Execution Report

Title: **Human-Robot Interactions in Investment Decisions**
Authors: **Milo Bianchi & Marie Brière**

Full reference: Milo Blanchi & Marie Brière "Human-Robot Interactions in Investment Decisions", forthcoming in *Management Science*, March 2024.

The structure and contents of this execution report provided by **cascad** for the certification are similar to those recommended by the AEA Data Editor.

1. DATA DESCRIPTION

This study uses a large set of Employee Saving Plan from January 2016 to June 2021, managed by a leading French asset manager, to study the influence of automated financial advisors on investment decisions. Those datasets are confidential: they can only be accessed within one dedicated machine located in a closed office, after having obtained accreditations.

For a thorough description of the data, please refer to Section 2 of the paper.

2. CODE DESCRIPTION

The verification materials contain one do-file, *dorobo.do*, and one Excel spreadsheet, *preliminary stats Divep alerts MS 2024 04 08 for journal.xlsx*, which sums up all the results. The do-file imports the datasets, perform the analyses, and generate all the Tables (in log-files and in csv format) and Figures, except for Figures 3 and 4. They are generated using Excel, after exporting the contents of the Stata data editor.

3. VERIFICATION STEPS

On March 27, one of the authors reach out to us and requested a **cascad** certification. Then, the author sent us a replication package including all the article, the code, an Excel spreadsheet, and a readme file. Given the confidential nature of the data, we agreed that the best course of action was to conduct an online verification on Teams, which took place on April 9. The author shared the screen of the dedicated machine and ran the code in Stata. The cascad verifier watched for any error during the whole process. It took the code around one hour to run and no issue occurred. Once this was done, the author sent us all the results generated by email in a zip file.

==We reproduced Tables 1-7, A1-A4 and Figures 1-4 with accuracy.==

4.1 TABLE 1: DESCRIPTIVE STATISTICS

Panel A: Statistics by Individual
Takers:

```
    Variable |         p5       Mean        p95         SD          N
-------------+-----------------------------------------------------------
 i_age_group |         27   44.76099         62   11.01486      14191
       i_sex |          0   .2817983          1   .4498914      14191
i_ass_disp~p |   128.4835    5089.88   20603.03   11221.58      14191
 i_ass_group |    183.445    14144.6   63520.23   31583.96      14191
i_amountr~up |          0   1504.043    6553.27   2776.734      14191
i_nbdisp_g~p |          1   2.522148   6.823529   1.992632      14191
i_nbconnec~p |          0   .8054532   2.833333   2.543733      14191
i_w_disp_e~p |          0   .1638069   .5448883   .1935578      14141
i_ret_dis~up |  -.0022799   .0570495   .1848675   .0798683      12153
-------------+-----------------------------------------------------------
```

Curious:

```
    Variable |         p5       Mean        p95         SD          N
-------------+-----------------------------------------------------------
 i_age_group |         28   45.91783         64   11.53147      18848
       i_sex |          0   .3587649          1   .4796507      18848
i_ass_disp~p |   190.5456   8504.448   33035.14   18745.41      18848
 i_ass_group |    293.525   21009.65   87840.73   41751.57      18848
i_amountr~up |          0   1927.723   7417.073   3048.553      18848
i_nbdisp_g~p |          1   2.552085       6.25   1.954832      18848
i_nbconnec~p |          0   .8871063       3.25     2.4539      17069
i_w_disp_e~p |          0   .1584852   .5390455   .1903174      18793
i_ret_dis~up |  -.0026409   .0602876   .2057096   .0811094      17673
-------------+-----------------------------------------------------------
```

