

Finding the Bottom:

A Review of Free Press's Analysis of Network Neutrality and Investment

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October 29, 2009

Introduction

In a recent and brief analysis, *Finding the Bottom Line: The Truth about Network Neutrality & Investment*, ardent network neutrality advocate Free Press attempts to provide evidence on the relationship between ISP investment and network neutrality regulation.¹ The report concludes that since AT&T's total capital expenditure levels did not decline after accepting certain voluntary "neutral network" and "neutral routing" commitments upon merging with Bellsouth in 2006,² network neutrality regulations of all forms do not decrease investment by ISPs and, in fact, increase investments.³

As I demonstrate below, Free Press's conclusions cannot credibly be supported by their evidence because their analysis of the data is flimsy and self-serving.⁴ Indeed, the organization effectively rebuts itself in its own report, and has repeatedly demonstrated a lack of competence in empirical analysis.⁵ In this latest report, Free Press conducts not a single statistical test of its hypotheses, yet does not shy away from strong conclusion on causality. While the effects of network neutrality regulations on the development of the Internet are worthy of careful consideration, Free Press's latest report is not helpful in that regard and is nothing more than net neutrality propaganda.

Evaluating the Free Press Analysis

In the modern broadband policy debate, many are calling for a more "data intensive" analysis of policies. But, data is not information, and it is information that guides policy. To be relevant, data must be converted to information using valid conceptual frameworks and legitimate empirical methodologies. It is important, then, to consider whether or not the conversion of data to information is based on legitimate theoretical and empirical methods. The Free Press study fails on both counts.

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Free Press's report attempts to establish a causal link (or refute such a link) between network neutrality regulation and ISP investments. As for the theoretical argument, the report holds that "investment decisions are driven primarily

by six factors: expectations about demand; supply costs; competition; interest rates; corporate taxes; and general economic confidence (at 2).” Presumably, given the stated purpose of the paper, regulation is a seventh element on this list.

The theory of the report holds that network neutrality regulation was imposed on AT&T as a condition of its merger with Bellsouth, which was approved by the FCC in December of 2006. Their proposed empirical test is a simple comparison of AT&T’s aggregate investment levels before and after the merger. Any change in aggregate investment, according to Free Press, is directly and solely attributed to the network neutrality merger condition. (The use of “empirical test” is perhaps too strong, since Free Press does not employ statistical hypothesis testing.)

The near full extent of Free Press’s evidence is provided in Table 1, which summarizes gross capital expenditures as a percentage of revenue for AT&T.⁶ As shown in the table, investment levels are slightly higher for AT&T after the merger (years 2007, 2008). Since investment levels are higher after the merger, Free Press concludes network neutrality regulation increases investment.

Year	AT&T/Bellsouth
2005	14.4%
2006	14.8%
2007	15.0%
2008	16.4%

The shortcomings of this approach are immediately apparent. As an initial matter, AT&T’s change in investment after 2006 is not particularly impressive, barely budging in 2007. Even Free Press acknowledges that many ISPs increased investment much more than AT&T between the two periods, yet none of those firms were subject to the same merger condition (see Free Press at Tables 2 and 3).⁷ Qwest Communications, for example, increased its capex-to-revenue ratio by the same levels as

AT&T, yet faced no merger condition on network neutrality.⁸

However, the most apparent and severe defect with the Free Press study is their attribution of all change in investment-to-revenue ratio to a single voluntary merger commitment on network neutrality, particularly since their report claims that there are seven factors (including regulation) that determine a firm’s choice of capital expenditures. The inconsistency between their own “theory” and the “empirics” is plain to see and demonstrates a lack of expertise in the implementation of empirical research.

