

## Net Neutrality, Reclassification and Investment:

### A Further Analysis

Dr. George S. Ford\*

May 16, 2017

#### Introduction

In a recent paper, *Net Neutrality, Reclassification and Investment: A Counterfactual Analysis*<sup>1</sup>, I used the difference-in-differences methodology to estimate the effect on telecommunications investment of the Federal Communications Commission's ("FCC") Net Neutrality policies, including especially the Agency's decision to reclassify broadband as a Title II common carrier telecommunications service.<sup>2</sup> I took this approach because far too many analysts have focused on the changes in nominal levels of capital expenditures over time to measure the investment effects of the FCC's 2015 *Open Internet Order*, comparisons which—as discussed in the prior paper—are utterly meaningless.<sup>3</sup> The relevant question for public policy is *not* whether capital expenditures rise or fall, but rather whether such expenditures are below the level they would have been "*but for*" the regulatory intervention. A counterfactual analysis, like that offered in my earlier work and again here, is required for such a comparison.

The econometric analysis in my earlier paper revealed large effects: investment was down about 20% to 30% over the years 2011 through 2015, costing the nation about \$150-\$200 billion in investment over the five-year period. The "reclassification" treatment was dated at 2010, the year in which reclassification was proposed by then Chairman Julius Genachowski.<sup>4</sup>

---

---

*... I provide alternative estimations to my earlier work.... \*\*\* None of these modifications materially alters my results. Investment in telecommunications is below expectations by about 25% since the FCC's introduction of Title II reclassification.*

---

---

Since publication, I have received a number of comments on the paper, for which I am grateful. In this PERSPECTIVE, I offer some additional analysis of the investment data in response to some of these remarks. As detailed below, I provide alternative estimations to my earlier work that incorporate the following: (1) I restrict the data to investments in property and equipment (thereby excluding investment in intellectual property); (2) I construct an alternative control group using the more aggregated investment categories; and (3) I exclude both 2010 and 2011 from the data to provide more time for the investment effects to occur. None of these modifications materially alters my results. Investment in telecommunications is below expectations by about 25% since the FCC's introduction of Title II reclassification.

## Investment Data

As before, domestic investment data is supplied by the U.S. Bureau of Economic Analysis' Fixed Assets tables.<sup>5</sup> Telecommunications investment falls under the broad class of "Information" services in the subcategory "Broadcasting and Telecommunications." For equipment and property, broadcasting makes up a very small share of the total investment figures (about 3%).<sup>6</sup> My data span 1980 through 2015, the last year for which data are available. The treatment period is defined to be years 2011-2015, though here I also exclude 2011 in some samples.

---

*... far too many analysts have focused on the changes in nominal levels of capital expenditures over time to measure the investment effects of the FCC's 2015 Open Internet Order, comparisons which—as discussed in the prior paper—are utterly meaningless.*

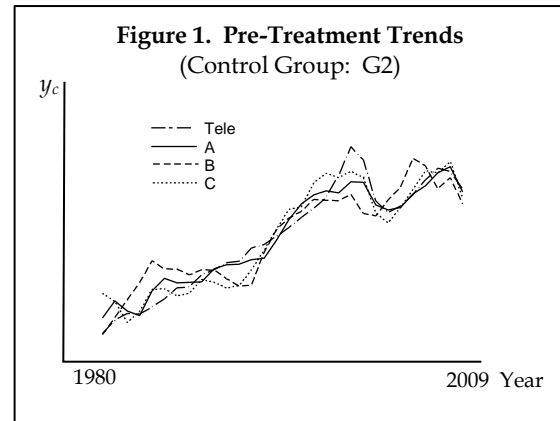
---

## Control Group

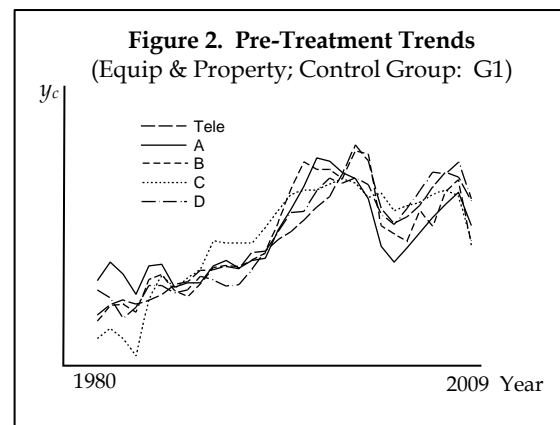
In the earlier paper, four sectors were chosen for the control group: (A) machinery manufacturing; (B) computer and electronic products manufacturing; (C) plastic and rubber products manufacturing; and (D) transportation and warehousing. I label this control group G1. In consideration of the parallel paths assumption of the DiD methodology, these sectors were chosen based on the similarities in the investment trends in the pre-treatment period (1990-2009).

