, U.S. GDP (value added) would drop by over $290 million annually. These economic impacts are smaller than that of search but would become more pronounced as the sector grows. It is expected to grow rapidly, with the global consumer oriented cloud storage market forecasted to grow by 40 percent between 2012 and 2018.[55]

Table 9. **Assumed Reduction in Receipts: Data Storage Services**

Data Processing, Hosting and Related Services
NAICS 518210
2012
Data Storage Services

Estimated Reduction in Receipts *14.7%*

	Base	Impacted ($ million)	Difference
Final Demand			
Gross Output	$3,452	$2,945	$(507)
Employee Earnings	$745	$636	$(110)
Employment	15,712	13,402	(2,310)
Value-Added	$1,966	$1,677	$(289)
Direct Employment			
Final Demand Total Employment	15,712	13,402	
Direct Effect Multiplier	3.46	3.46	
Direct Employment	4,541	3,873	(668)
Direct Employee Earnings			
Total Earnings	$745	$636	
Direct Effect Multiplier	2.53	2.53	
Direct Earnings	$295	$251	$(43)

Reducing Safe Harbors Will Hurt the Entire Internet Sector

Direct Effects on the U.S. Internet Sector

The consumer surveys focused on two Internet intermediary services, consumer oriented cloud storage and Internet search. These account for about 18 percent of all intermediary Internet services revenue. There are many more Internet intermediaries, and the reduction in safe harbor protections would affect most of these companies.

To estimate the potential impact on the overall U.S. Internet sector, we calculated the revenue-weighted average decrease in receipts from Internet search and cloud services. Specifically, the relevant NAICS codes for search report receipts of $73.2 billion, whereas the NAICS codes for all cloud storage generate $47.5 billion. A weighted average of the survey results (i.e., a demand reduction of 7.6 percent and 14.7 percent for search and all cloud services, respectively) results in a reduction in revenues of approximately 10 percent.

Using this 10 percent revenue drop as an indicator of the percentage decrease for the *entire* U.S. Internet sector indicates that a reduction in safe harbor protection would cost the U.S. economy $75 billion annually, lower employee earnings by some $23 billion annually, and eliminate over 425,000 jobs. The U.S. gross domestic product would decrease by $44 billion annually. The overall impact on the U.S. economy is summarized in Table 10.[56]

Table 10. **All NAICS Categories Summary, 2012**

Total Receipts ($ million)	*$352,127*
Assumed Reduction in Receipts	*10.0%*

	Base	Impacted ($ million)	Difference
Final Demand			
Gross Output	$753,088	$677,780	$(75,309)
Employee Earnings	$225,861	$203,275	$(22,586)
Employment	4,285,827	3,857,245	(428,583)
Value-Added	$438,657	$394,792	$(43,866)
Direct Employment			
Final Demand Total Employment	$4,285,827	$3,857,245	
Direct Effect Multiplier	3.05	3.05	
Direct Employment	$1,404,700	$1,264,230	(140,470)
Direct Employee Earnings			
Total Earnings	$225,861	$203,275	
Direct Effect Multiplier	2.02	2.02	
Direct Earnings	$111,864	$100,677	$(11,186)

Secondary Effects on the U.S. Internet Sector

In addition to the more easily measurable negative direct effects on the U.S. economy, a reduction in safe harbor protections will also have negative secondary effects that are not easily quantifiable. In particular, there is evidence that it will reduce the formation of new Internet intermediary startups, as well as reduce investment in the Internet more generally.

Emerging technological businesses are considered the drivers of future economic growth in the United States. Investments made by venture capitalists are an important factor in the early stage development of Internet intermediaries. Because many of the Internet intermediary business models consist of distributed digital content and the amount of this content has grown hugely, their ability to operate within safe harbors has grown more important. The regulatory and legal environment is particularly important to U.S. startup investors, as shown in a 2014 survey.[57] According to the survey, 93 percent of respondents found legal ambiguity (defined as concern about regulatory environment, uncertain and potentially large damages, and IP infringement) as having a negative impact on startup investment. Of the respondents, 89 percent stated it would negatively affect "investing in digital content intermediaries that offer user generated music and video" as these intermediaries "are particularly exposed to potential new legislation, and the current legal environment…."

