

## Does Title II Reduce Infrastructure Investment? Repairing Hooton's Analysis

George S. Ford, PhD\*

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In a recent paper entitled *Testing the Economics of the Net Neutrality Debate*, Chris Hooton of the Internet Association<sup>1</sup> again claims to offer evidence that Net Neutrality rules had no (statistically significant) effect on investment.<sup>2</sup> Title II advocates, desperate to prove common carrier regulation did not reduce infrastructure investment, were atingle.<sup>3</sup> Even former FCC Chairman Tom Wheeler jumped in by gleefully promoting the study and accusing the current Commission of maintaining its investment story "[t]ruth be damned."<sup>4</sup>

As detailed in an earlier PERSPECTIVE, Hooton's new work says nothing about the effect of Net Neutrality on investment, mainly (though not exclusively) because his data does not measure investment.<sup>5</sup> Hooton measured investment using the account *Capital Expenditures Incurred But Not Yet Paid*, which is not capital expenditures (investment) but an optionally reported *credit* account that holds the unpaid balance for purchases of fixed assets that occurred in the past.<sup>6</sup> While Hooton offers a detailed and glowing portrayal of his measure investment, his description is *entirely fabricated*, despite the fact the true nature of the account can be ascertained online or from an accounting handbook.

In this PERSPECTIVE, I pose and answer an interesting question: if I adopt Hooton's general statistical approach, what would be the effect of Title II regulation on investment if I substitute actual investment for Hooton's invalid measure

of it? Applying the difference-in-differences estimator, as Hooton did, and using Hooton's the treatment date and treatment group, I find a negative and statistically significant effect on investment resulting from the implementation of Title II regulation in the *2015 Open Internet Order*.<sup>7</sup>

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### Data

Like Hooton, I obtain financial data from the Securities and Exchange Commission's ("SEC") online database.<sup>8</sup> Rather than using the account *Capital Expenditures Incurred But Not Yet Paid*, which does not measure investment, I use the account *Payments To Acquire Property Plant And Equipment*, which does measure investment. I

then substitute the latter for the former in a statistical model to test for changes in investment around the dates of Net Neutrality rule changes.

Annual data by industry group, indicated by Standard Industry Classification Code (or SIC), is obtained for years 2009 through 2017 (all the years available). Absent much data prior to the 2010 rules (less than a full year is available for 2009), I limit my analysis to years 2012 through 2017, steering clear of the 2010 decision and focusing instead on the 2015 decision (dated using the approach in Hooton). There are three years prior to and following the treatment in (early) 2015 for the Title II rules. I include only those industry sectors with a full complement of yearly data, resulting in a balanced panel. Since the reversal of Title II regulation occurred in 2017, and the judicial confirmation of that change occurred only recently, I define the treatment years as 2015 through 2017.

I likewise define the treatment group in the same manner as Hooton, using SIC codes: 4812, 4813, 4822, 4841, 4899, 4822, 4899, and 4375. Like Hooton, I ignore the common trends assumption and use all firms in the sample as the control group.

**Statistical Model**

To estimate the investment effect of the 2015 rules applying Title II regulation to the Internet, I apply the standard two-way fixed effects Difference-in-Differences (“DD”) regression model. The model is,

$$y_{it} = \delta T_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{1}$$

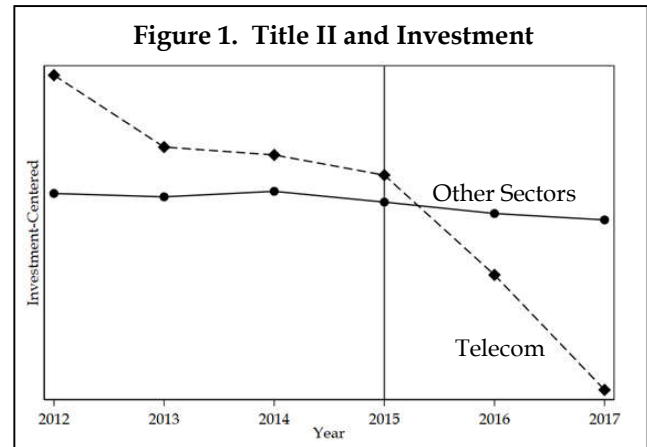
where  $y_{it}$  is (the natural log of) capital expenditures in SIC  $i$  in year  $t$ ,  $T_{it}$  is the treatment dummy variable equal to 1.0 for treated sectors in years 2015 through 2017,  $\mu_i$  is a fixed effect for the cross sections,  $\lambda_t$  is a fixed effect for years, and  $\varepsilon_{it}$  is the econometric disturbance term.<sup>9</sup> The coefficient of interest is  $\delta$ —the DD estimator. As is standard, the null

