

In the Matter of)
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Restoring Internet Freedom) **WC Docket No. 17-108**

Comes now a group of Economic Scholars, including Mark A. Jamison, Ph.D., Public Utility Research Center, Warrington College of Business, University of Florida; Michelle P. Connolly, Ph.D., Department of Economics, Duke University; Gerald Faulhaber, Ph.D., Business Economics and Public Policy Department, Wharton School, University of Pennsylvania; Janice Hauge, Ph.D., Department of Economics, University of North Texas; and James Prieger, Ph.D., School of Public Policy, Pepperdine University (identified collectively hereafter as "Economic Scholars" or "Scholars") and files this their findings of economic research regarding the issues surrounding net neutrality and regulation of the internet under Title II of the Communications Act. The list of the articles reviewed is contained in the References section attached to this Summary.

The Economic Scholars' purpose here is to review what has been demonstrated in the economics literature rather than to advocate particular decisions that they believe the Federal Communications Commission should make. They limit their review to articles that use explicit economic models and that appear in higher-level, peer-reviewed economics journals. Beyond these selection criteria, they do not make evaluations of the relative weight that they might individually place on each publication.

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Introduction

Net neutrality has been the subject of an increasingly contentious policy debate in the U.S. for a number of years. Even though they disagree on means, many of the proponents and opponents of strict net neutrality regulations appear to share a common policy goal, namely to maintain a robust and innovative digital ecosystem that empowers consumers and businesses alike. The advocates' and opponents' disagreements appear to be largely in the space of understanding the economic implications of various policy options, from strict prohibitions against service offerings such as fast lanes, to a general conduct standard,¹ to laissez faire approaches for ensuring a robust digital environment, and to the numerous options in between.

Because these disagreements center on beliefs about the economics of net neutrality, it is useful to summarize clearly what the economics literature says about the topic. This is what the Economics Scholars attempt to do in this filing. Their approach is to identify leading peer-reviewed² economics articles and simply explain what they find.³ They selected the articles summarized by restricting their search to economics journals⁴ and to articles whose findings are based on clearly specified economic models.⁵ They do not make evaluations of the relative merits of the individual articles and models selected using these criteria. Similarly, even though as individuals they might have differing opinions on what the Federal Communications Commission (FCC) should do regarding net neutrality – they have not discussed this as a group – the Economic Scholars believe that it is important that someone accurately represent the economics research on the issues. Their work is motivated by their roles as scholars and is not funded by any outside entity.

The Economic Scholars address two basic economic questions. The first is whether the economics literature supports *ex ante* restrictions⁶ prohibiting internet service

¹ General conduct standards can take many forms. The standard adopted by the FCC in 2015 appears sufficiently vague to provide few bounds on what the agency might actually do in the future.

² Peer review means that the article has been reviewed by other economists and found to have economic merit. The Scholars deviate from their emphasis on peer-reviewed articles when they investigate the economic foundations for Title II, as that literature appeared largely as books in its early history. They also cite a summary of that literature (Trebing 2001), which is a chapter in an edited book. They accept the Trebing summary because of the author's reputation as a leading institutional economist on the foundations of economic regulation of public utilities.

³ Other groups of economists have provided thoughts based upon economic analyses on what the FCC should do on net neutrality. These include Baumol et al. (2007) and Mayo et al. (2017). The Scholars herein have no quarrel with their analyses, but limit their own comments to peer reviewed literature.

⁴ The Scholars limit their search for articles to those appearing in economics journals ranked in the top 300 in IDEAS/RePEc Aggregate Rankings for Journals (<https://ideas.repec.org/top/top.journals.all.html>). Their search was not exhaustive of these journals, so it is possible that they omitted some articles that are relevant to the topic. Therefore their comments should be considered as a review of articles that were found, not an exhaustive review.

⁵ The Scholars' specifications lead them to exclude many articles that provide interesting insights, but are not explicitly grounded in economic theory or analysis nor in highly ranked economic journals.

