

Results Presentation

Using Staggered DiD to Measure the Impact of Company Carbon Neutral Pledges on Average Yearly Stock Prices and Media Attention, Complemented by Measures of Pledge Heterogeneity



4/1/2025
Eli Toffel
Economics Thesis

Quick Refresher on Staggered DiD Methodology:

- Staggered DiD is a method to measure difference in difference when treatment occurs at different years.
- My staggered DiD is also a stacked DiD, so pledged companies in year t are compared to companies that will never or have not yet pledged.
- I implement staggered DiDs on average yearly stock prices and media attention using company and year fixed effects.
- All of the coefficients are measured in comparison to “Year - 1,” the year before the carbon neutral pledge is made.

Carbon Pledging Effect On Average Yearly Stock Prices

Key Notes:

- Results are not statistically significant, however parallel trends do seem to hold
- After carbon pledge, Avg Stock drops significantly, and then slowly recover back to pre-pledge rates

Figure 1: Staggered DiD: Effect on Avg. Stock Price

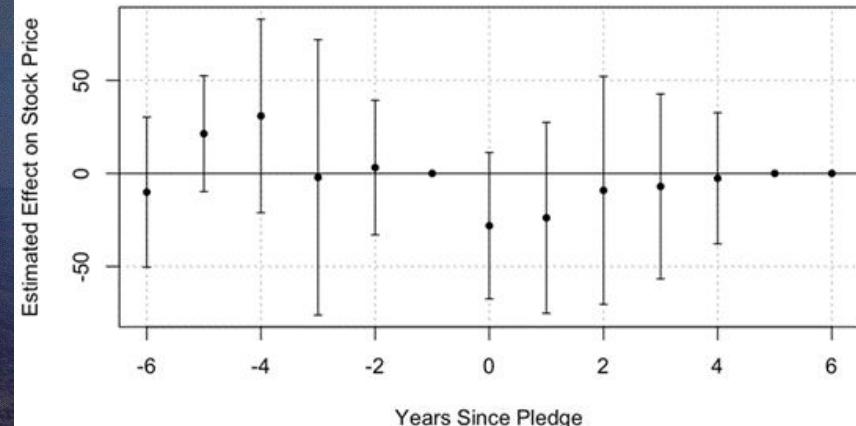


Table 1. Effect of Carbon Neutrality Pledges on Stock Price (Staggered DiD)

stat	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4
estimate	-10.07	21.33	30.88	-2.14	3.15	-28.10	-23.87	-9.11	-6.99	-2.61
std.error	(20.16)	(15.57)	(26.03)	(37.03)	(18.07)	(19.68)	(25.67)	(30.63)	(24.85)	(17.63)

Heterogeneity: Carbon Credit Use

Key Notes:

- These results hint towards investors valuing information on how plans are being accomplished, and those that are not relying on carbon credits are a bit more valued than those that are.
 - Notice y axis
- Parallel trends do not hold

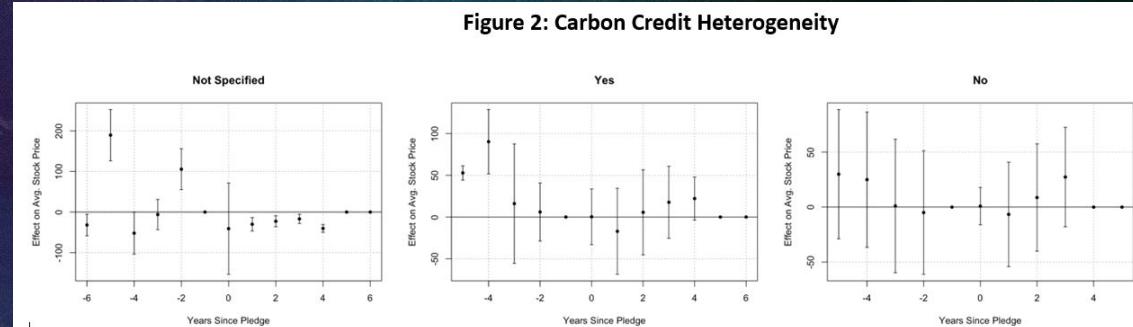


Figure 2: Carbon Credit Heterogeneity

Table 2. Carbon Credit Heterogeneity (Staggered DiD Estimates)