To demonstrate the defect clearly and simply, consider an example. Say there is a firm that makes capital investments based on only two factors: the presence of regulation (*R*) and general market conditions (*Z*). (Let the *Z* be a portmanteau holding the six factors listed in the report.) For simplicity, say the firm’s investment calculation is as follows:

$$I = 90 + Z - 5R \tag{1}$$

where regulation is either present or absent $R = (0, 1)$. Equation (1) says the firm will (a) invest at least \$90; (b) invest \$1 for every one unit of *Z*; and (c) reduce investment by \$5 if regulated.⁹ At the status quo, let $Z = 10$ and $R = 0$. From Equation (1), we see the firm will invest \$100 [= 90 + 10 - 5·0].

In the next period, regulation is imposed ($R = 1$); but *Z* also rises to 20. Now, the aggregate investment level is \$105 [= 90 + 20 - 5·1]. The aggregate investment level rises (from \$100 to \$105) despite the imposition of regulation, which is known to reduce investment by \$5. This increase is fully attributable to the change in *Z* (+10), partially offset by the imposition of regulation (-5).

By Free Press standards, since investment rose after the imposition of regulation, the rise in

investment implies regulation causes an increase in investment. As just shown, however, this conclusion confounds one effect (that of Z) for another (that of R). The false conclusion is simply based on a failure to analyze the problem in a manner consistent with professional standards. Avoiding such errors are the focus of statistical and econometric research, the basics of which appear to be unknown (or at least ignored in this instance) by Free Press.

A Lesson in Self Rebuttal

Notably, the simple example above and the logic thereof are consistent with the Free Press's own proposed theoretical framework. Thus, Free Press disagrees with itself on proper implementation of the empirical test. Let me explain.

The report provides a cursory discussion of six factors other than regulation that determine investment decisions of firms. Mathematically, the report's own discussion envisions the following functional relationship:

$$I = f(x_1, x_2, x_3, x_4, x_5, x_6, R) \quad (2)$$

where the x_i are the six listed factors. (For expositional purposes, my analysis above has condensed the x_i into a single variable Z .) Over time, the x_i and the R will change. The total change in investment (I) depends on the sum of such changes based on relationships between the x_i and R and the investment levels. As just shown in the simple example, we cannot attribute a change in I to a change in R if one or more of the x_i change too.

By focusing simply on aggregate investment levels and attributing all of it to network neutrality, Free Press proposes an empirical test based on the following relationship:

$$I = f(R), \quad (3)$$

where investment is simply a function of regulation. Clearly, if Equation (2) is correct, as Free Press claims, then Equation (3) is not a legitimate empirical framework for testing Equation (2). Since the Free Press sets forth Equation (2) as legitimate, then uses Equation (2) to test their hypothesis, the organization has rebutted itself.

Free Press rebuts its own analysis in other ways as well. For example, over the period in question, the largest cable company experienced better than a five-fold increase in cable telephone subscriptions.¹⁰ Since Free Press argues that competition increases investment (p. 4), we must attribute a portion of the investment increase to an increase in competition. Furthermore, mobile telephony subscriptions rose by about 40%, and AT&T is a significant presence in the mobile telephony and data market.¹¹ Free Press argues that rising demand increases investment (p. 3), therefore some portion of the investment must be attributed to higher demand for mobile services by their own argument.

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Moreover, the network neutrality merger condition was only one of many conditions tied to the merger. Other merger conditions included, but were not limited to, the following: (a) a commitment to provide broadband service throughout 100% of Bellsouth's region; (b) a commitment to provide free modems to some consumers; (c) a commitment to heavily discount DSL offerings to some subscribers; (d) a commitment to continue in the deployment of video services throughout their region; (e) a commitment to invest in disaster recovery

capabilities; (f) to maintain settlement free peering arrangements; and (g) a commitment to offer services using and/or divest some spectrum assets. All of these conditions are likely to impact aggregate investment levels.

In the framework outlined above, there is no R , but there are many R (say, $r_1, r_2, r_3 \dots r_N$). Looking at it this way reveals a serious problem with using the merger conditions in an empirical test. Since all the merger conditions applied as a condition of the merger, and because the merger itself may impact investment levels, it is exceedingly difficult to determine the contribution of any single merger condition.