⁶ *Ex ante* regulations prohibit conduct that may be harmful, in contrast to *ex post* regulations, which remedy harm when it occurs. All of the articles reviewed consider *ex ante* regulations, so hereafter the analysis omits specifying that the regulations considered are *ex ante*.

provider (ISP) service offerings, such as fast lanes and zero rating. In general, the economics research on net neutrality has found that the impacts of regulations depend on the conditions in the marketplace: Under various conditions the regulations can be harmful to consumers, harmful to network providers, harmful to content providers, or hinder investment; but there are also conditions under which opposite effects can occur. As Greenstein, Peitz and Valletti (2016)⁷ explain in their summary of the related economics literature, “There is little support for the bold and simplistic claims of the most vociferous supporters and detractors of net neutrality.”

The second economic question the Scholars address is whether the internet service providers are, as a matter of economic rationale, common carriers to be regulated as contemplated in Title II of the Communications Act.⁸ While this is often debated largely as a legal question, the legal provisions of Title II exist because of the economic natures⁹ of the services provided when the laws were adopted. Whether internet services provided by ISPs hold these same economic natures is an important economic question, although not the same as asking whether there might be other regulatory frameworks that might be appropriate for the current situation. They find that the economics literature does not support a conclusion that the economic natures of ISP services fit the economic conditions contemplated for the development of Title II.

The Scholars do not address the important question of rent seeking. Economists have long recognized that the creation of regulations are often motivated by firms seeking to limit the amount of competition that they face. It is an important question whether adopting Title II regulations for ISPs increases the likelihood of rent seeking, but the Economic Scholars found no relevant economics literature that met their criteria for inclusion here.

The Scholars organize their comments into sub-questions: (1) How regulations restricting ISPs from offering enhanced network features, such as fast lanes, to content providers might affect (a) total welfare,¹⁰ (b) network investment, and (c) the variety of content on the internet and content provider investment; (2) How prohibitions on network termination fees affect total welfare; (3) How prohibiting ISPs from blocking content affects total welfare;¹¹ and (4) What economic research says about the economic natures of internet services provided by ISPs. Following each question the Scholars summarize

⁷ This paper is a summary of the economics literature with respect to net neutrality, and offers basic analyses to address the core issues.

⁸ Title II was part of the original Communications Act of 1934, although it was modified in 1996 to accommodate Congress’s desire to transition telecommunications markets from traditional monopoly structures to competitive structures.

⁹ By “economic natures” we mean the roles of the services in the economy and the economic characteristics of the markets.

¹⁰ Total welfare is the sum of consumer surplus and producer surplus. Sometimes the surpluses are weighted, for example, by giving a certain amount of preference to consumers. Consumer surplus is the net value that consumers receive from consuming a product or products over and above what the consumers pay. Producer surplus is the revenue producers receive over and above their production costs.

¹¹ While there have been rare instances where ISPs have blocked content, platforms such as Google and Facebook appear to do this more often, especially when they are encouraged to do so such as when content is considered to promote violence.

the findings of various research papers. The first time that a paper is cited, they provide a footnote describing the salient market assumptions made by the authors in their models.

Analysis

Question 1a. Whether imposing regulations that prohibit ISPs from offering enhanced features, such as fast lanes, to content providers affects the overall economy, which economists often measure as total welfare?

The literature finds that the welfare effects of regulation depend on market conditions, such as whether ISPs are monopolies, how charges might be implemented, network engineering, the value that content provides to customers, and the types and variety of content provided on the internet. Most articles find that the regulations decrease welfare.

- a. Hermalin and Katz (2007)¹² find that such regulations can either increase or decrease total welfare, but are most likely to reduce it. More specifically, the restrictions lower total welfare when content providers who would prefer low-quality connections are excluded from the market because ISPs are not allowed to accommodate their needs or when content providers who would prefer high-quality service have to settle for lesser quality service.
- b. Choi and Kim (2010)¹³ find that the regulations lower welfare when content providers vary greatly in what they provide.
- c. Njoroge et al. (2014)¹⁴ find that if an ISP charges content providers that connect through another ISP,¹⁵ the regulations lower total welfare. They also find that regulations can increase welfare if content providers vary greatly in the types of content¹⁶ that they provide.¹⁷

¹² This is a theory paper in which a monopoly ISP - that does not provide its own content - provides network service to competing content providers and to consumers. In contrast to most other papers, this paper analyzes transmission differences as quality differences as opposed to explicit fast lanes or paid prioritization.