Not takers:

```
    Variable |         p5       Mean        p95         SD          N
-------------+-----------------------------------------------------------
 i_age_group |         27   45.98942         68   12.86632      19718
       i_sex |          0   .4180748          1   .4932551      19707
i_ass_disp~p |   31.51188   5425.161   23518.93   15486.45      19718
 i_ass_group |   46.58852   11262.64   50937.57   33602.73      19718
i_amountr~up |          0    917.376   4630.862   2288.403      19718
i_nbdisp_g~p |          1   2.076821          5   1.552872      19718
i_nbconnec~p |          0   .3031493   1.166667   1.280037      19718
i_w_disp_e~p |          0   .1191573   .5016733   .1924873      19640
i_ret_disp~p |  -.0028279   .0452789   .1964593   .0785289      18533
-------------+-----------------------------------------------------------
```

Not exposed:

```
    Variable |         p5        Mean         p95          SD           N
-------------+------------------------------------------------------------
 i_age_group |         28    48.20393          70    13.12228       19188
       i_sex |          0    .3165407           1    .4651388       18917
i_ass_disp~p |   60.72826    8592.147    36035.56    27504.55       19189
 i_ass_group |   85.05345    20246.92       89422    51907.41       19189
i_amountr~up |          0    899.7142    4502.336    2035.167       19189
i_nbdisp_g~p |          1     2.28712           6    2.034114       19189
i_nbconnec~p |          0     .418353    1.666667     1.65657       19189
i_w_disp_e~p |          0    .1162799    .5080968     .201973       19144
i_ret_dis~up |  -.0698231    .0623048    .2512508    .1178076       17616
-------------+------------------------------------------------------------
```

Panel B: Statistics by Contract and Month

```
    Variable |         p5        Mean         p95          SD           N
-------------+------------------------------------------------------------
       i_age |         30    48.36155          65    11.17672     4795438
       i_sex |          0    .3615161           1    .4804396     4795438
  i_ass_disp |          0    9129.986    41751.62     25208.9     4795438
       i_ass |   139.7282    34811.31    139757.5    61820.74     4795438
i_amountre~r |          0    2404.584      9269.6    3690.146     4795438
    i_nbdisp |          1    4.214543          10    2.865143     4795438
i_nbconnec~h |          0    1.006416           4    3.173018     1697422
i_nbarb_disp |          0    .0478225           0    .2904249     4795438
i_nba~p_disp |          0     .011493           0    .1100548     4795438
i~eauto_disp |          0    .0166708           0    .2278405     4795438
i_ret_disp~l |  -.0945351    .0348811    .2419184    .1319204     3174911
i_ret_disp~p |  -.0061781    .0635141    .2495387    .0982959     3173832
i_equitysh~e |          0    .2163434    .8024911    .2601568     2782081
-------------+------------------------------------------------------------
```

4.2. TABLE 2: INVESTORS' ATTENTION AND TRADING

Dep. Variable	Number of connections			Trades	Robo(>t)	Individual
Robo treated*after	0.283***	0.270***	0.140***	0.094***	0.044***	0.003
Std. Err.	(0.074)	(0.080)	(0.040)	(0.014)	(0.004)	(0.002)
Obs	881,087	675,586	871,373	3,589,424	3,589,424	3,589,424
R² within	0.01	0.01	0.01	0.01	0.01	0.00

4.3. TABLE 3: ALERTS AND REBALANCING

Dep. Variable	(1)	(2)	(3)	(4)	(5)
Robo treated*Alert	0.308***	0.295***	-0.046***		
Std. Err.	(0.051)	(0.048)	(0.004)		
Alert	0.144	0.104***	0.040***	-0.006***	
Std. Err.	(0.117)	(0.015)	(0.004)	(0.001)	
Alert MIF					0.001*
Std. Err.					(0.001)
Obs	208,705	1,434,041	1,286,735	679,577	614,292
R² within	0.01	0.15	0.01	0.00	0.00

4.4. TABLE 4: EQUITY EXPOSURE AND RETURNS

	(1)	(2)	(3)	(4)	(5)
Robo treated*after	0.030***	0.026***	0.023***	0.026***	0.021***
Std. Err.	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)
Equity share			0.095***		0.136***"
Std. Err.			(0.007)		(0.006)
Obs	2,782,081	3,174,911	3,174,652	3,173,599	3,173,326
R² within	0.01	0.00	0.01	0.01	0.05

