Internet Appendix for "Dissecting Green Returns"

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Contents

This Internet Appendix presents additional results mentioned in the paper.

1. Additional results on German twin bonds

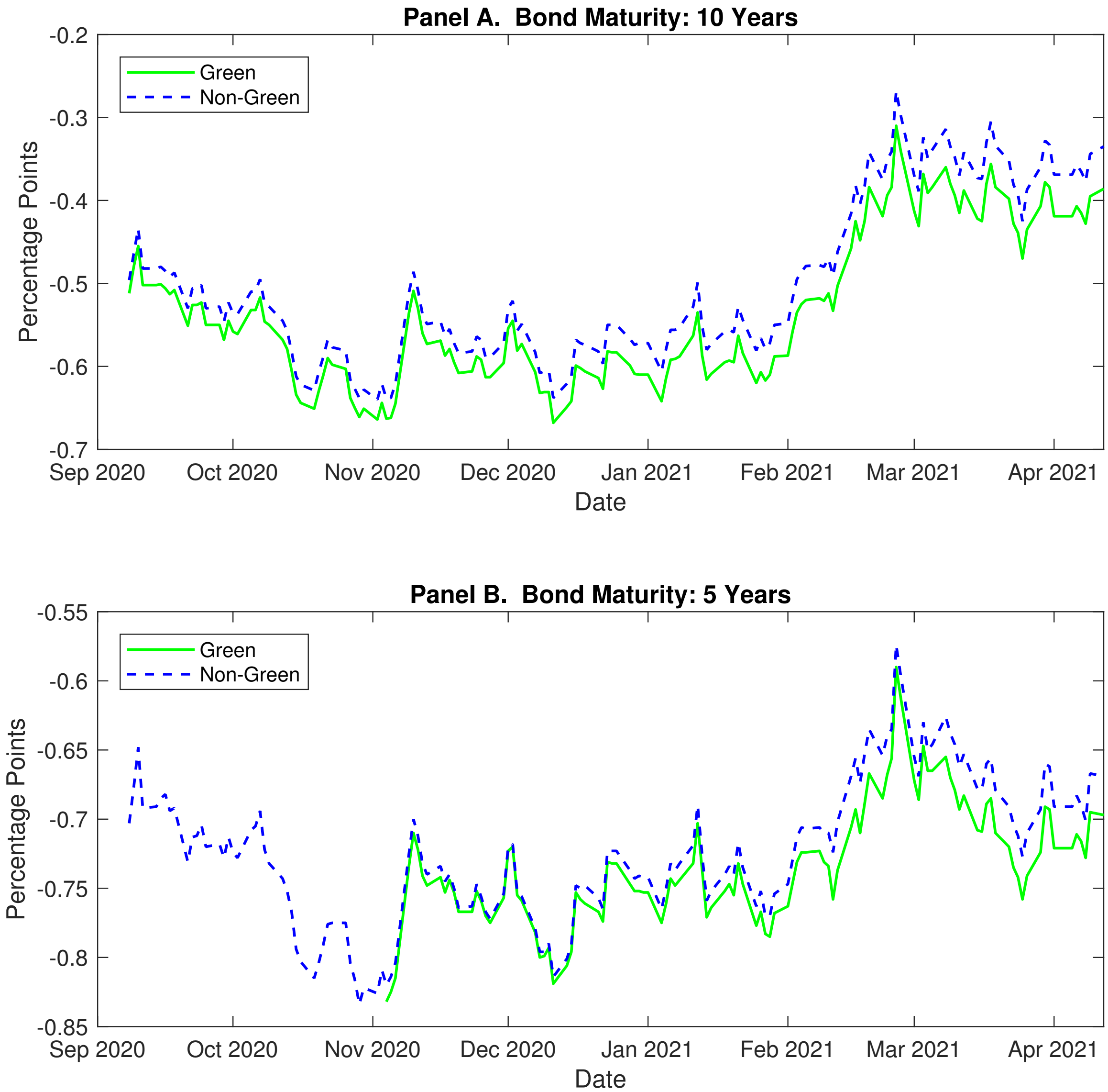


Figure A.1. Yields of German twin bonds. The figure plots the daily time series of mid-yields to maturity for the German government's twin bonds: green and non-green. Panel A focuses on 10-year bonds; Panel B on 5-year bonds. The yields are plotted since the first date of trading of the green bond, which is September 8, 2020 for the 10-year bond and November 4, 2020 for the 5-year bond. The yields are in percent per year.

