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I. INTRODUCTION

There have been a number of calls for the government to regulate internet businesses. The most prominent of these involves "net neutrality" regulation of pricing by Internet Service Providers (ISPs). In a short space of time the net neutrality debate has resulted in a voluminous and heated literature.[2] More recently there has been demand for "search neutrality" regulation of the results displayed by search engines.[3]

This paper makes several largely unrelated observations that policymakers could find helpful in considering the need for regulation and entertaining some of the proposals that have been offered. It presents a skeptical view that we know enough to be sure that there are market failures that should be corrected or that policymakers could know enough about the present and future of the internet economy to devise regulations that would improve social welfare.

II. IT IS THE BEGINNING OF INTERNET HISTORY

Traditional industries follow well-known lifecycles. There is a drastic innovation. That is followed by the entry of large number of firms that develop products related to that innovation. There is a shakeout over time as inefficient firms, or ones that have not found the right niche, fail. The industry eventually reaches a period of stability.[4] Later, a new drastic innovation will

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[2] There are a number of good survey papers on this topic including a survey of the economic literature by Florian Schuett, *Network Neutrality: A Survey of the Economic Literature*, 9(2) REV. OF NETWORK ECON., Art. 1 (2010), a survey of the economic case concerning intervention by Martin Cave, *Competition and Consumer Protection Issues in the Net Neutrality Debate,* Directorate for Financial and Enterprise Affairs Competition Committee's Meeting on Jun. 27, 2011 (ref. DAF/COMP/WP2 (2011) 4), and a summary of the case for net neutrality by Robin S. Lee & Tim Wu, *Subsidizing Creativity through Network Design: Zero-Pricing and Net Neutrality,* 23(3) J. ECON. PERSP., 61, 76 (2009). These surveys are helpful given the vast amount of articles than have been written on this topic since Wu coined the term and advanced the case for net neutrality in a 2003 law review article (Tim Wu, *Network Neutrality, Broadband Discrimination,* 2 J. TELECOMM. & HIGH TECH. L., 141, 180 (2003)). A Google Scholar search of articles, published from 2003 to the present, which includes the exact phrase "net neutrality" returns 2,673 listings. Net neutrality goes by other names, so a more expansive search would have revealed more. At this point, a number of prominent economists and law professors have written on the topic.

[3] For recent debates on "search neutrality" regulation, *see* Barbara van Schewick, *Towards an Economic Framework for Network Neutrality Regulation*, 5 J. TELECOMM. & HIGH TECH. L. 329, 333 (2007); Frank Pasquale, *Internet Nondiscrimination Principles: Commercial Ethics for Carries and Search Engines*, U. CHI. L. FORUM 263, 298 (2008); Mark R. Patterson, *Non-Network Barriers to Network Neutrality*, 78 FORDHAM L. REV. 2843 (2010); Andrew Odlyzko, *Network Neutrality, Search Neutrality, and the Never-ending Conflict Between Efficiency and Fairness in Markets*, 8 REV. NETWORK ECON. 40 (2009); Frank Pasquale, *Asterisk Revisited: Debating a Right of Reply on Search Results*, 3 J. BUS. & TECH. L. 61 (2008); Frank Pasquale, *Rankings, Reductionism, and Responsibility*, 54 CLEV. ST. L. REV. 115 (2006).

[4] *See* Michael Gort & Steven Klepper, *Time Paths in the Diffusion of Product Innovations,* 92(367) ECON. J. 630, 653 (1982); Boyan Jovanovic, *Michael Gort's Contribution to Economics,* 1(2) REV. ECON DYN. 327, 337 (1998).

disrupt that industry and its products, and many of the firms in it will disappear as Schumpeter noted when he coined the term "creative destruction."[5]

Of course the internet isn't an industry but rather a facilitating technology, together with the web, that, in turn, has lead to the birth of a number of industries. In this way the internet is similar to the invention of electricity. It took 50 years for the electric revolution to become largely diffused throughout the economy.[6]

At least since Cusumano & Yoffee coined the term "Internet Time" there has been a sense that businesses develop much more quickly on the internet than they did before.[7] Everything has gotten faster as is evidenced by the remarkable rise of Facebook. While that is perhaps true for individual businesses, it is not at all clear that a 22nd century historian will find that the diffusion path for the internet will have been that much faster than electricity or other major innovations. It seems doubtful that, looking back, our future historian will be focused on changes that took place over months or years.