4.5. TABLE 5: EQUITY EXPOSURE AND RETURNS: COMPARING TO CURIOUS CLOSE

	(1)	(2)	(3)	(4)	(5)
Robo treated*after	0.011**	0.012***	0.010***	0.011***	0.009***
Std. Err.	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)
Equity share			0.096***		0.139***
Std. Err.			(0.008)		(0.006)
Obs	1,127,745	1,275,225	1,275,225	1,273,690	1,273,690
R² within	0.00	0.01	0.02	0.01	0.08

4.6. TABLE 6: ROBO REBALANCING

	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.002***		0.002***	0.003***		0.003***
Std. Err.	(0.000)		(0.000)	(0.000)		(0.000)
Female	-0.015***		-0.019***	0.017***		0.021***
Std. Err.	(0.004)		(0.004)	(0.003)		(0.003)
Total account value (ln)	0.013***		0.009***	-0.019***		-0.034***
Std. Err.	(0.001)		(0.001)	(0.001)		(0.001)
Variable remuneration (10k)	-0.001		0.000	-0.007***		-0.004***
Std. Err.	(0.001)		(0.001)	(0.000)		(0.000)
Past equity share	-0.046***		-0.054***	-0.051***		-0.101***
Std. Err.	(0.009)		(0.009)	(0.006)		(0.006)
Past returns	0.003		-0.367***	0.153**		-0.147**
Std. Err.	(0.106)		(0.108)	(0.066)		(0.070)
Bear market		-0.257***	-0.257***		-0.001	0.007
Std. Err.		(0.005)	(0.005)		(0.005)	(0.005)
Obs	70,358	70,579	70,358	62,453	63,052	62,453
R² within	0.01	0.03	0.04	0.03	0.00	0.04