row_label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4
Not Specified	-31.89	189.46	-52.06	-6.16	105.68	-40.98	-30.17	-22.65	-16.91	-40.37
Not Specified SE	12.81	30.55	24.99	18.06	24.48	54.45	8.06	6.49	5.46	4.61
Yes	NA	52.84	90.25	16.05	6.06	0.29	-17.12	5.64	17.69	22.10
Yes SE	NA	4.15	18.87	35.09	17.04	16.37	25.23	24.95	21.14	12.62
No	NA	29.94	24.97	1.05	-4.95	0.88	-6.62	8.72	27.36	NA
No SE	NA	24.04	25.14	24.82	22.95	6.95	19.42	19.96	18.47	NA

Heterogeneity: Interim Year

Key Notes:

- Notice difference in y axis
- Shows no interim target experience much greater negative shock in the first 3 years, however regain and over take interim target
- Investors value information
- Parallel trends do not hold for interim target

Figure 3: Interim Targets

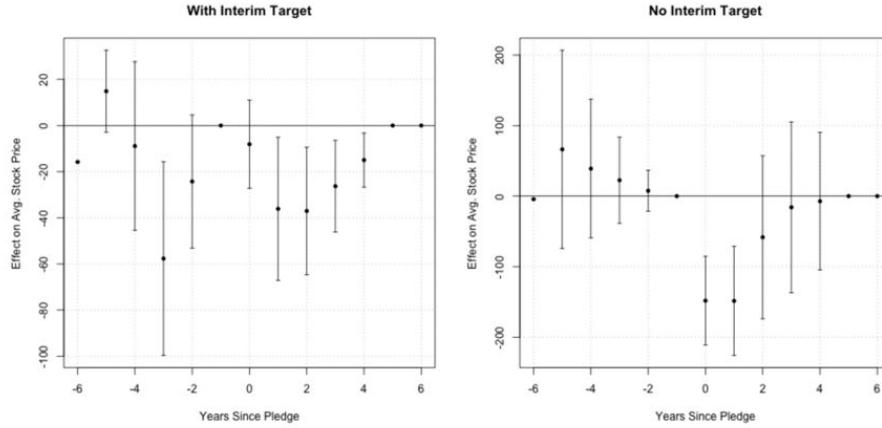


Table 3: Interim Target Heterogeneity (Staggered DiD Estimates)

row_label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4
Interim Target	-15.79	14.88	-8.90	-57.68	-24.25	-8.10	-36.13	-37.05	-26.31	-14.97
Interim Target SE	0.00	8.84	18.22	20.93	14.37	9.55	15.45	13.78	9.89	5.84
No Interim Target	-4.35	66.27	38.93	22.54	7.61	-148.25	-148.62	-58.33	-15.84	-7.22
No Interim Target SE	0.00	63.85	44.63	27.68	13.23	28.60	35.15	52.49	55.06	44.32

Heterogeneity: Complete-by Date

Key Notes:

- Show quite opposite results within this heterogeneity, those that have net zero targets before 2035 have drastically more negative results than those with distant pledges.
- Investors are more scared by immediate change
- Parallel trends do not hold for right plot

Figure 4: Net Zero Target Year Heterogeneity (Staggered DiD Estimates)

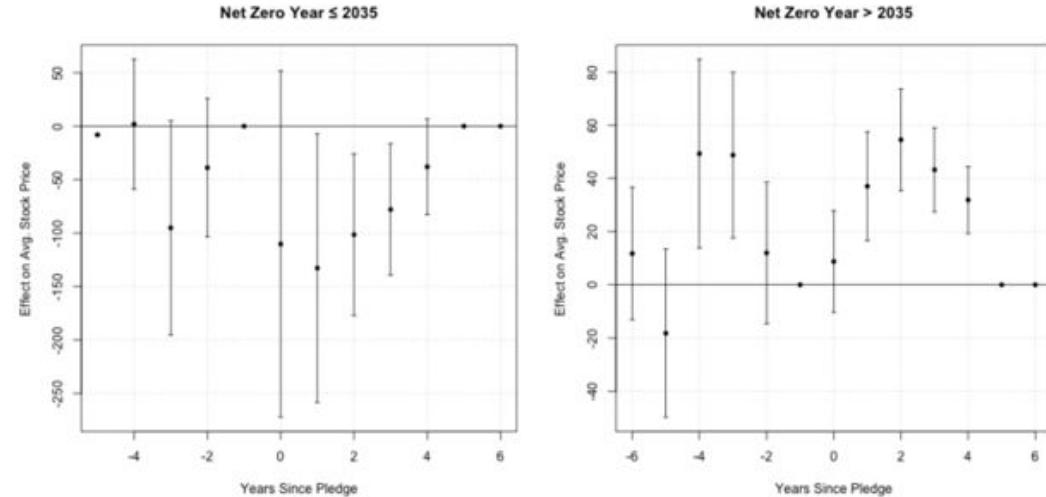


Table 4: Net Zero Target Year Heterogeneity (Staggered DiD Estimates)