¹³ This is a theory paper that examines a situation where there is a monopoly ISP and two content providers that differ in the quality of their content. Only one content provider is allowed to purchase a fast lane.

¹⁴ This is a theory paper that examines a situation where there are two ISPs and neither provides its own content. There is a large number of competing content providers that vary in the quality of their individual services and that receive money only from advertising.

¹⁵ In Njoroge et al. (2014) a content provider might connect directly to one ISP and then reach consumers that are connected to a second ISP. The second ISP might charge the content providers for reaching its consumers.

¹⁶ In Njoroge et al. (2014) content providers can be very similar or very different from each other. The authors find that the amount of variation affects results.

¹⁷ The findings of Njoroge et al. (2014) regarding the effects of content differentiation differ from those of Choi and Kim (2010) in part because Choi and Kim assume that only one content provider can purchase the fast lane. Choi and Kim also assume a monopoly ISP and that the ISP offers fast lanes by offering paid prioritization. Njoroge et al. assume that the ISP offers separate fast and slow lanes.

- d. Most economic analyses assume that ISPs can vary the amount of bandwidth that they provide, which appears to align with actual ISP practice. In contrast, Economides and Hermalin (2012)¹⁸ examine the situation where bandwidth is fixed and find that the regulations improve total welfare¹⁹ in monopoly situations. They also state that welfare potentially increases when ISPs can vary bandwidth.
- e. Assuming that content providers may not necessarily benefit from advanced network features such as fast lanes, Economides and Tåg (2012)²⁰ find that the effects of regulations on total welfare²¹ depend on a variety of market conditions. In a related article, Caves (2012) uses the Economides and Tåg model and finds that regulation decreases total welfare under the most common market conditions.²² Economides and Tåg also find that consumers are always worse off with regulations.
- f. Bourreau, Kourandi, and Valletti (2015)²³ find that the regulations lower welfare.
- g. Choi, Jeon and Kim (2015)²⁴ find that the effects of the regulations on welfare are sensitive to the degree to which content providers receive revenue from advertising or payments from consumers for accessing content.
- h. Reggiani and Valletti (2016)²⁵ find that the regulations lower welfare if they lower content innovation, which they define as the amount of content provided.²⁶

¹⁸ This is a theory paper in which there is a single ISP whose total bandwidth is fixed, the ISP does not provide its own content, and there is a large number of content providers, but they do not compete.

¹⁹ It appears that Economides and Hermalin (2012) consider only consumers' surplus and content providers' profits in their welfare calculations, omitting ISP profits.

²⁰ This is a theory paper that considers both monopoly ISP and duopoly ISP situations. There are many content providers that obtain revenue from advertising and that differ in their costs of setting up their services. This model is unique in that it assumes that content providers do not benefit from services such as fast lanes. The model omits considering how ISPs might alter their investment and requires that all consumers purchase ISP service.

²¹ It appears that Economides and Tåg (2012) consider only the value of content in their welfare calculations.

²² Caves (2012) employs an empirical model to show for the restrictions studied in Economides and Tåg (2012) to improve welfare, "the ratio of aggregate content provider profits to aggregate platform operator profits must be strictly less than 0.4", which does not appear to hold in practice.

²³ This is a theory paper in which there are two competing ISPs. Content providers vary in their preferences for fast lanes.

²⁴ This is a theory paper in which content providers are heterogeneous in the value of their content and vary in how much they value fast lanes. Content providers receive revenue from advertising and may charge customers for accessing content. The paper finds that it makes no difference whether there is one ISP or two as long as the ISPs determine interconnection charges and subscribers pay a single subscription price.