A 2016 survey of U.S. investors found a similar result, with 94 percent of investors stating that an uncertain legal environment had negative consequences for investment and with 76 percent of investors concerned about exposure to very large damages.[58]

Thus, although our consumer survey estimated the potential direct impact on the usage of consumer storage and Internet search from an increase in costs, these investor surveys indicate that there are also significant potential secondary effects that would harm the U.S. economy.

Conclusion

The U.S. Internet sector is one of our nation's most successful economic performers, both here and internationally. As we have detailed, the reduction in Internet safe harbor protections would likely have severe negative economic consequences on U.S. employment as well as on the U.S. GDP.

Appendix A: Cloud Search Survey

Attributes and Levels in Cloud Storage Conjoint Analysis

Attribute Descriptions

Automatic Backup – whether the cloud data storage service automatically backs up one or multiple devices (e.g., smartphone, laptop) to the cloud. Devices can still be backed up manually if automatic backup is not available.

Encryption – whether the stored files are encrypted. Encryption provides an additional level of security for stored files.

File Sharing – available options for allowing others to view, download, and/or edit files.

File Size Restrictions – maximum size of an individual file that can be uploaded to the cloud (the average high definition movie is about 3-5 GB).

Price – monthly subscription price, in dollars.

Storage – amount of monthly storage included in plan (1 GB of space will hold approximately 240 songs or 300 photos, whereas 1000 GB of space will hold approximately 300 high definition movies).

Attribute Levels

Automatic Backup	Encryption	File Sharing	File Size Restrictions	Price	Storage
No	No	No file sharing	250 MB	$1.99	5 GB
One device	Yes	View or download only	1 GB	$5.99	10 GB
Multiple devices		View, download, and real-time editing	2 GB	$9.99	50 GB
			5 GB	$15.99	100 GB
			10 GB	$19.99	500 GB
			Unlimited	$24.99	1000 GB

Attributes and Levels in Internet Search Conjoint Analysis

Attribute Descriptions

Accuracy – The percentage of searches that return a relevant result on the first page.

Advertising – Length of video advertising, in number of seconds, that must be watched to access search results.

Autocomplete Capability – The ability of the search engine to suggest search terms while you enter your search query.

Categorization – The ability to filter search results by images, videos, maps, and news stories.

Data Sharing – The extent to which the search engine collects and shares your search history.

Maximum Searches per Day – The maximum number of searches the search engine allows per day. The average person makes about 5 searches per day.

Mobile Friendly – Whether the search results are easy to read on mobile devices.

Attribute Levels

Accuracy	Advertising	Autocomplete Capability	Categorization	Data Sharing	Max Daily Searches	Mobile Friendly
70%	0 seconds	Yes	Yes	Yes	1	Yes
75%	5 seconds	No	No	No	5	No
80%	10 seconds				10	
85%	15 seconds				15	
90%	20 seconds				20	
95%	30 seconds				25	

Appendix B: Internet Search Survey

In this appendix, we briefly discuss the economic impacts of lesser litigation-related expense assumptions, which still show very significant negative economic consequences of reducing Internet safe harbor protections.

The results from the Internet survey showed a likely 7.6 percent reduction in Internet advertising receipts following the reduction in the United States of Internet safe harbor protections. If, instead, there was a 4.6 percent reduction in receipts based on three additional ads per search,[59] as shown in Table 11, such a reduction in receipts translates into a drop of about $4.8 billion in gross output annually, 31,000 in overall employment (of which close to 11,000 are direct employees), and $1.8 billion annually in overall employee earnings (of which direct employee earnings are about $950 million annually). In total, U.S. GDP (value added) would drop by $2.8 billion annually. These results do not pick up the impact of any diminution in international revenues that would likely follow as the result of the reduction in U.S. safe harbor protections as other countries likely would feel emboldened to enact similar laws.