row_label	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4	Year -6
Net Zero ≤ 2035	-8.07	1.86	-95.20	-38.89	-110.27	-132.80	-101.57	-77.94	-38.00	NA
Net Zero ≤ 2035 SE	0.00	29.24	48.25	31.15	77.98	60.38	36.33	29.56	21.48	NA
Net Zero > 2035	-18.21	49.26	48.73	11.99	8.77	37.05	54.51	43.23	31.89	11.74
Net Zero > 2035 SE	15.64	17.59	15.45	13.17	9.45	10.11	9.49	7.82	6.22	12.32

Heterogeneity: Accountability

Key Notes:

- I make the assumption that this variable accounts for promises of accountability deliverables in their original plan.
- “Not specified” is relatively congruent to control groups
- Suggests that while investors may be immediately worried about companies planning to document themselves following through with their sustainability plans, the effect of explicitly not planning to deliver accountability measures is much worse for companies’ stock prices.
 - Pay attention to Y axis

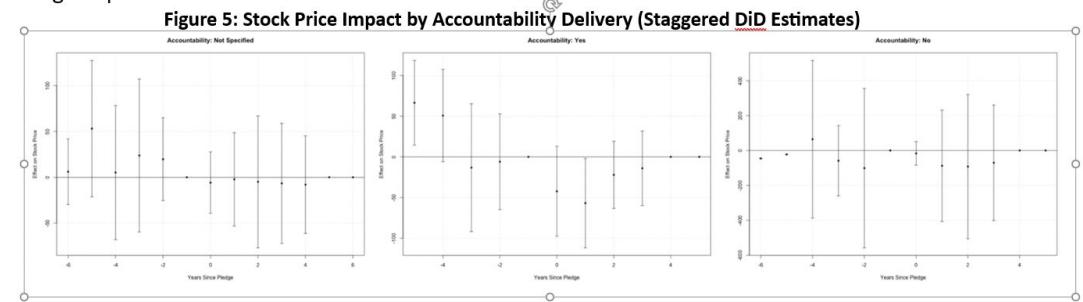


Table 5: Stock Price Impact by Accountability Delivery

label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4
Not Specified	6.03	53.12	5.18	23.72	19.70	-5.84	-2.32	-4.98	-6.64	-8.01
Not Specified (SE)	(17.44)	(36.23)	(35.65)	(40.65)	(21.98)	(16.32)	(24.81)	(35.08)	(31.99)	(25.94)
Yes	NA	66.45	50.75	-13.17	-5.97	-42.20	-56.84	-22.13	-14.06	NA
Yes (SE)	NA	(25.50)	(27.81)	(38.45)	(28.76)	(27.03)	(26.89)	(20.24)	(22.37)	NA
No	-45.38	-22.60	64.68	-58.61	-101.01	-16.54	-87.41	-91.98	-70.11	NA
No (SE)	(0.00)	(0.00)	(162.81)	(72.47)	(164.55)	(24.23)	(114.98)	(148.91)	(119.09)	NA

Carbon Pledging Effect On Media Attention

Key Notes:

- The results on total media is a bit concerning, as there seem to be a clear trend where before companies before pledging had less total media than the control group and the point where this changes is at the year before pledging.
- Surprisingly, negative business articles increase after companies make carbon pledges.
- More congruently with my hypothesis, negative personal articles drop after making a carbon pledge.