There are several specific reasons to doubt that the internet-based economy is close to equilibrium, or that we even have a very good idea of what that equilibrium might look like.

First, following the electricity analogy, only a fraction of what could be connected to the internet is, in fact, connected. Most personal computers in developed countries are connected to the internet. But personal computers are only a portion of the devices that would benefit from an internet connection. There is a rapid growth in the use of mobile phones that have reliable internet connections but they still constitute a fraction of mobile phones globally.[8] Internet-connected televisions are beginning to increase but it is still early days. There are many other devices beyond these that would benefit from an internet connection. For example, there are hundreds of millions of point-of-sale devices for payments in physical locations. These devices take credit and debit cards at merchants around the world.[9] Although some entrepreneurs are now introducing internet-connected payment terminals at the point of sale (e.g. Square) the process of having the internet revolutionize the point of sale is in its infancy. Most likely, there are many other devices that have embedded local software that could be connected to the internet. Once they are connected it is likely that that they will rely on cloud-based software that will open up new possibilities for how people and businesses will use those devices. It would seem that we are many years away from the sort of diffusion of internet-connectivity, and the cloud-based software solutions it opens up, that we currently have for electricity.

Second, relatively recent innovations will take many years to fully play themselves out. It is possible that Facebook will evolve into a massive communications, e-commerce, and applications platform. It has a large base of heavily engaged users (750 million active users) and is

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[5] JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY, 81 (3rd Ed.)(2006).

[6] DAVID S. LANDES, THE UNBOUND PROMETHEUS: TECHNOLOGICAL CHANGE AND INDUSTRIAL DEVELOPMENT IN WESTERN EUROPE FROM 1750 TO THE PRESENT (2003).

[7] MICHAEL A. CUSUMANO & DAVID B. YOFFEE, COMPETING ON INTERNET TIME: LESSONS FROM NETSCAPE AND ITS BATTLE WITH MICROSOFT (1998).

[8] As of April 2011, 234 million Americans ages 13 and older used mobile devices and 74.6 million of them owned smartphones, which means a 31.9 percent market share for smartphones in U.S. market, comScore April 2011 U.S. Mobile Subscriber Market Share Reports.

[9] In the United States alone there are more than 6 million merchant locations that accept payment cards and many of these have multiple points of sale devices.

still growing rapidly. Importantly, it also has an open software platform that enables the development of a multitude of applications (with more than 500,000 applications). Some of these applications such as games have already led to the development of large companies (e.g. Zynga) and industries (e.g. social gaming). It could take decades for many of the possible uses of Facebook to emerge and reach maturity. The same phenomenon is at play with the emergence of mobile phone software platforms, such as the iPhone OS and Android, which support the development of applications. New industries could develop from these applications and, again, it could take many years for innovation to take place and for the resulting industries to mature.

Third, these internet-related innovations are unlikely to be the last. Seven years ago the web seemed like it had matured. Facebook and the iPhone didn't exist and it wasn't even clear how successful Google would be. It was only after the fact that we recognized that 2004 marked the beginning of Web 2.0 and a massive wave of new innovation. Future innovations could also lead to the introduction of new industries that will go through the lifecycle of entry, shakeout, and stability described above. Eventually, if the internet follows other drastic innovations, the internet-based innovation will have diffused itself through the economy and things will settle down. It would seem plausible though that our 22nd century historian will date this point of maturity at many decades into the 21st century.

The fact that we are still at the beginning of the evolution of the internet-based economy point would suggest great caution in imposing long-lived rules based on an infant ecosystem. Of course, one could argue that rules could have extraordinary value by preventing the suboptimal evolution of the web-based economy. But one would have to have a lot of confidence that the rules move us closer to the optimal path than create significant distortions.

III. THERE ARE NO WHITE KNIGHTS

There is a lot of money to be made in the explosively growing web economy. Naturally, when there are fortunes to be made, firms have great incentives to make sure the rules of the game are helpful for developing and securing profitable businesses. The long tail of the web has received great notoriety. There are thousands of blogs and small websites that provide valuable content. However, the internet has made it possible to develop massive global businesses very quickly as a result of network effects, the development of business models that transcend national boundaries, and scale economies from key assets ranging from software platforms to server farms.