hypothesis is that  $\delta = 0$ . Equation (1) is estimated by least-squares with standard errors clustered on the industry groups.

**Results**

The final sample includes 339 industry groups with data for six years for a total sample of 2,034 observations. The F-statistic of the model is 10.26 (prob < 0.01). A statistical test indicates the yearly fixed effects are not redundant (F = 9.83, prob < 0.01).

The  $\delta$  coefficient is -0.79, indicating a 55% reduction in investment following the 2015 rules.<sup>10</sup> The clustered t-statistic is -2.33, which is statistically different from zero at better than the 5% level. Thus, when using the correct measure of capital expenditures, Hooton’s analysis indicates investment fell significantly, both in size and significance, after the 2015 *Open Internet Order*.



The effect is seen clearly by illustration.<sup>11</sup> Figure 1 shows the investment values for each year of the sample. The vertical line at 2015 indicates the treatment year. As is clear, telecommunications investment fell sharply after the 2015 *Open Internet Order* relative to the control group.

**Caveat**

My analysis here is motivated by Hooton’s work. I would not analyze this question the

same way or using these data. In my admittedly limited experience with the SEC data, I do not, at this point, believe these data are reliable for this sort of analysis, at least without considerable effort cleaning it.

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While remedying some of the more obvious defects in Hooton's empirical analysis, including the proper aggregation of data and the correct specification of the two-way fixed effects regression model, I have not addressed all of Hooton's many errors. Problems that remain include, but are not limited to, the selection of the treatment/control groups and the treatment date selection. My point here is not to analyze these data with rigor, but rather to remain as true to Hooton's analysis as is (in good conscience) possible. As such, I offer these results as illustrative.

### Conclusion

As noted above, Title II advocates have hailed Hooton's new study as conclusive proof that imposing common carrier regulation on the Internet did not deter investment. Given Hooton's demonstrated carelessness in his research, perhaps they should rethink their enthusiasm.

As with his earlier work purporting to show no adverse effect on investment from Title II,<sup>12</sup> Hooton's latest study has been shown to be a case study in statistical negligence—a key defect

of which is measuring investment using a variable that does not measure investment, among a slew of other fatal errors.<sup>13</sup>

In this PERSPECTIVE, I have used the dataset employed in Hooton's new study, replacing his invalid measure of investment with data on actual capital expenditures. Also, I have defined the telecom sector and the 2015 treatment date using Hooton's definitions. Some, though not all, of the more significant statistical errors in Hooton's study have been remedied. My analysis finds a sizeable and statistically-significant decline in investment in the telecommunications sector following the 2015 *Open Internet Order*.

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A thorough analysis of Hooton's latest paper on Net Neutrality and investment exposes two key points. First, Hooton unquestionably used the wrong data in his new paper. Hooton's study says nothing about investment because the data cannot do so. Second, upon replacing Hooton's invalid measure with actual investment and applying his general statistical procedure, Title II regulation is found to reduce investment in a large (about 50%) and statistically-significant manner. These findings beg the question: Will such gross errors matter much to advocates of Title II regulation? I doubt it. I suspect Hooton's latest study, like his botched earlier one, will be heavily hawked by Title II advocates—truth be damned.