4.7. TABLE 7: CONTROL GROUPS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated*after	0.270**	0.299***	0.093***	0.090***	0.046***	0.051***	0.029***	0.042***
Std. Err.	(0.097)	(0.090)	(0.018)	(0.016)	(0.004)	(0.005)	(0.005)	(0.008)
Obs	832,283	808,816	3,676,837	3,835,642	2,781,104	2,851,673	3,202,133	3,300,663
R² within	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01
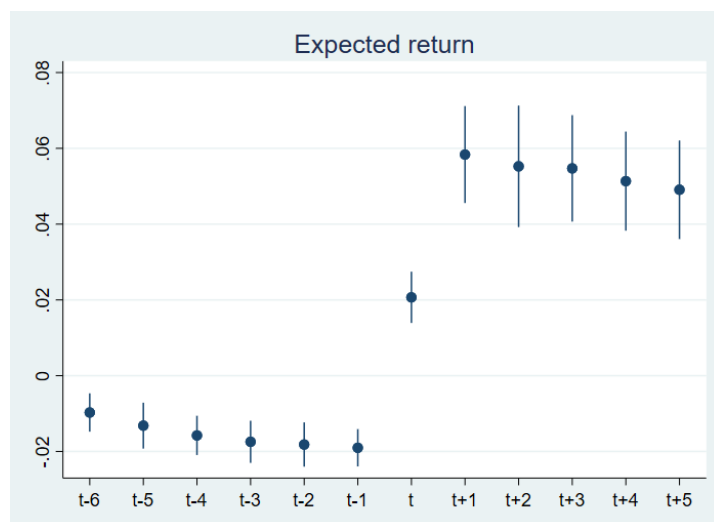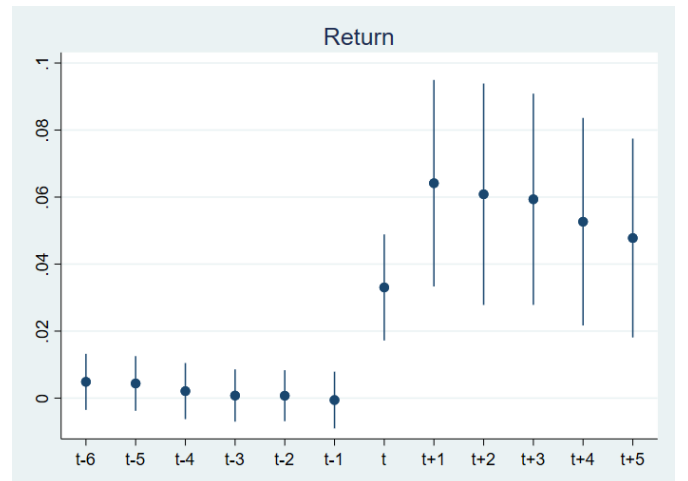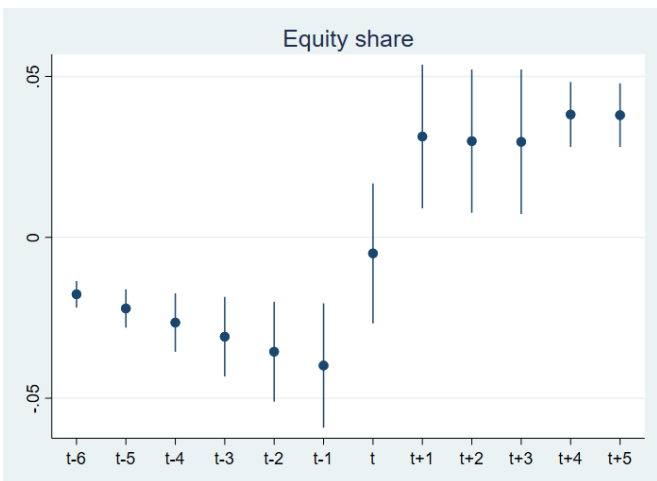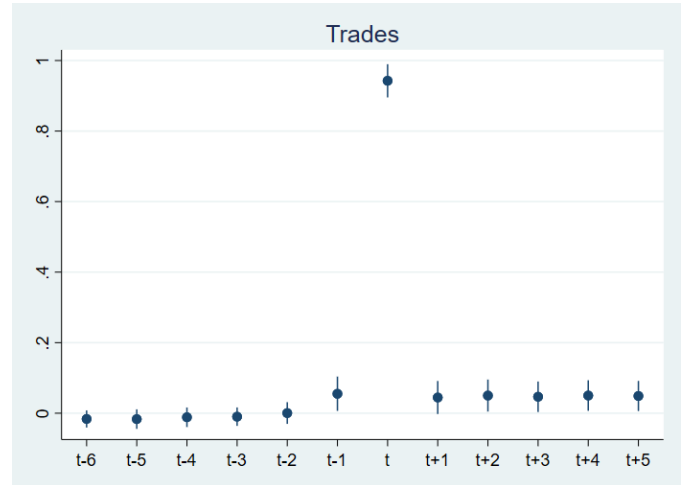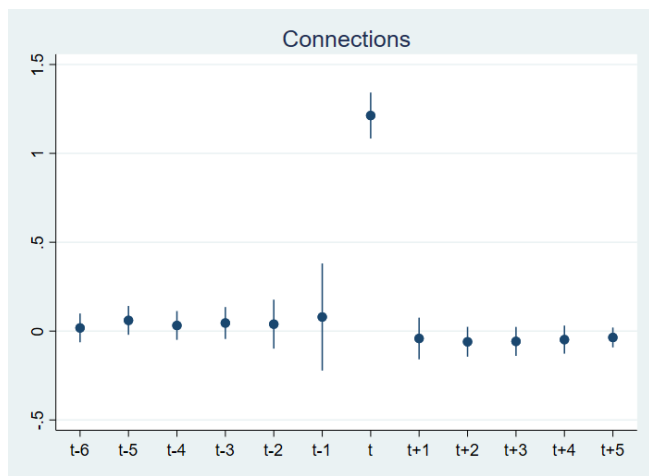
Connections

