Are Government Broadband Internet Subsidies a Waste of Money?

Data Science Institute COLUMBIA UNIVERSITY

Topic Importance:

With the rising importance of the internet in people's daily life, broadband has become a hot topic in recent years. The government has offered various funds to support rural areas in developing broadband. With such a large amount of money involved, whether the funds help with broadband deployment is essential in designing future government and company policies.

Background Information & Methods Applied:

1. FCC-477; 2. Census Data; 3. USAC High-Cost Funds Dataset:

Methods Used: 1. Data Cleaning; 2. Data Visualization; 3. Correlation Analysis;

4. Linear Regression; 5. Random Forest; 6. Casual Inference

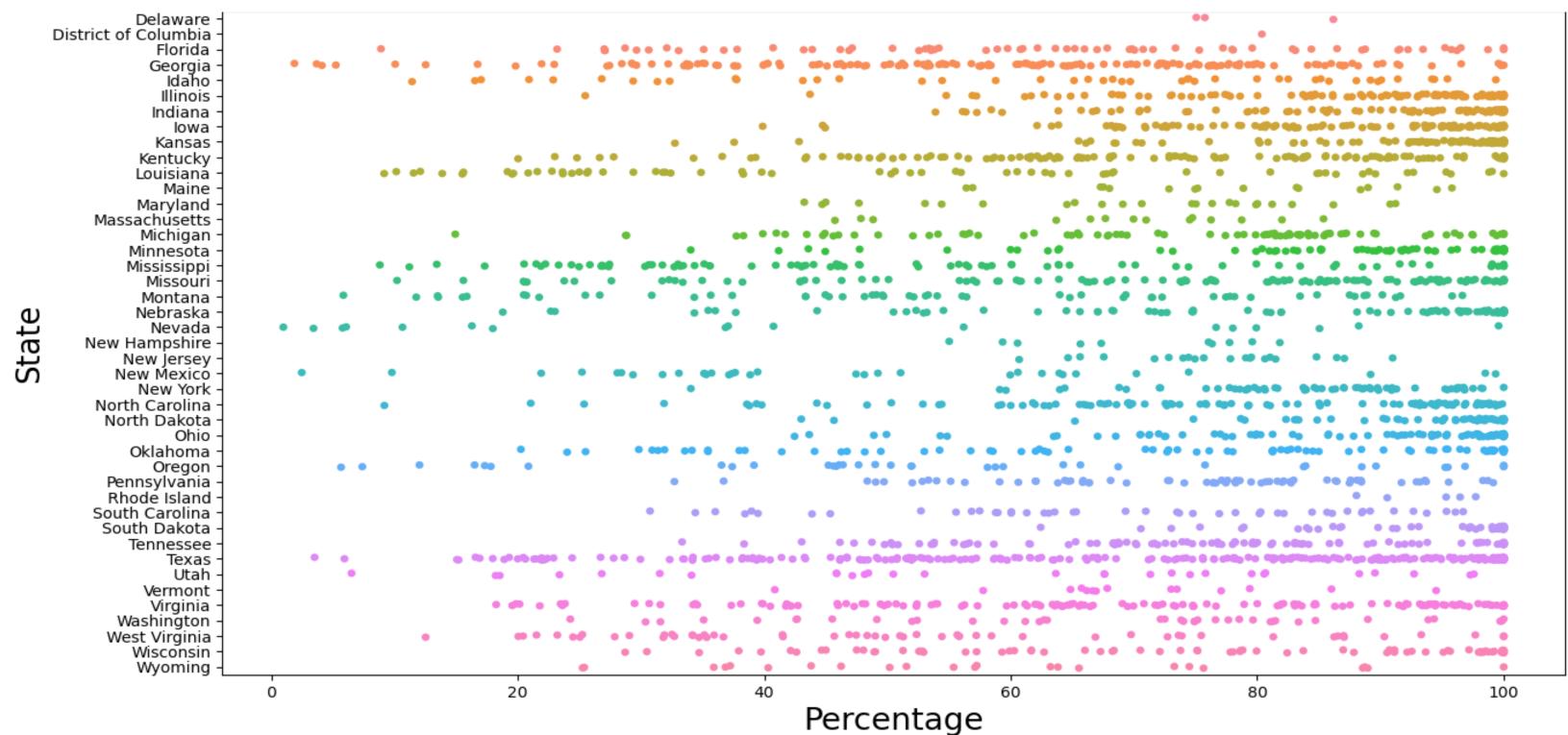
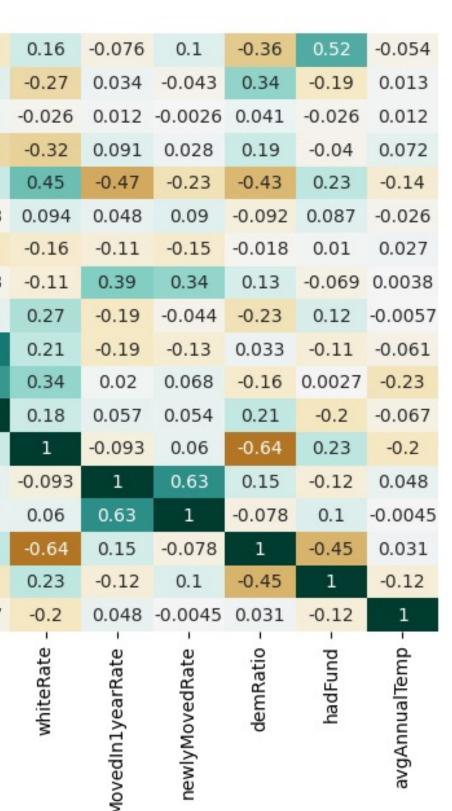