It is useful to provide some perspective on some of the major players in the internet-economy today. Data from DoubleClick AdPlanner for April 2011 show that the largest 25 of the top 1000 properties accounted for 80 percent of total page views globally; these statistics do not include Google search pages and therefore would show an even higher level of concentration with those included. These properties do very different things. The shares within particular categories would be even higher. There is nothing wrong with this and these shares do not indicate any competition problem by themselves. The point is that these firms are not without bargaining power.

Table 1 reports the market caps of some of the leading web properties along with some of the more prominent ISPs and mobile operators. These relative market caps certainly do not prove that either the large ISPs or the large content providers have the upper hand but they do suggest that one needs to be careful about thinking about, for example, the net neutrality debate as the David vs. Goliath story that is sometimes portrayed.

Table 1: Market Capitalization of Leading Web Properties, ISPs and Mobile Operators

Company	Market Cap ($ Billions)
Apple	299.7
Microsoft	208.8
AT&T	184.2
Google	158.9
Vodafone	137.3
Verizon	100.8
Facebook	100.0*
Amazon	87.8
Deutsche Telekom	65.9
eBay	38.7
Yahoo!	20.0

Source: Google Finance with the exception of *Facebook which is based on various press reports of its likely valuation.

These statistics show that ISPs are not alone in this ecosystem in being significant businesses that control access to a significant number of consumers and, further, they suggest caution in adopting net neutrality policies for the purpose of controlling ISP market power. Further consideration needs to be given to the relative bargaining power of the large players—especially given that ISPs tend to be domestic and some of the large web-content providers are global—and the extent to which the long tail is really at risk. Likewise, when it comes to the search neutrality debate, it is naïve to think that Google has the control that is sometimes ascribed to it, especially given the movement of eyeballs and activity to Facebook and the emergence of a strong number two as a result of Microsoft's search deal with Yahoo.

Policymakers should be very careful about siding with supposed Davids against purported Goliaths and should be watchful about downtrodden firms serving as stalking horses for Goliaths.

IV. DOUBLE MARKUPS DRIVE BUSINESS AND POLICY STRATEGY

The web-economy has evolved into a highly connected ecosystem in which many firms provide complementary products to each other but in which these complementary products could easily evolve into substitutes. This has important implications for how firms approach both their business strategies and their lobbying.

Many firms, each of which has market power, provide products or services that are complements. That is obviously the case with the large content providers and the ISPs but is

pervasive throughout this ecosystem. We have known since Cournot's famous 1838 book that this presents both a problem and an opportunity for the businesses involved.[10]

When each of these firms sets its profit-maximizing price, it ignores the fact that a higher price reduces the sales and profits of complementary firms. Each firm with significant market power imposes negative externalities on providers of complementary products and services. That's the problem. Each firm would like to preserve its own market power but eliminate the negative externalities by forcing its complements to be (or act) more competitively. A firm can make the complementary segment more competitive through entry, contracts, and regulation or, of course, it can internalize the externality through merger.

Even though one firm preserves its market power, this sort of behavior results in lower prices, greater output, and increased social welfare. Of course, the complexity in practice is that every firm wants to end up being the firm that lords it over a competitive field of complementary products. This may explain many business developments in the web-based economy starting with Microsoft's heavy investment in Internet Explorer in the late 1990s to Google's investment in the Android operating system in the late 2000s. This conflict among firms is exacerbated by the concern—sometimes reaching paranoia—that complements can become substitutes. That was at the heart of Microsoft's concern over technologies from Internet Explorer to mobile phones to video game consoles.

Regulation could be used to eliminate the double-markup problem in principle by making a sector "be competitive." There are a couple of concerns though. One, given the number of complementary firms with market power, is whether policymakers are likely to do a better job than the market in minimizing the double-markup problem while being sensitive to the fact that some categories are naturally going to be dominated by large firms as a result of network effects and scale economies. A related issue is whether regulation is a good tool for solving the problem. The second concern is whether the lobbying and political processes are likely to lead to the right result. There are multiple double-markup problems that could be addressed, each resulting in different winners and losers. It is hard to believe the socially optimal and politically likely results will often be coincident.