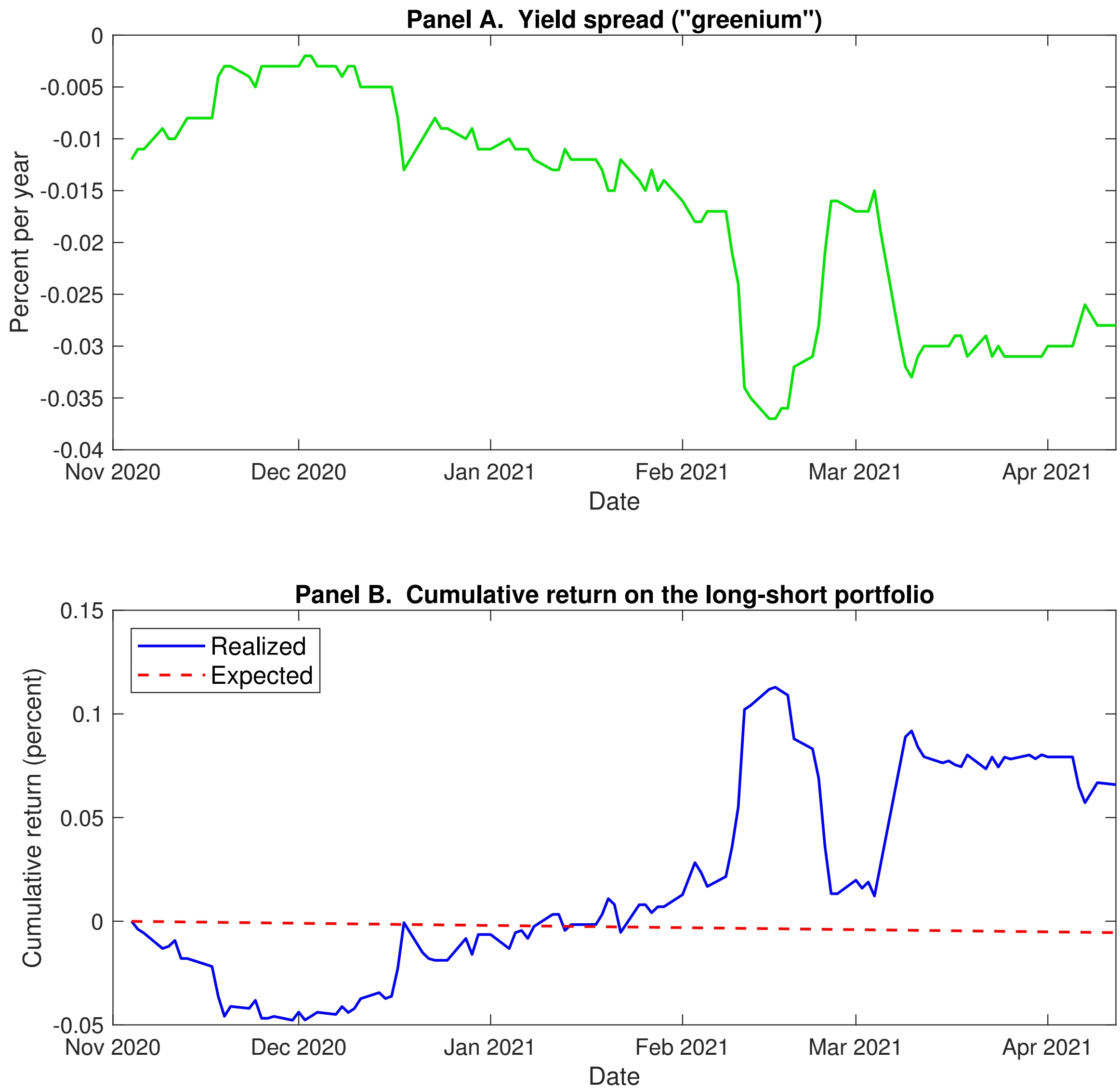


Figure A.2. German twin bonds: Five-year maturity. Panel A plots the daily time series of the "greenium," the difference between the yields of the German government's 5-year green bond and its non-green twin, in annual terms. Panel B plots the performance of a portfolio that goes long the 5-year green bond and short its non-green twin. The solid line plots this long-short portfolio's daily cumulative realized return. The dashed line plots the expected cumulative return as of the first day of trading of the green bond (November 4, 2020), absent a subsequent change in the greenium, which was −1.2 basis points on that day.