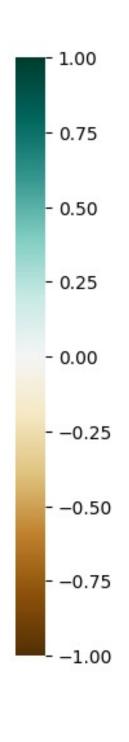
Figure 1. 2021 State Level Broadband Deployment Situation **Correlation Heatmap**

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deploymentRateDiff -	1	-0.13	-0.0063	-0.015	0.14	0.079	0.0019	-0.035	0.095	-0.13	-0.032	-0.19
popDensity -	-0.13	1	0.13	0.054	-0.36	-0.038	-0.015	0.057	-0.14	-0.0054	-0.15	0.087
houseRoadDensity -	-0.0063	0.13	1	0.0032	-0.046	-0.0068	-0.0063	0.0029	-0.012	0.0061	-0.0082	0.023
unemploymentRate -	-0.015	0.054	0.0032	1	-0.24	-0.034	0.085	0.12	-0.076	-0.29	-0.27	-0.27
houseOwnerRate -	0.14	-0.36	-0.046	-0.24	1	0.039	-0.051	-0.3	0.33	0.46	0.36	0.19
maleRate -	0.079	-0.038	-0.0068	-0.034	0.039	1	-0.058	0.045	-0.14	0.059	-0.042	-0.023
ageUnder17Rate -	0.0019	-0.015	-0.0063	0.085	-0.051	-0.058	1	-0.17	-0.48	-0.0051	-0.24	-0.2
ageBetween18and24Rate -	-0.035	0.057	0.0029	0.12	-0.3	0.045	-0.17	1	-0.3	-0.17	-0.077	-0.033
ageAbove65Rate -	0.095	-0.14	-0.012	-0.076	0.33	-0.14	-0.48	-0.3	1	0.003	0.18	0.067
medianIncome -	-0.13	-0.0054	0.0061	-0.29	0.46	0.059	-0.0051	-0.17	0.003	1	0.46	0.71
aboveHighSchoolRate -	-0.032	-0.15	-0.0082	-0.27	0.36	-0.042	-0.24	-0.077	0.18	0.46	1	0.59
aboveBachelorRate -	-0.19	0.087	0.023	-0.27	0.19	-0.023	-0.2	-0.033	0.067	0.71	0.59	1
whiteRate -	0.16	-0.27	-0.026	-0.32	0.45	0.094	-0.16	-0.11	0.27	0.21	0.34	0.18
MovedIn1yearRate -	-0.076	0.034	0.012	0.091	-0.47	0.048	-0.11	0.39	-0.19	-0.19	0.02	0.057
newlyMovedRate -	0.1	-0.043	-0.0026	0.028	-0.23	0.09	-0.15	0.34	-0.044	-0.13	0.068	0.054
demRatio -	-0.36	0.34	0.041	0.19	-0.43	-0.092	-0.018	0.13	-0.23	0.033	-0.16	0.21
hadFund -	0.52	-0.19	-0.026	-0.04	0.23	0.087	0.01	-0.069	0.12	-0.11	0.0027	-0.2
avgAnnualTemp -	-0.054	0.013	0.012	0.072	-0.14	-0.026	0.027	0.0038	-0.0057	-0.061	-0.23	-0.067
	deploymentRateDiff -	popDensity -	houseRoadDensity -	unemploymentRate -	houseOwnerRate -	maleRate -	ageUnder17Rate -	Between18and24Rate -	ageAbove65Rate -	medianIncome	aboveHighSchoolRate -	aboveBachelorRate -