V. THE WILD WEST WASN'T SUCH A GREAT PLACE TO LIVE

Lawrence Lessig and others have focused on how the highly decentralized free-for-all nature of the web has resulted in innovation. The flip side of having an open space with minimal rules is that participants can impose negative externalities on each other with abandon. The seedy side of the web consists of vast amounts of pornography, tricks to lure people to sites they wouldn't go to on their own, and virus-infected websites. It is much like those who romanticize the American Wild West. Cowboys lived a brutal and dangerous life, and there weren't many girls to marry available. If that's really the world most people wanted, one could advocate laissez-faire. But sometimes laws and social norms are not so bad.

It is becoming apparent that people who use the web have a strong preference for rules. We know that because hundreds of millions of people have voted with both their clicks and their time for largely walled gardens that provide a measure of safety and predictability. Facebook is by far the largest example. It is almost a continent unto itself on the web where people live in

[10] AUGUSTIN COURNOT, RESEARCHES INTO THE MATHEMATICAL PRINCIPLES OF THE THEORY OF WEALTH (1838).

villages of friends and where there are strict rules for how an individual can be reached and what content can be presented. Emerging examples include the mobile-device software in platform-based ecosystems such as that created by Apple. There are rules for what applications can be presented to users. Innovators are also moving to these properties, which provide code made available through APIs and software developer kits for applications; access to aggregations of consumers; and sometimes organized marketplaces for selling applications. A recent headline in *Wired Magazine* in the United States pronounced "The Web Is Dead," which meant that businesses are creating walled gardens to which people and entrepreneurs are flocking.[11]

The law of revealed preference therefore suggests that the desire for rules on the web is no different than the desire for rules in society generally. The debate over regulatory policy for the web-based economy needs to move beyond the nostalgia-based arguments seen in, for example, the articles by Lee & Wu and Wu.[12]

VI. INSIGHTS FROM THEORY OF TWO-SIDED MARKETS

Some of the work on optimal regulatory policy towards ISP pricing has tried to use the theory of two-sided markets.[13] This work is subject to the criticism that economic theory can prove an infinite number of propositions given that it can make an infinite number of assumptions. It is likely that the search neutrality debate will also result in papers arguing for intervention (or against it) based on two-sided market theory.

Nevertheless, the theory of two-sided markets does provide important insights, which are largely robust to assumptions, including the following:

The relative pricing to the two sides of the market is highly dependent on underlying demand conditions including the relative elasticities of demand, the strength of the indirect network effects between the two sides, the price structure that is needed to ignite a new platform by achieving critical mass, and the ability to deviate from that price structure over time.[14]

The relative pricing on the two-sides can and, sometimes, does change depending on the evolution of the market. Magazines were primarily subscription supported in the 19th century United States and became primarily ad-supported in the 20th century. The pricing structure flipped. Some online media, particularly newspapers, are moving from an ad-supported model to a subscription-supported model; it is too soon to know how this will work out. But, in any event, there is no reason to believe that pricing structures are invariant to market developments.

Multi-sided platform businesses may not choose the socially optimal price structures (and, therefore, may not have socially optimal prices even putting aside the exercise of market

[11] Chris Anderson & Michael Wolff, *The Web is Dead. Long Life the Internet,* WIRED (Aug. 17, 2010, 9:00 AM), http://www.wired.com/magazine/2010/08/ff_webrip/all/1.

[12] Robin S. Lee & Tim Wu, *Subsidizing Creativity through Network Design: Zero-Pricing and Net Neutrality,* 23(3) J. ECON. PERSP.., 61, 76 (2009). Tim Wu, *Network Neutrality, Broadband Discrimination,* 2 J. TELECOMM & HIGH TECH. L., 141, 180 (2003).

[13] Florian Schuett, *Network Neutrality: A Survey of the Economic Literature,* 9(2) REV. NTWK. ECON. Art. 1 (2010).