Figure 6: Media Coverage

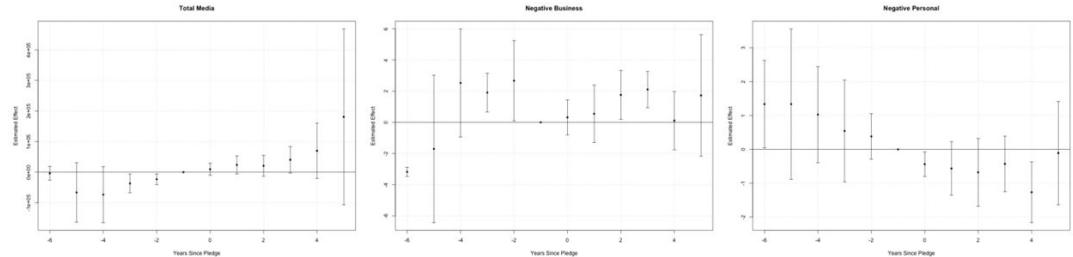


Table 6. Media Coverage (Staggered DiD Estimates)

row_label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Total Media	-3769.00	-66367.83	-73449.31	-36876.81	-23152.17	9491.34	23684.26	20786.30	40385.25	69917.05	180978.00
Total Media SE	11249.93	48753.82	45851.36	15346.76	8814.29	9855.84	14834.39	17079.04	21560.53	45364.54	144289.73
Negative Business	-3.18	-1.70	2.52	1.91	2.67	0.32	0.55	1.76	2.11	0.11	1.73
Negative Business SE	0.15	2.37	1.74	0.62	1.29	0.56	0.92	0.79	0.58	0.93	1.95
Negative Personal	1.34	1.34	1.03	0.54	0.38	-0.44	-0.56	-0.68	-0.43	-1.27	-0.11
Negative Personal SE	0.65	1.11	0.71	0.75	0.34	0.18	0.40	0.50	0.41	0.45	0.77

Heterogeneity: Carbon Credit Use

Key Notes:

- No carbon credits have dramatically less news articles written about them (comparing the first row).
- Companies that pledge to not use carbon credits have consistently less negative personal articles than those that pledge to use credits.

Figure 7: Carbon Credit Heterogeneity

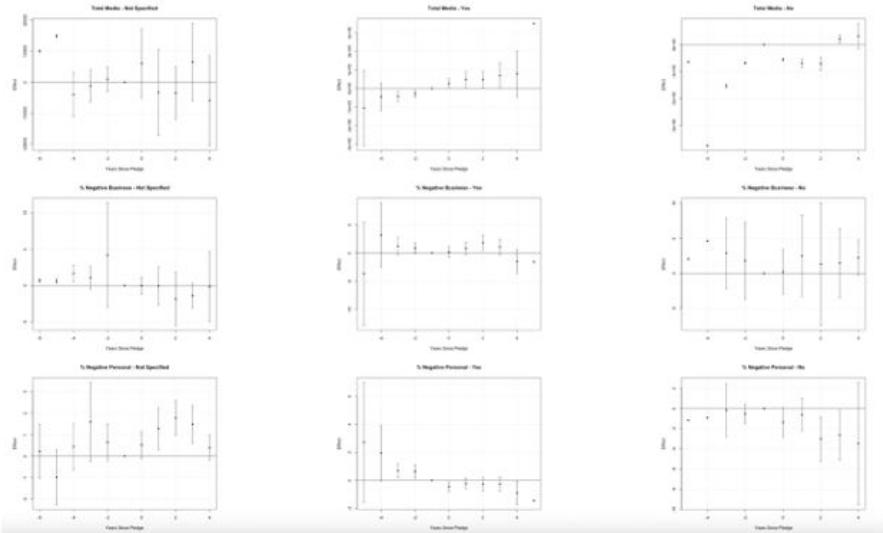


Table 7. Staggered DiD Estimates (Percent Negatives + Total Media)

row_label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Total Media - Not Specified	10010.50	14901.00	-3996.83	-1197.74	944.88	6002.16	-3315.62	-3511.91	6439.00	-5971.00	NA
Total Media - Yes	NA	-105770.67	-44797.25	-43148.95	-28482.00	27258.82	47759.00	47696.32	69374.46	78781.14	349502.00
Total Media - No	NA	-63912.00	-374040.00	-152373.60	-67868.13	-55461.38	-68873.38	-70572.29	21033.33	31911.00	NA
% Negative Business - Not Specified	0.70	0.62	1.68	1.09	4.17	-0.03	-0.06	-1.83	-1.41	-0.14	NA
% Negative Business - Yes	NA	-3.64	3.17	1.18	0.85	0.18	0.82	1.79	1.05	-1.53	-1.59
% Negative Business - No	NA	2.02	4.62	2.89	1.79	0.23	2.49	1.31	1.47	2.22	NA
% Negative Personal - Not Specified	0.22	-0.98	0.44	1.58	0.64	0.51	1.27	1.78	1.48	0.39	NA
% Negative Personal - Yes	NA	2.71	1.96	0.69	0.64	-0.45	-0.22	-0.27	-0.27	-0.90	-1.45
% Negative Personal - No	NA	-1.16	-0.92	-0.17	-0.54	-1.37	-0.61	-3.02	-2.64	-3.47	NA