In fact, determining the unique contribution of a single merger condition is near impossible because the neutrality regulations are collinear with the merger and the other merger conditions. That is, all outcomes after 2006 reflect the change in incentives caused by the merger itself and the entire lot of merger conditions. Determining causal relationships under such conditions requires a very rich data set and sophisticated econometric models, neither of which Free Press employs. Free Press is merely exploiting a temporal correlation and calling it causation to support a particular policy preference. (In fairness, they are not unique in this regard, as has been noted by others.¹²) As it stands, an equally legitimate interpretation of Free Press's analysis is that the FCC should promote more mergers if they want more investment.

As Senior Advisor to Federal Communications Commission Chairman Julius Genachowski Carlos Kirjner observed, "correlation is not causation."¹³ A legitimate effort to determine the causal effect of regulation on investment must first establish a counterfactual case where regulation is absent but other factors (that is, the Z) are allowed to change.¹⁴ A proper analysis of causality using observational data (rather than experimental data) must estimate the counterfactual.

Returning to the example above, in the absence of regulation in the second period ($R = 0$), the investment level would be \$110 [= 90 + 20 - 5.0]. So, the counterfactual outcome is \$110. Evaluating the effect of regulation from the counterfactual uncovers the negative impact of regulation; that is, \$105 - \$110 = -\$5. In practice, we cannot observe the counterfactual, since the treatment (e.g., the regulation) is or is not present. As such, empirical methods are required to establish the counterfactual, and there is a rich literature on such empirical techniques. For a recent example of such techniques applied to broadband policy, see, e.g., PHOENIX CENTER POLICY PAPER NO. 38, *Internet Use and Depression Among the Elderly*.¹⁵

... the Free Press report recommends that "[p]olicymakers need to look at the data and judge the facts for themselves." In light of the quality of the Free Press's analysis, this is exceptionally good advice.

Other Problems

There are a number of other obvious defects with the Free Press study; too many to detail in a rational allocation of time. As such, I will mention but a few.

First, the study claims that the voluntary merger commitments agreed to by AT&T are comparable to the current proposals for network neutrality regulation. This claim simply is not true. Existing net neutrality proposals in Congress, past action by the FCC in the *Comcast* decision, and the Notice of Funds Availability recently issued by the National Telecommunications and Information Agency, all include elements of price regulation and/or strict network management rules.¹⁶ Moreover, the FCC has just issued a Notice of Proposed

Rulemaking with the purported goal of ensuring a “free and open Internet” that includes much of the same command and control regulatory elements.¹⁷ While Free Press tries to claim that network neutrality proposals are a “very light regulatory firewall (at 7),” recent policy initiatives, as well as the arguments made by the Free Press themselves, belie their claim.

Second, the study rests the assumption that higher levels of investment for a given level of output are desirable. This belief is plainly defective. Society is unambiguously better off if it can produce the same output with fewer resources. Also, the lower is the level of capital required to be in business, the more firms there are in equilibrium, *ceteris paribus*.¹⁸ Shrinking investment levels by incumbent firms may signal more competition in the future.

Third, regulation of one market may shift investments to another, less regulated line of business (or perhaps to another country). Aggregate investment levels cannot detect such shifts. In fact, regulation in one market may increase overall investment by inefficiently shifting the firm to a more capital-intensive portfolio. Consequently, the cursory analysis of investment levels sheds no light on the issue of responses to regulatory treatments, or the efficiency consequences of such responses.

Finally, the Free Press ignores the most obvious empirical example of the effects of network neutrality regulation on the investment decision

of firms—the C Block auction of the 700 MHz spectrum. Other things constant, the neutrality regulations placed on that spectrum reduced its price at auction by about 40%.¹⁹ Clearly, neutrality regulations can have a significant impact on market value and retard investment incentives, other things equal.