Figure 2. Correlation Matrix for Each Feature

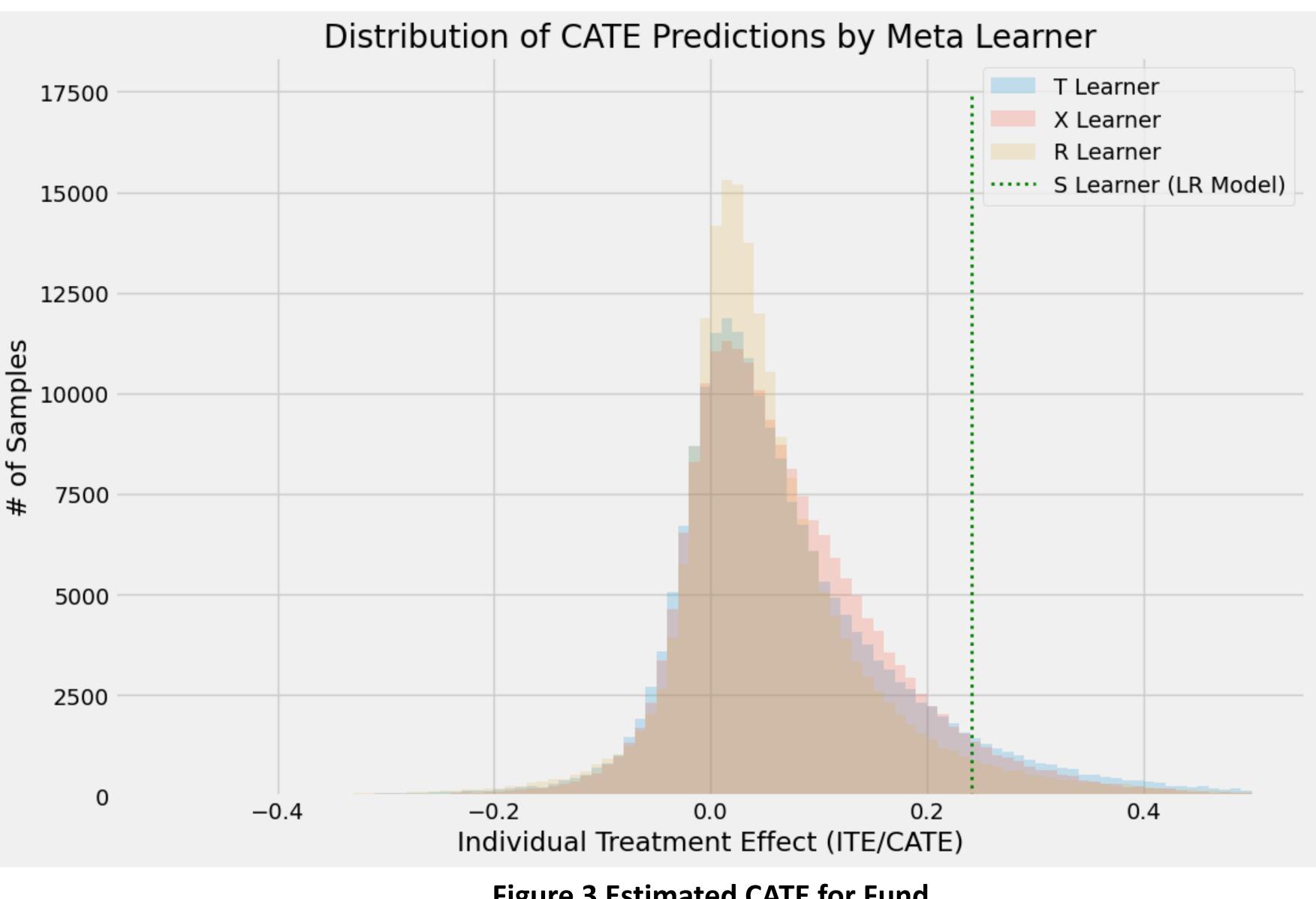
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Results:

Using the Causal Inference, the result is positively significant, which means the funds positively affect broadband deployment in rural areas.



Conclusion & Recommendation:

USAC High-Cost Funds have a positive effect on promoting broadband deployment in rural areas. Considering all other effects, we recommend continuing to apply funds to suitable rural areas to help build broadband across the US.

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References:

Gadiraju, V., Panat, A., Poddar, R., Sherriff, Z., Kececi, S., & Schulzrinne, H. (2018). Who gets broadband when? A panel data analysis of demographic, economic, and technological factors explaining U.S. broadband deployment. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3142479

Data Science Capstone Project with Henning Schulzrinne, **CS** Department

Figure 3 Estimated CATE for Fund