Rebalancer

Change in distance
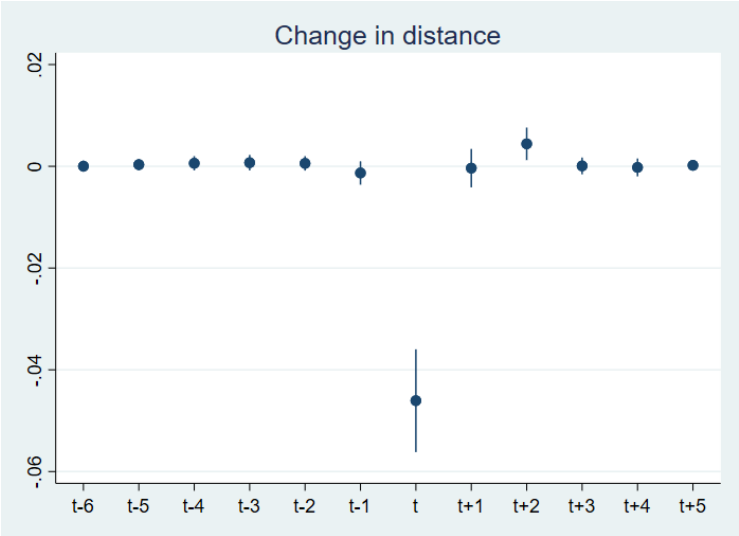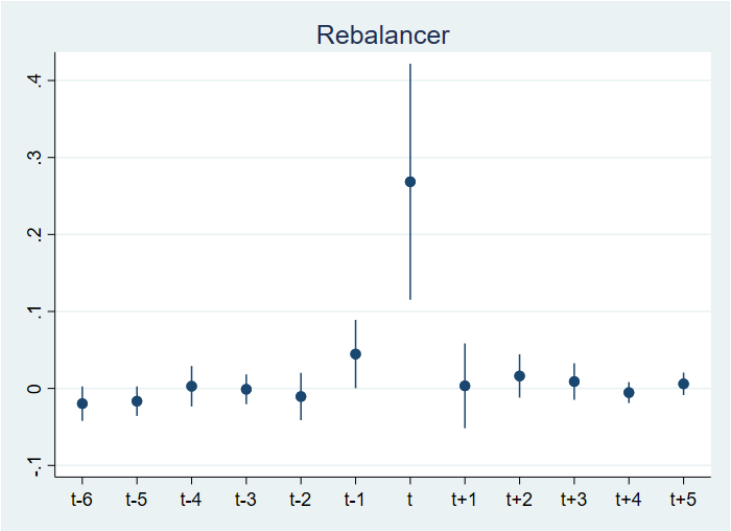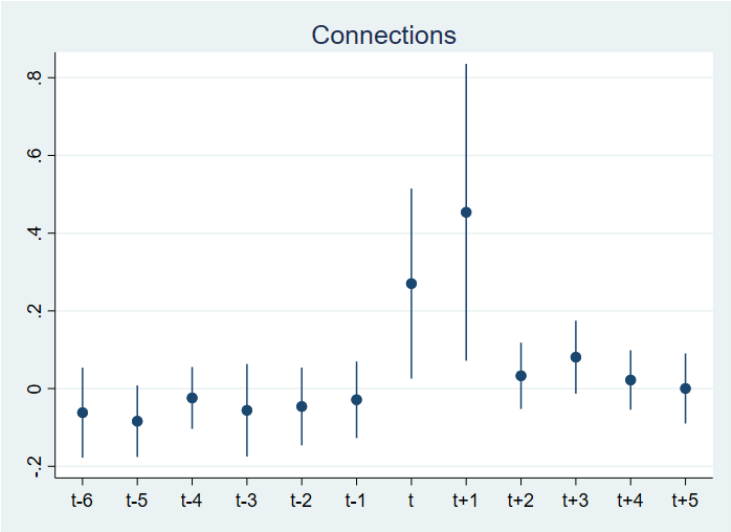