The first three control sectors from this control group are from the broad "manufacturing" sector, which is also divided into subcategories "durable" and "non-durable" goods manufacturing. Investment trends in the broad manufacturing and durable goods

manufacturing sectors also closely matched that of telecommunications, but they were excluded from the control group due to the use of the more narrowly defined sectors within the broader classes, thus avoiding using the "same" control sector twice.



In this updated analysis, I alter the control group by choosing controls from the more aggregated sectors. One possible advantage is that these broader sectors are less likely to be influenced by the idiosyncrasies of a narrowly-defined sector. For the new control group (labeled G2), three control sectors are selected: (A) durable goods manufacturing; (B) wholesale trade; and (C) transportation and warehousing (also used in the prior study). The pre-treatment trends for investments in *total fixed assets*—the dependent variable in the prior study—are illustrated in Figure 1, and the similarity of the trends provides support for the parallel paths assumption.



For investments in equipment and structures, the pre-treatment trends for control group G2 are nearly identical to those in Figure 1, so I do not update that figure. The pre-treatment trends for investments in equipment and structures alone for control group G1 are illustrated in Figure 2. Group G1 also appears to satisfy the parallel paths assumption for the more limited investment data.

**Estimation Model**

As before, investment effects are quantified using the DiD regression,

$$y_{it} = \delta D_{it} + \beta K_{it-1} + \lambda_t + \mu_i + \varepsilon_{it} , \quad (1)$$

where, as before,  $y_{it}$  is the (natural log of the) investment for economic sector  $i$  at time  $t$ ,  $D_{it}$  is a dummy variable that equals 1 for the period for which the broadband providers faced the possibility of reclassification (0 otherwise),  $\mu_i$  is fixed effect for each economic sector in the sample  $i$ ,  $\lambda_t$  is a time effect common to all observations in time  $t$ , and  $\varepsilon_{it}$  is the econometric disturbance term that is assumed to be distributed independently of all  $\mu$  and  $\lambda$ .<sup>7</sup> The variable  $K_{it-1}$ , which appears in some of the regressions, is a one period lag of net capital stock.

**Results**

Equation (1) is estimated for both control groups G1 and G2, and for investment in all fixed assets (Obs. = 75) and alternately equipment and property only (Obs. = 60). Matching the prior paper but reducing the reported results for expositional purposes, I only report results from the pre-treatment period of 2000-2009; the post-treatment period is 2011-2015. For all fixed assets, the average investment level between 2011 and 2015 is about \$126 billion; for equipment and property, the average investment level is about \$80 billion. The estimated marginal effects (expressed as percentage changes) along with the t-statistics are summarized in Table 1.

**Table 1. Summary of Estimates**  
(Years 2000-2015)

	Control G1	Control G2
Investment Types	Marg. Eff. (t-stat)	Marg. Eff. (t-stat)
All Fixed Assets	-23.4% (-4.83)***	-25.8% (-4.27)***
Equipment & Property	-24.4% (-3.06)***	-29.6% (-4.46)***
Including (lagged) Net Capital Stock (K) as a Regressor.		
All Fixed Assets	-24.7% (-5.57)***	-24.5% (-3.96)***
Equipment & Property	-26.1% (-3.48)***	-27.9% (-4.13)***

Sig. Levels: \* 10%, \*\* 5% \*\*\* 1%

For both control groups, both measurements of investment, and both model specifications, the investments effects are large and statistically different from zero at the 1% or better. As in the prior paper, the marginal effects are estimated at a 25% reduction in investment due to reclassification.

*The relevant question for public policy is not whether capital expenditures rise or fall, but rather whether such expenditures are below the level they would have been “but for” the regulatory intervention. A counterfactual analysis, like that offered in my earlier work and again here, is required for such a comparison.*

The size of the marginal effects (a percentage) are not much affected by the choice of the control group or the measure of investment. At the average level of investment post treatment, the

results indicate that investment in total fixed assets would have been about \$30 billion more annually “but for” reclassification. Investment in equipment and property would have been \$20 billion more “but for” reclassification. Over the five-years since 2010, total investment is down \$150 billion and investment in equipment and property, which excludes intellectual property, is down \$100 billion.

**Two-Year Transition Window**

In the prior paper and the results just presented, the treatment year (2010) is excluded from the sample, which leaves five years of data during the treatment period. Investment effects are likely to be realized with some lag, so as an alternative specification I exclude both years 2010 and 2011. The results are summarized in Table 2.

Excluding two years of data to account for the transition does not much change the marginal effects, increasing all of them slightly. Despite the loss in observations, all the marginal effects remain statistically significant at the 1% level or better.