²⁵ This is a theory paper in which there is a single ISP and multiple content providers. There is only one large content provider, which is defined as one that sells multiple applications. All other content providers are small and provide only a single application. An important feature of this paper is that the ISP charges a fixed price for prioritization and that prioritization is not a substitute for any other input that a content provider might use. These mean that buying prioritization is more profitable for the large content provider than for the small content providers. Therefore the effects of fast lanes are driven by the response of the large content provider.

- i. Greenstein, Peitz and Valletti (2016) explain that in general restrictions on ISPs charging content providers (that depend on advertising for revenue) for access to consumers may increase or decrease total welfare, but the restrictions do result in higher consumer prices for ISP services.
- j. Greenstein, Peitz and Valletti (2016) also explain that if content providers charge customers for services, such as in the cases of Netflix and Amazon Prime, then the regulations decrease market efficiency if ISPs are able to charge different service fees to lower-value content providers than to higher-value content providers. The regulations can increase efficiency if ISPs are unable to discriminate between content providers.
- k. Greenstein, Peitz and Valletti (2016) find that recent theoretical contributions generally support the idea that net neutrality regulation on competing platforms is welfare decreasing, but state that this is an under-researched area.

Question 1b. Whether imposing regulations that prohibit ISPs from offering enhanced features, such as fast lanes, to content providers affects ISP network investment?

The literature gives mixed results because the investment incentive is sensitive to how content providers and consumers respond to prices and to how consumers value content.

- a. Choi and Kim (2010) find that ISPs' incentives to invest depend on the value that customers place on network services relative to the value that some content providers might place on faster delivery speeds. In their work the effects of the business restrictions on network investment is ambiguous.
- b. Economides and Hermalin (2012) find that the regulations decrease ISP investment in situations where ISPs dedicate capacity to content providers (by, for example, guaranteeing speeds) rather than prioritizing traffic.
- c. Njoroge et al. (2014) find that ISPs invest less in their networks with these regulations than without them.
- d. Bourreau, Kourandi, and Valletti (2015) find that the regulations lower broadband investment.
- e. Reggiani and Valletti (2016) find that the regulations lower network investment if fast lanes stimulate content provision by a large content provider enough to overcome any decline in the number of small content providers.

²⁶ Reggiani and Valletti (2016) define innovation as an increase in the amount of content. Therefore they consider innovation by the large content provider to be an increase in the content it provides, and innovation by the small, fringe content providers as the number of providers that are profitable.

Question 1c. Whether imposing regulations that prohibit ISPs from offering enhanced features, such as fast lanes, to content providers affects the variety of content offered and investment by content providers?

Again, the literature gives mixed results. Most articles find that some content providers value the features that could be offered and so regulations lower content value.

- a. Hermalin and Katz (2007) find that the regulations reduce the number and variety of content providers by eliminating content providers that would prefer a slower service.
- b. The regulations induce content providers “in the middle” of the market with respect to their interest in purchasing higher speeds to utilize higher than they would otherwise, which is more economically efficient in the cases of these content providers (Hermalin and Katz, 2007).
- c. The regulations force content providers that prefer higher speeds to utilize lower speeds. This lowers these content providers’ efficiency (Hermalin and Katz, 2007).
- d. Bourreau, Kourandi, and Valletti (2015) find that the regulations lower content innovations.
- e. Reggiani and Valletti (2016) find that the regulations lower the amount of content provided by a large content provider if its advertising fees are low relative to its content production costs and high relative to the smaller content providers’ production costs.
- f. Greenstein, Peitz and Valletti (2016) describe how an ISP might price the enhanced service in such a way as to exclude some lower-end content providers if lower-end and higher-end content providers would both pay for terminating their content.
- g. Peitz and Schuett (2016)²⁷ find that the regulations cause content providers to underinvest in technology that could efficiently manage the amount of traffic they put on the network. As a result, strict net neutrality restrictions often lead to socially inefficient allocation of traffic and traffic inflation.²⁸ Weaker net neutrality regulations – ones that would allow some differences in traffic treatment by ISPs – do not necessarily improve the situation.