Heterogeneity: Complete-by Date

Key Notes:

- Net Zero < 2035 have much more total articles post pledge
- Net zero < 2035 have fewer negative business articles post pledge
- Net zero < 2035 have more negative personal articles post pledges

Figure 9: Staggered DiD by Net Zero Year

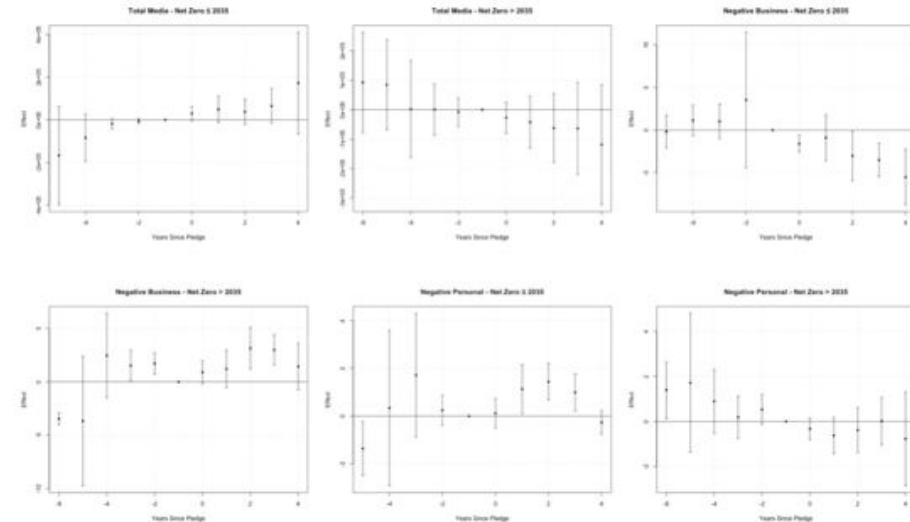


Table 9: Staggered DiD Estimates by Net Zero Year (Estimates Only)

row_label	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4	Year -6
Total Media - Net Zero ≤ 2035	-166948.00	-83237.50	-18422.31	-6011.39	29487.09	49329.80	37848.52	65356.58	171915.14	NA
Total Media - Net Zero > 2035	84498.17	1607.69	261.03	-8560.61	-27643.71	-42548.98	-62319.40	-63963.58	-119339.77	92314.83
Negative Business - Net Zero ≤ 2035	-0.20	1.13	1.02	3.52	-1.61	-0.91	-3.04	-3.50	-5.52	NA
Negative Business - Net Zero > 2035	-3.66	2.46	1.52	1.71	0.89	1.20	3.15	2.99	1.43	-3.45
Negative Personal - Net Zero ≤ 2035	-1.36	0.34	1.71	0.24	0.12	1.13	1.44	0.99	-0.26	NA
Negative Personal - Net Zero > 2035	1.71	0.89	0.19	0.53	-0.33	-0.62	-0.38	0.02	-0.78	1.39