*No meaningful changes to the estimated investment effects are found—the decline in investment from reclassification remains large and statistically different from zero.*

**Conclusion**

Using a broad measure of telecommunications investment, prior analysis demonstrates that since 2010 investment in telecommunications is about \$150 to \$200 billion lower than it would have been absent reclassification of broadband as a Title II telecommunications service. In this PERSPECTIVE, I extend my earlier analysis by applying the same methodology to a different control group and narrower definition of investment. No meaningful changes to the estimated investment effects are found—the decline in investment from reclassification remains large and statistically different from zero.

**Table 2. Summary of Estimates**  
(Years 2000-2015)

	Control G1	Control G2
Investment Types	Marg. Eff. (t-stat)	Marg. Eff. (t-stat)
All Fixed Assets	-24.9% (-4.80)***	-27.5% (-4.16)***
Equipment & Property	-25.9% (-3.00)***	-31.9% (-4.41)***
Including (lagged) Net Capital Stock (K) as a Regressor.		
All Fixed Assets	-25.5% (-5.36)***	-25.9% (-3.73)***
Equipment & Property	-26.8% (-3.28)***	-29.8% (-3.95)***

Sig. Levels: \* 10%, \*\* 5% \*\*\* 1%

## NOTES:

\* **Dr. George S. Ford is the Chief Economist of the Phoenix Center for Advanced Legal and Economic Public Policy Studies. The views expressed in this Perspective do not represent the views of the Phoenix Center or its staff. Dr. Ford may be contacted at [ford@phoenix-center.org](mailto:ford@phoenix-center.org).**

<sup>1</sup> G.S. Ford, *Net Neutrality, Reclassification and Investment: A Counterfactual Analysis*, PHOENIX CENTER POLICY PERSPECTIVE No. 17-02 (April 25, 2017) (available at: <http://phoenix-center.org/perspectives/Perspective17-02Final.pdf>).

<sup>2</sup> *Protecting and Promoting the Open Internet*, REPORT AND ORDER ON REMAND, DECLARATORY RULING AND ORDER, GN Docket No. 14-28, FCC 15-24, 80 Fed. Reg. 19738 (rel. Mar. 12, 2015) (hereinafter “2015 Open Internet Order”), *aff’d*, *United States Telecom Association v. FCC*, 825 F.3d 674 (D.C. Cir. 2016), *petitions for Rehearing En Banc denied*, \_\_ F.3rd \_\_ (May 1, 2017).

<sup>3</sup> A recent example is D. Turner, *It’s Working: How the Internet Access and Online Video Markets are Thriving in the Title II Era*, FREE PRESS WORKING PAPER (May 2017) (available at: <https://www.freepress.net/sites/default/files/resources/internet-access-and-online-video-markets-are-thriving-in-title-II-era.pdf>).

<sup>4</sup> Press Release, Federal Communications Commission, *The Third Way: A Narrowly Tailored Broadband Framework*, Statement of Chairman Julius Genachowski 4-5 (May 6, 2010) (available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-297944A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-297944A1.pdf)) (hereinafter “Genachowski Statement”); Press Release, Federal Communications Commission, *A Third-Way Legal Framework for Addressing the Comcast Dilemma*, Statement of General Counsel Austin Schlick (May 6, 2010) available at: [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-297945A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-297945A1.pdf) (hereinafter “Schlick Statement”).

<sup>5</sup> Tables 3.7 (<http://bea.gov/iTable/iTable.cfm?ReqID=10&step=1#reqid=10&step=3&isuri=1&1003=55>).

<sup>6</sup> <https://www2.census.gov/programs-surveys/aces/tables/2015/table4a.xlsx>.

<sup>7</sup> See, e.g., B.D. Meyer, *Natural and Quasi-Experiments in Economics*, 13 JOURNAL OF BUSINESS & ECONOMIC STATISTICS 151-161 (1995); J.D. Angrist and J.S. Pischke, *MOSTLY HARMLESS ECONOMETRICS: AN EMPIRICIST’S COMPANION* (2008); J.D. Angrist and A.B. Krueger, *Empirical Strategies in Labor Economics*, in HANDBOOK OF LABOR ECONOMICS (Volume 3A)(1999) (O. Ashenfelter and D. Card, eds.) at Ch. 23; see also D. Card, *The Impact of the Mariel Boatlift on the Miami Labor Market*, 43 INDUSTRIAL AND LABOR RELATIONS REVIEW 245-257 (1990); S. Galiani, P. Gertler, and E. Schargrodsky, *Water for Life: The Impact of the Privatization of Water Services on Child Mortality*, 113 JOURNAL OF POLITICAL ECONOMY 83-123 (2005) (available at: <http://sekhon.berkeley.edu/causalinf/papers/GalianiWater.pdf>).