## 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> <https://internetassociation.org/team/chris-hooton>.

<sup>2</sup> C.A. Hooton, *Testing the Economics of the Net Neutrality Debate*, TELECOMMUNICATIONS POLICY (article in press) (available at: <https://assets.documentcloud.org/documents/6430695/Net-Neutrality.pdf>).

<sup>3</sup> K. Bode, *Study Proves The FCC's Core Justification for Killing Net Neutrality Was False*, VICE (September 27, 2019) (available at: [https://www.vice.com/en\\_us/article/kz4g9x/study-proves-the-fccs-core-justification-for-killing-net-neutrality-was-false](https://www.vice.com/en_us/article/kz4g9x/study-proves-the-fccs-core-justification-for-killing-net-neutrality-was-false)).

<sup>4</sup> T. Wheeler, *California Will Have an Open Internet*, NEW YORK TIMES (October 2, 2019) (available at: <https://www.nytimes.com/2019/10/02/opinion/net-neutrality-fcc-wheeler.html>).

<sup>5</sup> G.S. Ford, *Statistical Negligence in Title II Impact Analysis*, PHOENIX CENTER POLICY PERSPECTIVE No. 19-05 (October 1, 2019) (available at: <http://phoenix-center.org/perspectives/Perspective19-05Final.pdf>).

<sup>6</sup> For a definition, see <https://www.calcbench.com/element/CapitalExpendituresIncurredButNotYetPaid>. An analogy may be helpful. Say you agree to pay a contractor \$2,000 for some work and divide the payment into \$1,500 up front and \$500 when the work is complete. The actual Capital Expenditure is \$2,000 and the *Capital Expenditures Incurred But Not Yet Paid* is \$500. Hooton measures investment as the \$500 credit that is to be paid upon completion.

<sup>7</sup> *Protecting and Promoting the Open Internet, Report and Order on Remand, Declaratory Ruling, and Order*, FCC 15-24, 30 FCC Rcd 5601 (2015).

<sup>8</sup> The data is available at: <https://www.sec.gov/dera/data/financial-statement-data-sets.html>.

<sup>9</sup> Negative values are excluded, though most values in this group are positive.

<sup>10</sup> The marginal effect is computed using  $\exp(\delta) - 1$ .

<sup>11</sup> Following Hooton, the control group is all non-treated industry sectors. In a more careful analysis, the common trends assumption would be considered.

<sup>12</sup> C. Hooton, *An Empirical Investigation of the Impacts of Net Neutrality*, Internet Association (2017) (available at: <https://internetassociation.org/publications/an-empirical-investigation-of-the-impacts-of-net-neutrality>); G.S. Ford, *A Review of the Internet Association's Empirical Study on Network Neutrality and Investment*, PHOENIX CENTER POLICY PERSPECTIVE No. 17-09, (July 24, 2017) (available at: <http://phoenix-center.org/perspectives/Perspective17-09Final.pdf>); G.S. Ford, *A Further Review of the Internet Association's Empirical Study on Network Neutrality and Investment*, PHOENIX CENTER POLICY PERSPECTIVE No. 17-10 (August 14, 2017) (available at: <http://phoenix-center.org/perspectives/Perspective17-10Final.pdf>); see also G. Macri, *Net Neutrality Investment Study Used "Corrupted, Made Up Data," ECONOMIST SAYS, GOVERNMENT TECHNOLOGY* (August 18, 2018) (available at: <https://www.govtech.com/policy/Net-Neutrality-Investment-Study-Used-Corrupted-Made-Up-Data-Economist-Says.html>). It should also be noted that the Federal Communications Commission, largely citing to my critiques of Hooton's work, rejected Hooton's investment analysis in its *Restoring Internet Freedom Order*. See *Restoring Internet Freedom*, DECLARATORY RULING, REPORT AND ORDER, AND ORDER, FCC 17-166, 33 FCC Rcd. 311 (rel. January 4, 2018), *aff'd in relevant part, Mozilla v. FCC*, \_\_\_ F.3d \_\_\_ (D.C. Cir. October 1, 2019), slip op. at pp. 78-80.

<sup>13</sup> *Supra* n. 5.