Table 11. **Alternative Reduction in Receipts: Publishing–Sale of Advertising Space–Internet**

Internet Publishing and Web Search Portals
NAICS 51913
2012
Publishing–Sale of Advertising Space–Internet

Assumed Reduction in Receipts *4.6%*

	Base	Impacted ($ million)	Difference
Final Demand			
Gross Output	$104,675	$99,860	$(4,815)
Employee Earnings	$38,208	$36,451	$(1,758)
Employment	673,992	642,989	(31,004)
Value-Added	$61,896	$59,049	$(2,847)
Direct Employment			
Final Demand Total Employment	673,992	642,989	
Direct Effect Multiplier	2.85	2.85	
Direct Employment	236,489	225,610	(10,878)
Direct Employee Earnings			
Total Earnings	$38,208	$36,451	
Direct Effect Multiplier	1.86	1.86	
Direct Earnings	$20,542	$19,597	$(945)

The results from the consumer oriented cloud data storage survey showed a likely 14.7 percent reduction in receipts following the reduction in U.S. Internet safe harbor protections. If, instead there was a 10.7 percent reduction in receipts based on a $3 increase in storage costs per month, as shown in Table 12, such a reduction in receipts would translate into a drop of about $370 million annually in gross output, about 1,700 in overall employment (of which about 490 would be direct employees), and $80 million annually in overall employee earnings (of which direct employee earnings would be about $30 million annually). In total, U.S. GDP (value added) would drop by over $200 million annually.

Table 12. **Alternative Reduction in Receipts: Publishing–Sale of Advertising Space–Internet**

Data Processing, Hosting and Related Services
NAICS 518210
2012
Data Storage Services

Assumed Reduction in Receipts *10.7%*

	Base	Impacted ($ million)	Difference
Final Demand			
Gross Output	$3,452	$3,083	$(369)
Employee Earnings	$745	$666	$(80)
Employment	15,712	14,031	(1,681)
Value-Added	$1,966	$1,755	$(210)
Direct Employment			
Final Demand Total Employment	15,712	14,031	
Direct Effect Multiplier	3.46	3.46	
Direct Employment	4,541	4,055	(486)
Direct Employee Earnings			
Total Earnings	$745	$666	
Direct Effect Multiplier	2.53	2.53	
Direct Earnings	$295	$263	$(32)

About the Author

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Notes

[1] OECD, "The Economic and Social Role of Internet Intermediaries," April 2010, p. 9.

[2] www.internetlivestats.com/google-search-statistics.

[3] 47 U.S.C. § 230(b)(1).

[4] 47 U.S.C. § 230(c)(1).

[5] Digital Law Online, Chapter 3: Copyright of Digital Information III.B. Congress Codifies the Decisions, 2002, http://digital-law-online.info/lpdi1.0/treatise33.html.

[6] 17 U.S.C. § 512(a); § 512(b)(1); §512(c)(1); § 512(d).

[7] 17 U.S.C. § 512(i)(1)(A).

[8] European Commission, Commission Communication to the European Parliament, the Council, the Economic and Social Committee, and the Committee of the Regions, A coherent framework for building trust in the Digital Single Market for e-commerce and online services, Jan. 11, 2012, p. 13.

[9] Internet Association, "Position Paper on the Regulatory Environment for Platforms, Online Intermediaries, Data and Cloud Computing and the Collaborative Economy," Dec. 2015, p. 8.

[10] Stephen E. Siwek, *Measuring the U.S. Internet Sector* (Internet Association, December 2015), pp. 5–8, 11, http://internetassociation.org/wp-content/uploads/2015/12/Internet-Association-Measuring-the-US-Internet-Sector-12-10-15.pdf (hereafter Measuring the U.S. Internet Sector).

[11] *Stuart Force, et al. v. Facebook Inc*., U.S. District Court for the Southern District of New York, case number 1:16-cv05158, 2016, ¶¶ 4, 337; *Tamara Fields, et al., v. Twitter, Inc*., U.S. District Court for the Northern District of California, case number 16-ev-00213-WHO, 2016.

[12] Memorandum of Opinion, *BMG Rights Management (US) LLC v. Cox Communications, Inc*., United States District Court for the Eastern District of Virginia, Civil No. 1:14-cv-1611, Aug. 8, 2016, p. 1 (*BMG v. Cox, Opinion*).

[13] The Court had instructed the jury that the "amount awarded must be between $750 and $30,000 for each copyrighted work that you found to be infringed." (*BMG v. Cox*, Opinion, pp. 1, 37).

[14] *EMI Christian Music Grp., Inc. et al. v. MP3tunes, LLC et al*., U.S. District Court of Appeals for the Second Circuit, Docket Nos. 14-4369-cv(L), 14-4509-cv(XAP), Oct. 25, 2016, p. 3 (hereafter MP3tunes Decision).