Heterogeneity: Interim Year + Accountability

Figure 8: Interim Target Heterogeneity

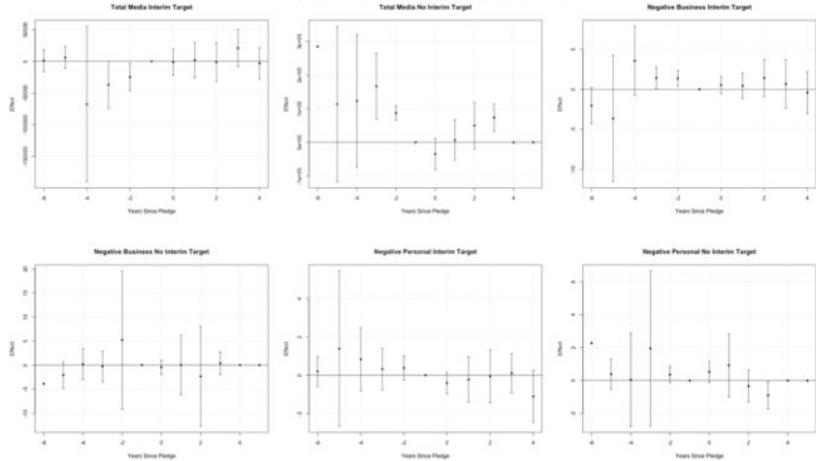


Table 8. Staggered DID Estimates by Interim Target Group (Estimates Only)

row_label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4
Total Media - Interim Target	1017.67	5796.33	-67627.09	-36983.15	-24970.47	-1408.58	2106.76	-1317.20	20795.61	-3400.69
Total Media - No Interim Target	284289.00	113525.50	123133.05	166476.61	86946.96	-35010.96	6859.94	49774.33	73254.25	NA
Negative Business - Interim Target	-2.02	-3.64	3.56	1.44	1.37	0.54	0.45	1.41	0.68	-0.39
Negative Business - No Interim Target	-3.87	-2.07	0.21	-0.28	5.21	-0.48	0.01	-2.33	0.40	NA
Negative Personal - Interim Target	0.19	1.38	0.83	0.32	0.37	-0.41	-0.22	-0.06	0.11	-1.10
Negative Personal - No Interim Target	2.27	0.39	0.05	1.94	0.35	0.52	0.92	-0.33	-0.90	NA

Figure 10: Staggered DiD by Accountability Delivery

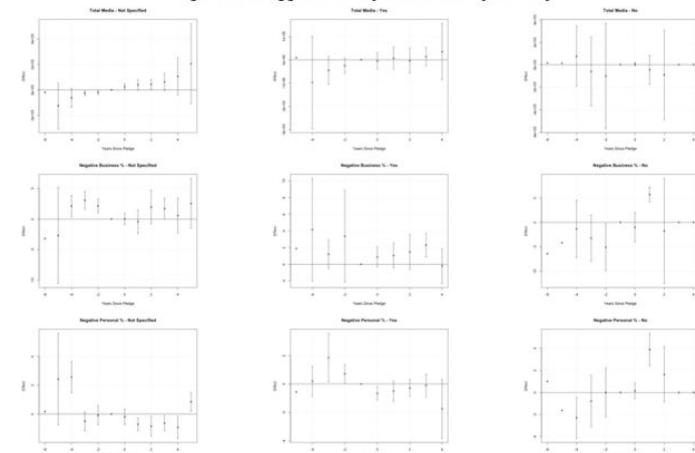


Table 10. Staggered DiD Estimates by Accountability Group (Estimates Only)

row_label	Year -6	Year -5	Year -4	Year -3	Year -2	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Total Media - Not Specified	-186688.00	-123111.00	-62543.86	-25420.05	-18644.48	23743.58	39810.63	43339.39	62770.88	105940.00	204827.50
Total Media - Yes	NA	8728.00	-98294.57	-45743.67	-26084.44	-5348.03	6387.91	-4453.32	12681.28	34282.62	NA
Total Media - No	16800.00	14755.50	74937.25	-60072.12	-100820.75	5143.70	-45705.67	-90587.00	NA	NA	NA
Negative Business % - Not Specified	-3.17	-2.70	2.11	3.07	2.15	0.01	-0.46	1.95	1.70	0.57	2.54
Negative Business % - Yes	NA	1.88	4.16	1.21	3.37	0.88	1.05	1.48	2.29	-0.22	NA
Negative Business % - No	-6.40	-4.19	-1.33	-3.22	-5.08	-1.01	5.67	-1.76	NA	NA	NA
Negative Personal % - Not Specified	0.16	2.42	2.56	-0.51	-0.09	-0.20	-0.72	-0.84	-0.64	-0.92	0.84
Negative Personal % - Yes	NA	-0.56	0.19	1.84	0.72	-0.66	-0.49	-0.29	-0.11	-1.75	NA
Negative Personal % - No	1.01	-1.62	-2.28	-0.78	0.00	0.16	3.87	1.64	NA	NA	NA

No real results, accountability for negative personal %, not specified < Yes < No