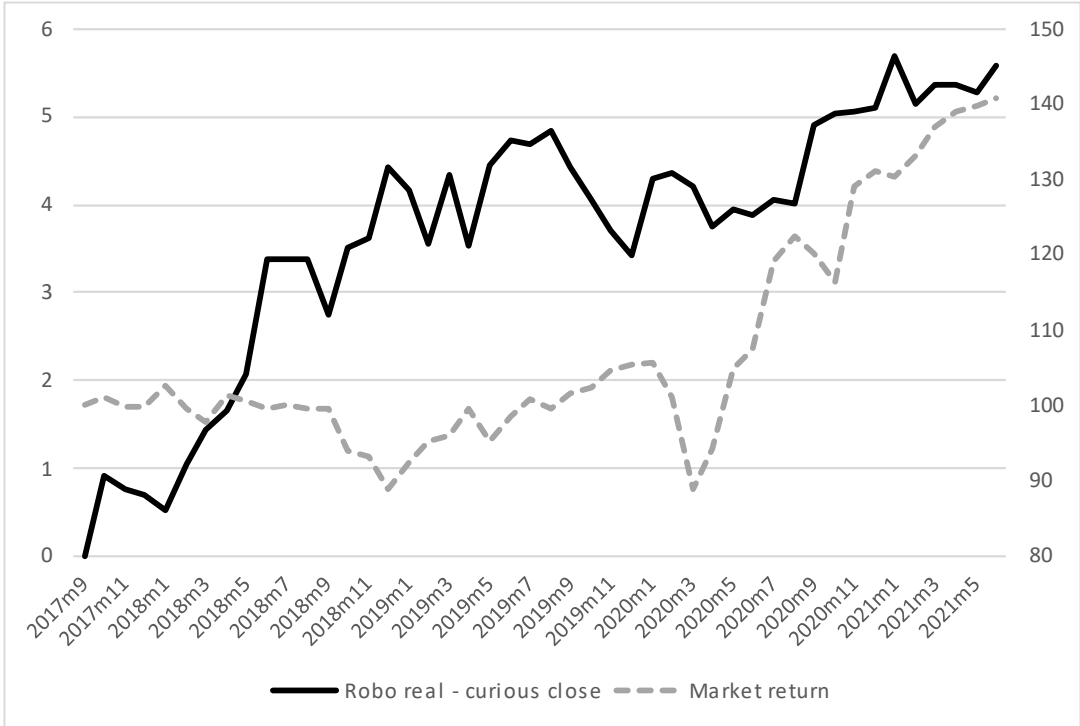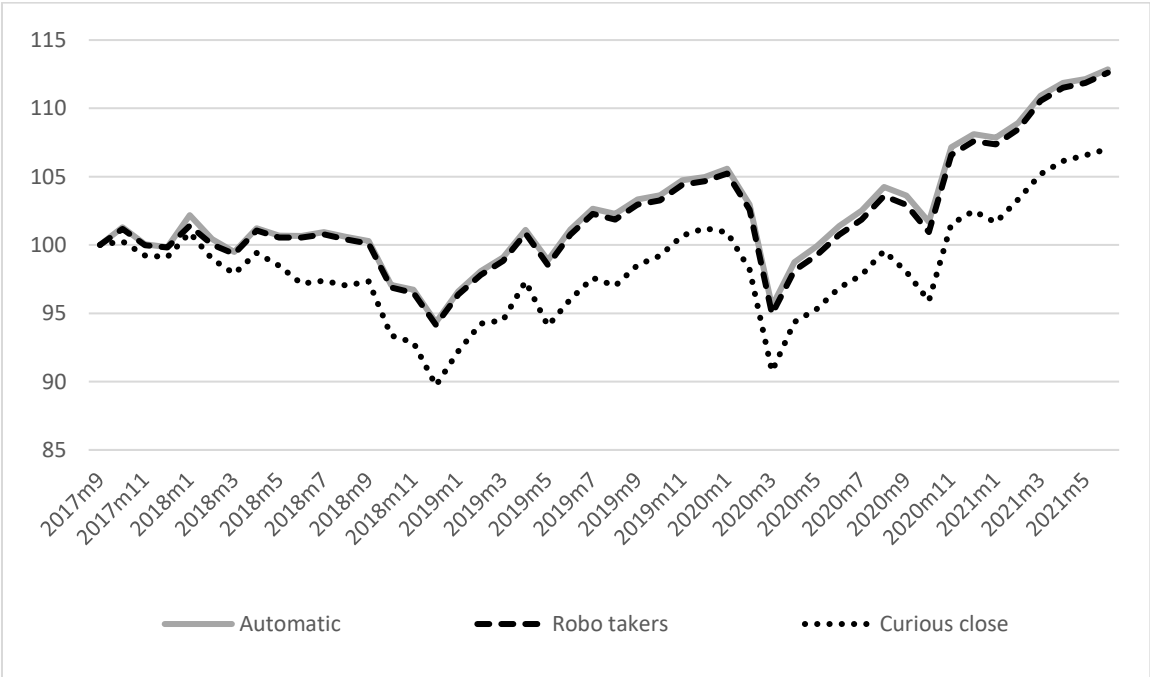
4.12. TABLE A1: REBALANCING AND CURIOUS CLOSE