²⁷ This is a theory paper in which a monopoly ISP serves two types of content providers: Some content providers offer content whose quality suffers if delivery is delayed, while others offer content whose quality is not sensitive to delay. This paper is different from most others in that the authors assume that content providers can make investments to improve their traffic management. The ISP offers paid prioritization if allowed.

²⁸ The authors examine a situation where content providers can invest in technologies that lower the amount of traffic that is needed to deliver their content. “Traffic inflation” means that the content providers underinvest in such technologies.

Question 2. Whether imposing regulations that prohibit ISPs from charging content providers for terminating traffic affects total welfare?

This question has received little attention in the literature. The work that has occurred finds that the effect depends upon how ISPs charge consumers and the value that customers obtain from content.

- a. Musacchio et al. (2009)²⁹ find that the regulations lower total welfare in situations where consumers' price sensitivity to prices for clicks is low or high (as opposed to nearly the same) relative to content providers' charges for advertising.³⁰
- b. Musacchio et al. (2009) also find that the regulations can improve total welfare in situations where consumers' price sensitivity is nearly the same as content providers' charges for advertising.
- c. Njoroge et al. (2014) find that if an ISP charges content providers that connect through another ISP, the regulations lower total welfare.
- d. Greenstein, Peitz and Valletti (2016) find that restricting ISPs from charging termination fees reduces total welfare.

Question 3. Whether imposing regulations that prohibit ISPs from blocking content affects total welfare?

Few economists have investigated this issue. In general they find that blocking content providers that customers want to access decreases welfare.

- a. The prohibitions on blocking improve total welfare in the Economides and Hermalin (2012) analysis. Greenstein, Peitz and Valletti (2016) confirm this result.
- b. Broos and Gautier (2017)³¹ find that ISPs have incentives to exclude content providers that compete with the ISPs' own services, such as a voice-over-internet (VoIP) service competing with an ISP's telephone voice service.³² A monopoly ISP may want to exclude a competing internet app if the app is of inferior quality relative to the ISP's own service and if the ISP cannot ask for a surcharge for its use, but doing so is not always profitable. In both the monopoly and duopoly

²⁹ This is a theory paper in which there are multiple ISPs of equal size, but each is a monopoly for its customer base. There are multiple content providers.

³⁰ Musacchio et al.'s model is analytically complex. Essentially they show that, in their model, when the price that consumers pay is approximately equal to the advertising price times the consumers' price elasticity of demand, then regulations can improve total welfare. When consumer prices deviate either direction from this rough equality, the regulations lower total welfare.

³¹ This is a theory paper in which there are up to two ISPs that compete for customers, the ISPs offer traditional phone service and internet service, and the phone service competes with an app that offers VoIP.

³² For example a telephone company in the U.S. blocked its internet customers from reaching a VoIP service.

situations, prohibiting the exclusion of the app and surcharges for its use may or may not improve welfare.

Question 4. Whether ISP internet services have essentially the same economic natures as services for which Title II was written?

The economic conditions for which Title II was written were situations where a service was critical for a community's economic well being and unregulated service providers had both a strong incentive and the ability to engage in discriminatory activities that caused economic harm.

- a. Institutional economists in the early 1900s identified the economic logic for Title II regulations.³³ One of the leading authors of the era, Martin Glaeser (1927), explained that the form of regulation provided in Title II – i.e., regulation designed for public utilities – is meant for firms that are peculiar in their relationship to their customers in that they have a significant impact on the public welfare such that undue discrimination can be particularly damaging.³⁴ Trebing (2001) explained that this implied two fundamental tests: (1) the degree to which the service could be construed as a necessity, and (2) the potential for exploitation or extortion.³⁵
- b. The economic importance of internet services to public welfare (the first test) has been demonstrated in the economics literature with little disagreement.³⁶
- c. Regarding the second test, namely that the service providers have the potential to exploit or extort, Greenstein, Peitz and Valletti (2016) explain that the economics literature gives mixed answers. Some articles demonstrate that the regulations may prevent exploitation while other articles find otherwise.³⁷ Brennan (2017) explains that the incentives for ISPs to exploit or extort appear to be small in

³³ Title II was part of a broader regulatory thrust that included railroads and public utilities, such as power companies. Much of the economic literature regarding the development of regulation was not specific to telephony. Overviews of the thinking of institutional economists at the time can be found in Glaeser (1927), Bonbright (1988), and Trebing (2001).