Conclusion

How ISPs will respond to network neutrality and network management regulations is an interesting and important public policy issue. Empirical evidence, such as that provided in POLICY PAPER NO. 25²⁰ or POLICY BULLETIN NOS. 16,²¹ 20²² and 23²³ will provide significant guidance on establishing good policy (assuming good policy is the goal). The Free Press’s recent study on investment, unfortunately, is just one more addition to the sloppy analysis already alleged to populate the record.²⁴ The report does not represent, and does not appear to even try to represent, a serious analysis of the investment consequences of network neutrality regulation.

While the conclusions of the Free Press study should largely be ignored by the more serious and open-minded policy makers, there is one conclusion of merit. The report recommends that “[p]olicymakers need to look at the data and judge the facts for themselves (p. 3).” In light of the quality of the Free Press’s analysis, this is exceptionally good advice.

NOTES:

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¹ D. Turner, *Finding the Bottom Line: The Truth about Network Neutrality & Investment*, The Free Press (October, 2009) (available at: http://www.freepress.net/files/Finding_the_Bottom_Line_The_Truth_About_NN_and_Investment_0.pdf).

² See *In the Matter of AT&T Inc. and BellSouth Corporation Application for Transfer of Control*, MEMORANDUM OPINION AND ORDER, FCC 06-189, 22 FCC Rcd 5662, 5807 (March 26, 2007) at Appendix F.

³ Turner, *supra* n. 1.

⁴ The incompetence of the analysis by Free Press directly conflicts with the study's author's own public statements. See *Free Press Responds to 'Sloppy' Incumbent Broadband Arguments: Data-Driven Reply Discredits Incumbent Broadband Plan Recommendations* (available at: <http://www.freepress.net/node/70426>) (quoting Derek Turner: "the FCC should not be duped by the ... self-serving claims. The national broadband plan must be built on a record of meaningful data and analysis—not on flimsy evidence and discredited arguments.").

⁵ See, e.g., J. Halpin, J. Heidbreder, M. Lloyd, P. Woodhull, B. Scott, J. Silver, and S. D. Turner, *The Structural Imbalance of Political Talk Radio* (available at: http://www.americanprogress.org/issues/2007/06/pdf/talk_radio.pdf). In this paper, the authors estimate a model of the form $y = f(x)$, then argue that policies should change y to alter x . The econometric model is essentially 'run backwards,' with the radio market HHI being regressed on the political leanings of aired programming. In essence, the study indicates that playing Rush Limbaugh on the radio will lead to radio mergers (pp. 27-30), but the authors then argue, in conflict with their model, for the de-concentration of radio markets in order to get Rush Limbaugh off the radio. Based on its statistical models of program choice and minority ownership, the study also encourages the FCC to use ownership regulations to promote politically-biased radio; S. D. Turner, *Broadband Reality Check II: The Truth Behind America's Digital Decline*, Free Press (August 2006) (drawing conclusions from univariate relationships, only to later propose a multivariate analysis that implies the univariate approach is invalid).

⁶ Other proffered evidence includes the pedestrian observation that the capex-to-revenue ratio is large for startup firms. See Turner, *supra* n. 1 at 10.

⁷ AT&T's investment change is within the 90% confidence interval for ISPs based on the sample of growth rates for 15 ISPs at Turner, *supra* n. 1, Table 3. Given the small sample size, the confidence interval on growth is bootstrapped using 500 simulations. The bounds of the 90% confidence interval are -0.53, 2.50.

⁸ Data from Qwest financial forms as provided in Mergent Online (both increasing by 8% from 2005-6 to 2007-8). Also see Turner, *supra* n. 1, at Table 3.

⁹ Regulation could be assumed to have a positive effect and Z a negative effect. The choices are for illustrative purposes alone.

¹⁰ See, e.g., Comcast Corporation 10-K Form (2008) at 2.

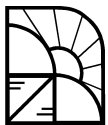
¹¹ *Wireless Quick Facts*, CTIA (available at: <http://www.ctia.org/advocacy/research/index.cfm/AID/10323>).