Dep. Variable	(1)	(2)	(3)
Robo treated*Alert	0.329***	0.309***	-0.035***
Std. Err.	(0.077)	(0.044)	(0.003)
Alert	0.130	0.096***	0.029***
Std. Err.	(0.101)	(0.018)	(0.004)
Obs	124,835	904,441	817,907
R² within	0.01	0.17	0.01

4.13. TABLE A2: CURIOUS CLOSE: 10% THRESHOLD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Robo treated*alert	0.305***	0.316***	-0.034***				
Std. Err.	(0.070)	(0.043)	(0.003)				
Alert	0.169*	0.090***	0.028***				
Std. Err.	(0.095)	(0.019)	(0.004)				
Robo treated*after				0.018***	0.016***	0.016***	0.013***
Std. Err.				(0.004)	(0.003)	(0.003)	(0.002)
Equity share					0.097***		0.140***
Std. Err.					(0.008)		(0.006)
Obs	117,525	858,336	776,206	1,447,895	1,447,895	1,446,362	1,446,362
R² within	0.01	0.18	0.01	0.01	0.02	0.01	0.07

4.14. TABLE A3: CURIOUS CLOSE: 15% THRESHOLD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Robo treated*alert	0.329***	0.309***	-0.035***				
Std. Err.	(0.077)	(0.044)	(0.003)				
Alert	0.13	0.096***	0.029***				
Std. Err.	(0.101)	(0.018)	(0.004)				
Robo treated*after				0.021***	0.018***	0.019***	0.015***
Std. Err.				(0.004)	(0.004)	(0.003)	(0.003)
Equity share					0.097***		0.140***
Std. Err.					(0.008)		(0.006)
Obs	124,835	904,441	817,907	1,583,096	1,583,096	1,581,592	1,581,592
R² within	0.01	0.17	0.01	0.01	0.02	0.01	0.07

4.15. TABLE A4: IV ESTIMATES

	(1)	(2)	(3)	(4)
Robo treated*alert	0.163**	0.0666**	0.0977***	0.0619***
Std. Err.	(0.0747)	(0.0267)	(0.00909)	(0.0149)
Fraction of treated employees	14.309***	3.225***	2.519***	3.064***
Std. Err.	1.918	0.330	0.345	0.362
F-Stat (first stage)	55.67	95.55	53.21	71.66
Obs	807,785	3,823,101	2,843,430	3,290,246
R² centered	0.0110	0.0061	0.0045	0.0083