[15] MP3tunes Decision, p. 5.

[16] MP3tunes Decision, pp. 9–10.

[17] MP3tunes Decision, p. 27.

[18] MP3tunes Decision, p. 49.

[19] European Commission, Factsheet on the "Right to be Forgotten" ruling (C-131/12), http://ec.europa.eu/justice/data-protection/files/factsheets/factsheet_data_protection_en.pdf. (Emphasis in original.)

[20] European Commission, Factsheet on the "Right to be Forgotten" ruling (C-131/12).

[21] Farhad Manjoo, "'Right to Be Forgotten' Online Could Spread," *The New York Times*, Aug. 5, 2015.

[22] Information Commissioner's Office, https://ico.org.uk/about-the-ico/who-we-are.

[23] Sophie Curtis, "EU 'right to be forgotten': one year on," *The Telegraph*, May 13, 2015.

[24] Allison Grande, "NY's 'Right To Be Forgotten' Bill Needs Narrower Focus," *Law360*, Mar. 28, 2017.

[25] Jennifer Stanley and Liwen A. Mah, "EU Court Brings New Copyright Liability for Linked Material," Law360, Oct. 7, 2016.

[26] *GS Media BV v. Sanoma Media Netherlands BV, et al*., Judgment of the Court (Second Chamber) case C-160/15, Sept. 8, 2016, ¶ 51.

[27] Jennifer Stanley and Liwen A. Mah, "EU Court Brings New Copyright Liability For Linked Material," *Law360*, Oct. 7, 2016.

[28] Binyamin Appelbaum, "Investors Put Money on Lawsuits to Get Payouts," *The New York Times*, November 14, 2010, http://www.nytimes.com/2010/11/15/business/15lawsuit.html; see also U.S. Chamber Institute for Legal Reform, *Selling Lawsuits, Buying Trouble: Third Party Litigation Funding In The United States* (hereafter U.S. Chamber Institute for Legal Reform, 2009), p. 1.

[29] Measuring the U.S. Internet Sector, p. 39.

[30] Income generated from production consists of payments to labor (compensation of employees), payments to government (taxes on production and imports), and returns on investment (gross operating surplus). The sum of these categories equals value added.

[31] Measuring the U.S. Internet Sector, pp. 5, 7–8.

[32] Measuring the U.S. Internet Sector, pp. 7–8.

[33] OECD, "Measuring the Internet Economy: A Contribution to the Research Agenda," OECD Digital Economy Papers, No. 226, 2013, p. 29.

[34] Erik Brynjolfsson and Andrew McAffee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies* (New York: W. W. Norton & Company, 2014), cited in Nadim Ahmad and Paul Schreyer, "Measuring GDP in a Digitalised Economy," OECD Statistics Working Papers, June 17, 2016, p. 11, DOI: 10.1787/5jlwqd81d09r-en (hereafter Measuring GDP in a Digitalised Economy).

[35] Measuring GDP in a Digitalised Economy, p. 5.

[36] eMarketer, "Facebook Mobile Ad Revenues to Near $30 Billion Next Year," Oct. 31, 2016, https://www.emarketer.com/Article/Facebook-Mobile-Ad-Revenues-Near-30-Billion-Next-Year/1014658.

[37] eMarketer, "Mobile Moves to Majority Share of Google's Worldwide Ad Revenues," Oct. 24, 2016.

[38] Brad Reed, "iCloud revealed as America's most-used cloud storage service," *BGR.com*, Mar. 21, 2013.

[39] Conditional logit models are appropriate when the choice among alternatives is modeled as a function of the characteristics of the alternatives instead of the characteristics of the respondents making the choice.

[40] It is certainly possible that a search-engine service with a subscription fee could emerge if safe harbor protections were reduced with the subscription price of the search engine covering the same legal costs that search engines would cover with increased advertising in our experiment. However, designing an experiment around search engines with subscription fees could lead to unexpected results. For instance, there is a risk of an "endowment effect" with survey respondents objecting to the concept of paying for something they currently receive for free. This could lead to protest answers (e.g., respondents stating they would not use any Internet search engines) or refusing to complete the survey rather than making tradeoffs between price and search behavior.