³⁴ Glaeser (1927) also explained that such regulated firms were granted privileges in order to provide a public service. Whether such privileges and corresponding obligations should be granted to ISPs is one of the questions before the FCC.

³⁵ Also summarizing the work of earlier economists, Bonbright et al. (1988) explained that firms fitting the public utility concept, which underlies Title II regulation, should be natural monopolies. This monopoly status is generally necessary for a firm to meet the second test, namely the potential for exploitation or extortion, since absent such market power customers can protect themselves by pursuing competitive options. Hazlett and Weisman (2011) find that ISPs in general lack market power, which would imply that they are rarely monopolies if ever. Greenstein, Peitz and Valletti (2016) explain that the extent to which monopoly status, or even market power, is necessary for exploitation to occur in internet markets is under researched.

³⁶ See, for example, Mayo and Wallsten (2011) and Greenstein and McDevitt (2011). In the case of Greenstein and McDevitt (2011) we deviate from our practice of citing only prominent economics journals because of the reputations of the authors.

³⁷ For example, Bourreau, Kourandi, and Valletti (2015) find that ISPs have an incentive to sabotage content providers that prefer slow lanes.

practice since there have been no more than four isolated instances of ISP conduct that could be considered as violating the regulations adopted by the FCC in its 2015 Open Internet Order.³⁸

Conclusion

In these comments, the Scholars examine the findings of economic research regarding the issues surrounding net neutrality and regulation of the internet under Title II of the Communications Act. Their purpose was to elucidate what has been demonstrated in the economics literature rather than to advocate particular decisions that they believe the FCC should make. Indeed as a group they have not discussed their opinions on FCC policy.

The economics research on net neutrality has found that the impacts of regulations depend on the conditions in the marketplace. Under various conditions, the regulations can be harmful to consumers, harmful to network providers, harmful to content providers, or hinder investment. But there are also conditions under which opposite effects can occur. Most of the articles that were found conclude that regulatory restrictions on what enhanced services ISPs may offer to content providers can lower economic efficiency, but the articles are not unanimous in this conclusion.

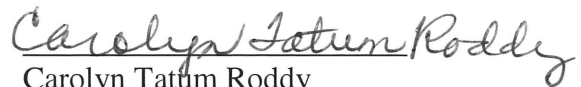
Regarding total welfare, the literature finds that the welfare effects of regulation depend on market conditions, such as whether ISPs are monopolies, how charges might be implemented, network engineering, and the types and variety of content provided on the internet. Most articles find that the regulations decrease welfare. The literature gives mixed results regarding the effects of regulation on investment because the investment incentive is sensitive to how content providers and consumers respond to prices and to how consumers value content. The literature also gives mixed results regarding the effects of strict net neutrality regulations on content markets because content providers vary in their preferences for advanced network features, such as fast lanes. Regarding the blocking of content that customers want to access, the research was nearly unanimous in finding that restrictions on such blocking benefited customers.

The economic conditions for which Title II was written were situations where the service was critical for a community's economic well being and the unregulated service providers had a strong incentive and the ability to engage in discriminatory activities that

³⁸ Brennan (2017) also explains that forms of regulation that have a lighter touch than Title II appeared adequate to address the concerns of those particular instances.

caused substantial economic harm. These conditions do not appear to fit today's internet markets.

Respectfully submitted this 15th day of July, 2017.

A handwritten signature in cursive script that reads "Carolyn Tatum Roddy".

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