[14] Jean-Charles Rochet & Jean Tirole, *Platform Competition in Two-Sided Markets*, 1(4), J. EUR. ECON. ASS'N, 990, 1029 (2003); Jean-Charles Rochet & Jean Tirole, *Two-Sided Markets: A Progress Report,* 37(3) RAND., 645, 667 (2006); Mark Armstrong, *Competition in Two-sided Markets,* 37(3) RAND., 668, 691 (2006), David S. Evans & Richard Schmalensee, *Failure to Launch: Critical Mass in Platform Businesses*, 9(4) REV. NTWK. ECON. Art. 1 (2010).

power).[15] However, precisely figuring out the optimal price is intensely fact-specific and there are no simple rules (e.g. marginal cost pricing) to guide policymakers.[16] Therefore, while papers such as those by Lee & Wu and Economides & Tag try to appeal to the two-sided literature to derive optimal policies it is highly unlikely that it will ever be possible to say more than "it depends" on a number of facts, most of which are largely unknowable with the level of precision that would be needed to provide an answer.[17]

Regulating price structures involves shifting costs between different sides of the platform— not in controlling market power. Regulating mobile termination fees results in phone subscribers paying higher prices[18] while regulating credit card interchange fees results in consumers paying higher prices.[19] When one or more sides consists of business customers, regulation of the price structure results in changes in business profits with those changes dependent on the extent to which price changes get passed through to consumers. The implication of this is that there are incentives to pursue regulation of price structures through lobbying efforts, because doing so can result in an increase in profits by shifting costs onto the other side of the platform.

VII. CONCLUDING OBSERVATIONS

The advocates of net neutrality have raised various problems that could arise as a result of the exercise of market power by ISPs, especially those that provide the last mile of service. The key policy question is whether those problems should be addressed through regulations that impose *ex-ante* prohibitions on certain practices, or by competition policy which imposes penalties and enjoins certain practices *ex post* based on an evaluation of whether those practices violate the antitrust laws. That choice should be informed by an understanding of the nature of the internet-based business ecosystem, what the relationships among the various players including the ISPs and content providers look like currently, and how this ecosystem will evolve over time. Similar issues will arise in the developing debate over search neutrality.

The regulatory and antitrust approaches each have advantages and disadvantages. Regulation can provide certainty of rules while antitrust can provide flexibility. Antitrust can act too slowly and allow irreversible market distortions to take place while regulation can deter innovation through rigid rules and have unforeseen and hard-to-predict consequences. Several factors would seem to make regulation less preferred than antitrust to deal with practices that could ultimately harm consumers and economic efficiency. Since we don't really know what we would be regulating, there is little economic guidance on what the right regulations would be,

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[15] *See* Mark Armstrong, *Competition in Two-sided Markets,* 37(3) RAND, 668, 691 (2006), and Özlem Bedre-Defolie & Emilio Calvano, *Pricing Payment Cards,* ESMT Research Working Papers ESMT-10-005 (2010).

[16] *See* Emilio Calvano, *Note on the Economic Theory of Interchange, Economic Theory of Interchange Fees*, (Feb. 22, 2011), http://www.federalreserve.gov/SECRS/2011/March/20110308/R-1404/R-1404_030811_69122_621890579792_1.pdf, and Emilio Calvano, Presentation at the Brussels Monnet conference, http://webcast.streamdis.eu/mediasite/SilverlightPlayer/Default.aspx?peid=8ed507c5df2d4cfd8a6fc16cb4a04f011d for a discussion in the context of payment card pricing structures.

[17] *See* Robin S. Lee & Tim Wu, *Subsidizing Creativity through Network Design: Zero-Pricing and Net Neutrality,* 23(3) J. ECON. PERSP., 61, 76 (2009), and Nicholas Economides & Joacim Tåg, *Net Neutrality on the Internet: A Two-Sided Market Analysis,* Net Institute Working Paper 07-14 (2009).

[18] Roman Inderst & Tommaso M. Valletti, *Buyer Power and the 'Waterbed Effect',* 59(1) J. INDUS. ECON., 1, 20 (2011).

[19] Howard Chang, David S. Evans, & Daniel D. Garcia-Swartz, *An Assessment of The Reserve Bank of Australia's Interchange Fee Regulation,* 4(4) REV. NTWK. ECON. Art. 5 (2005).

and there is a real risk that we would be selecting proposals that are designed to capture rents rather than improve social welfare. Of course these same considerations also suggest that antitrust policymakers should be cautious too.

These observations also apply to other conflicts among providers of complements and complements-that-could-become substitutes in the internet-based economy. The long-standing net neutrality debate and the beginning one over search neutrality are just two manifestations of these conflicts.