Notes

[41] In the survey, the amount of advertising is presented as the "length of video advertising, in number of seconds, that must be watched to access search results." We present advertising to our survey subjects in this way to clarify the tradeoff between advertising intensity and search behavior. We do not assume that search engines will introduce video advertising in response to a weakening of safe harbor provisions.

[42] MP3tunes Decision, p. 10; Timothy B. Lee, "Music labels force pioneering MP3tunes into bankruptcy," *arstechnica.com*, May 14, 2012, https://arstechnica.com/tech-policy/2012/05/music-labels-force-pioneering-mp3tunes-into-bankruptcy; Michael Robertson, "Court Ruling Denies EMI Access to Millions of Personal MP3 Files," *michaelrobertson.com*, http://www.michaelrobertson.com/archive.php?minute_id=259.

[43] This estimate is substantially based on public data for Google. Google completes about 115 billion searches per month conducted by about 1.17 billion unique users, or about 100 searches per user per month. The average number of ads displayed equals about eight per search. The Google segment of Alphabet had approximately $23 billion in operating income in 2015. This results in revenue per ad of $0.002. With five additional sponsored links per search, each user would generate about $0.011 in additional income per search. This equates to about $1.00 per user per month. Thus, with about 40 million total searches conducted in the United States, each sponsored link is expected to generate approximately $400 million in revenue per month. (See D. Sullivan, "Google Still World's Most Popular Search Engine by Far, But Share of Unique Searchers Dips Slightly," *searchengineland.com*, Feb. 11, 2013; Alphabet Inc., Form 10-K, December 2015, p. 95; L. Kim, "How Many Ads Does Google Serve in a Day?" *business2community.com*, Nov. 2, 2012; comScore, "comScore Releases February 2016 U.S. Desktop Search Engine Rankings," Mar. 16, 2016; G. Sterling, "Report: Nearly 60 percent of searches now from mobile devices," *searchengineland.com*, Aug. 3, 2016.)

[44] This calculation assumes all ads on the search engine are text-based ads; the average text ad is 125 characters, and the average reader can read 1,000 characters per minute. See https://support.google.com/adwords/answer/1704389?hl=en and https://en.wikipedia.org/wiki/Words_per_minute.

[45] This "average" service offers 1,000 GB of storage, encryption, automatic backup for multiple devices, the ability to allow others to view and download files, and a maximum file upload size of 500 GB, and costs $9.99 per month.

[46] Measuring the U.S. Internet Sector, p. 39.

[47] Measuring the U.S. Internet Sector, p. 57.

[48] IAB, "IAB internet advertising revenue report," Nov. 2016, p. 10.

[49] Measuring the U.S. Internet Sector, p. 53.

[50] Brad Reed, "iCloud revealed as America's most-used cloud storage service," *BGR.com*, Mar. 21, 2013; see also "The Cloud Storage Battle: Box vs. Dropbox," *computersciencedegreehub.com*, http://www.computersciencedegreehub.com/cloud-storage-battle.

[51] "The Cloud Storage Battle: Box vs. Dropbox," *computersciencedegreehub.com*.

[52] Gross output equals total market value of industry output (sales). It equals intermediate inputs plus value added.

[53] Value added equals total value of income generated from production. This income consists of payments to labor (compensation of employees), payments to government (taxes on production and imports), and returns on investment (gross operating surplus). The sum of these parts equals gross domestic product (GDP).

[54] Since the impact is measured relative to receipts any diminution in the availability of free storage is not captured.

[55] "The Cloud Storage Battle: Box vs. Dropbox," *computersciencedegreehub.com*.

[56] Measuring the U.S. Internet Sector, pp. 26–31.

[57] Matthew C. LeMerle, Tallulah J. LeMerle, and Evan Engstrom, "The Impact of Internet Regulation on Early Stage Investment," *Fifth Era*, November 2014, p. 40.

[58] Matthew C. LeMerle, Alison Davis, and Felix O. LeMerle, "The Impact of Internet Regulation on Investment," *Fifth Era*, January 2016, p. 91.

[59] This would generate approximately an estimated $0.60 per search function user per month and, based on the number of searches in the United States total, to about $260 million in revenue per month.

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