¹² *FCC Broadband Plan Coordinator Sees Little In Docket That "Moves The Ball Forward"*, TR DAILY (July 20, 2009): quoting Blair Levin, Coordinator of the FCC Broadband Plan ("one of the most amusing comments to me came from a large telco" that argued that investments in broadband networks had increased after deregulation of broadband facilities by the FCC, but which included a chart that showed that investment growth had begun before those deregulatory decisions. He said the filing violated "rule two" of lobbying, which he said is "don't give people information that contradicts the point you're trying to make." He added, "If you're going to cherry-pick data, cherry-pick the data." However, what Mr. Levin found "most disturbing" as he read through the docket "was a lack of seriousness of purpose...").

¹³ C. Kirjner, *Reflections on Being Part of the National Broadband Plan Team – and a Look Ahead* (August 24th, 2009)(available at: <http://blog.broadband.gov/?p=129>).

NOTES CONTINUED:

- ¹⁴ A. Cameron and P. Trivedi, *MICROECONOMETRICS* (2005), p. 32 (“Let X be the hypothesized cause and Y the outcome. By manipulating the value of X we can change the value of Y . Suppose the value of X is changed from x_1 to x_2 . Then a measure of the causal impact of the change on Y is formed by comparing the two values of Y : y_2 , which results from the change, and y_1 , which would have resulted had no change in X occurred. However, if X did change, then the value of Y , in the absence of the change, would not be observed. Hence nothing more can be said about causal impact without some hypothesis about what value Y would have assumed in the absence of the change in X . The latter is referred to as a counterfactual, which means hypothetical unobserved value.”)
- ¹⁵ G. S. Ford and S. G. Ford, *Internet Use and Depression Among the Elderly*, PHOENIX CENTER POLICY PAPER NO. 38 (October 2009) (available at: <http://www.phoenix-center.org/pcpp/PCPP38Final.pdf>).
- ¹⁶ These actions are all discussed in G. S. Ford, T. M. Koutsky and L. J. Spiwak, *Network Neutrality and Foreclosing Market Exchange: A Transaction Cost Analysis*, PHOENIX CENTER POLICY PAPER NO. 28 (March 2007) (available at: <http://www.phoenix-center.org/pcpp/PCPP28Final.pdf>) and in G.S. Ford, L.J. Spiwak and M.L. Stern, *Expanding the Digital Divide: Network Management Regulations and the Size of Providers*, PHOENIX CENTER POLICY BULLETIN NO. 23 (October 2009) (available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB23Final.pdf>).
- ¹⁷ *In the Matter of Preserving the Open Internet, Broadband Industry Practices*, Notice of Proposed Rulemaking, FCC 09-03, ___ FCC Rcd __ (rel. October 22, 2009).
- ¹⁸ G.S. Ford, T.M. Koutsky and L.J. Spiwak, *Competition After Unbundling: Entry, Industry Structure and Convergence*, PHOENIX CENTER POLICY PAPER NO. 21 (July 2005), and reprinted in 59 FEDERAL COMMUNICATIONS LAW JOURNAL 331 (2007).
- ¹⁹ G.S. Ford, T.M. Koutsky and L.J. Spiwak, *Using Auction Results to Forecast the Impact of Wireless Carterfone Regulation on Wireless Networks*, PHOENIX CENTER POLICY BULLETIN NO. 20 (Second Edition) (May 2008)(available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB20Final2ndEdition.pdf>).
- ²⁰ G.S. Ford, T.M. Koutsky and L.J. Spiwak, *The Burden of Network Neutrality Mandates on Rural Broadband Deployment*, PHOENIX CENTER POLICY PAPER NO. 25 (July 2006)(available at: <http://www.phoenix-center.org/pcpp/PCPP25Final.pdf>).
- ²¹ G.S. Ford, T.M. Koutsky and L.J. Spiwak, *The Efficiency Risk of Network Neutrality Rules*, PHOENIX CENTER POLICY BULLETIN NO. 16 (May 2006)(available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB16Final.pdf>).
- ²² *Supra* n. 19.
- ²³ *Supra* n. 16.
- ²⁴ *Supra* n. 12.



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