2. Industry-adjusted green factor

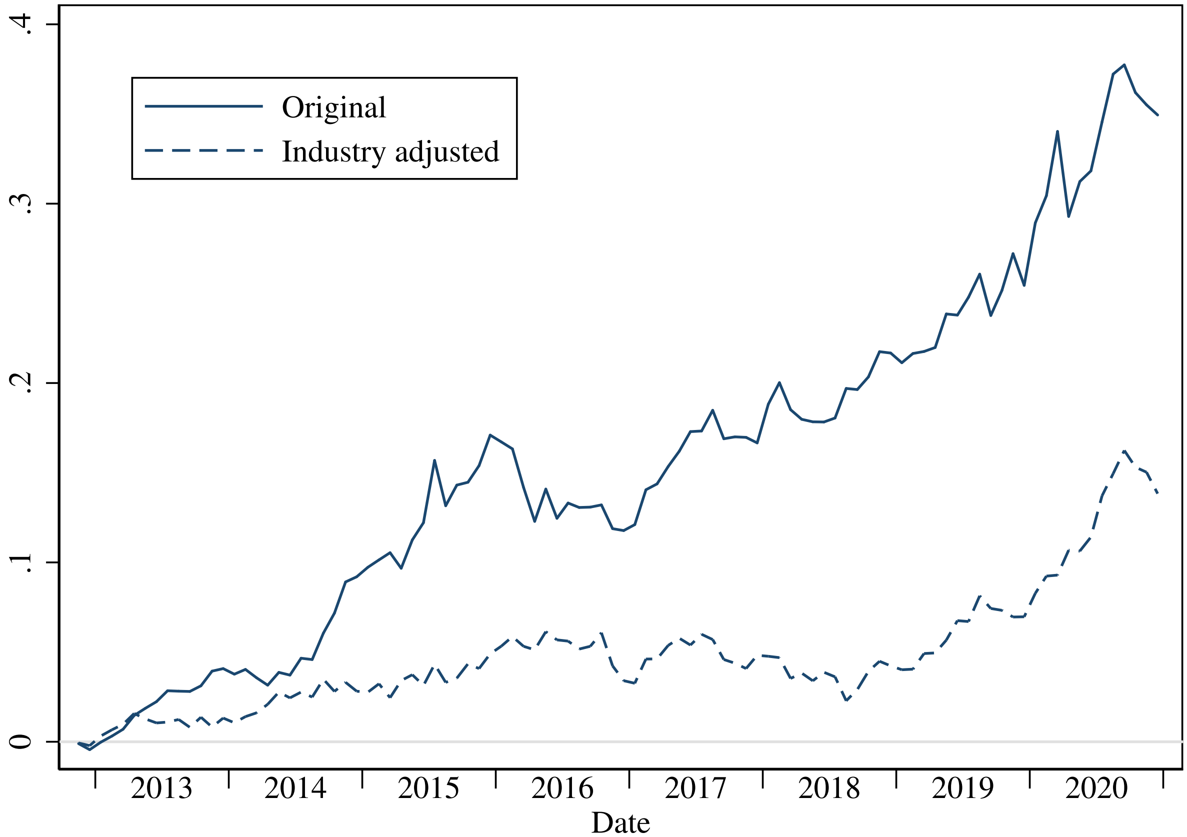


Figure A.3. Comparing the original and industry-adjusted green factors. The solid line is the same as in Figure 3 in the paper. The dashed line shows the cumulative return on the industry-adjusted green factor. We create that factor by de-meaning stocks' $g_{i,t-1}$ values at the industry-by-month level, then repeating the construction of the green factor using those de-meaned $g_{i,t-1}$ values.

Table A.1
Performance of the industry-adjusted green factor

This table is the same as the paper's Table 2, except this table uses the industry-adjusted green factor rather than the original green factor as the dependent variable. The industry-adjusted green factor is defined in the previous figure.

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.134	0.134	0.0537	0.0553	0.0600	0.0527
	(2.01)	(1.99)	(1.06)	(1.09)	(1.30)	(1.03)
Mkt-RF		0.000171	0.0457	0.0437	0.0380	0.0480
		(0.01)	(2.53)	(2.06)	(2.43)	(2.65)
SMB			-0.169	-0.171	-0.207	-0.171
			(-8.15)	(-8.59)	(-10.11)	(-6.82)
HML			-0.0615	-0.0667	-0.0666	-0.0674
			(-2.56)	(-2.27)	(-4.05)	(-1.96)
UMD				-0.00842		
				(-0.36)		
LIQ					0.0639	
					(3.62)	
RMW						-0.00958
						(-0.27)
CMA						0.0213
						(0.38)
Observations	98	98	98	98	98	98
R^2	0.000	0.000	0.458	0.459	0.523	0.459

3. Measuring changes in climate concerns using AR(1) innovations

Our main analysis measures changes in climate concerns as ΔC_t, which is computed by applying a distributed-lag model to the monthly MCCC index. We now use an alternative measure equal to the AR(1) innovation in the monthly MCCC index. To compute the AR(1) innovation in MCCC in month t, we follow Ardia et al. (2021) and estimate rolling AR(1) models using the 36 months of MCCC data ending in month $t-1$ (including data before November 2012), and we set the AR(1) innovation equal to the prediction error for $MCCC_t$. These AR(1) innovations have a 94% correlation with the ΔC_t measure used in the main paper.

Table A.2
Version of paper's Table 4 using AR(1) innovations in MCCC

This table is the same as Table 4 in the paper, except we measure changes in climate concerns using AR(1) innovations in the monthly MCCC index. Details on constructing the AR(1) innovations are above.

	(1)	(2)	(3)
MCCC AR(1) innov. (same month)	0.00825	0.00493	0.00539
	(1.37)	(0.82)	(0.88)
MCCC AR(1) innov. (prev. month)	0.0229	0.0198	0.0205
	(3.15)	(2.59)	(2.69)
Earnings announcement returns		0.562	0.489
		(0.98)	(0.80)
Delta Earnings forecasts		0.285	0.328
		(0.50)	(0.52)
ESG flows			0.0485
			(0.49)
ESG assets			-0.00155
			(-0.59)
Constant	0.000170	0.000364	0.00167
	(0.13)	(0.27)	(0.30)
Observations	68	68	68
R^2	0.159	0.179	0.172

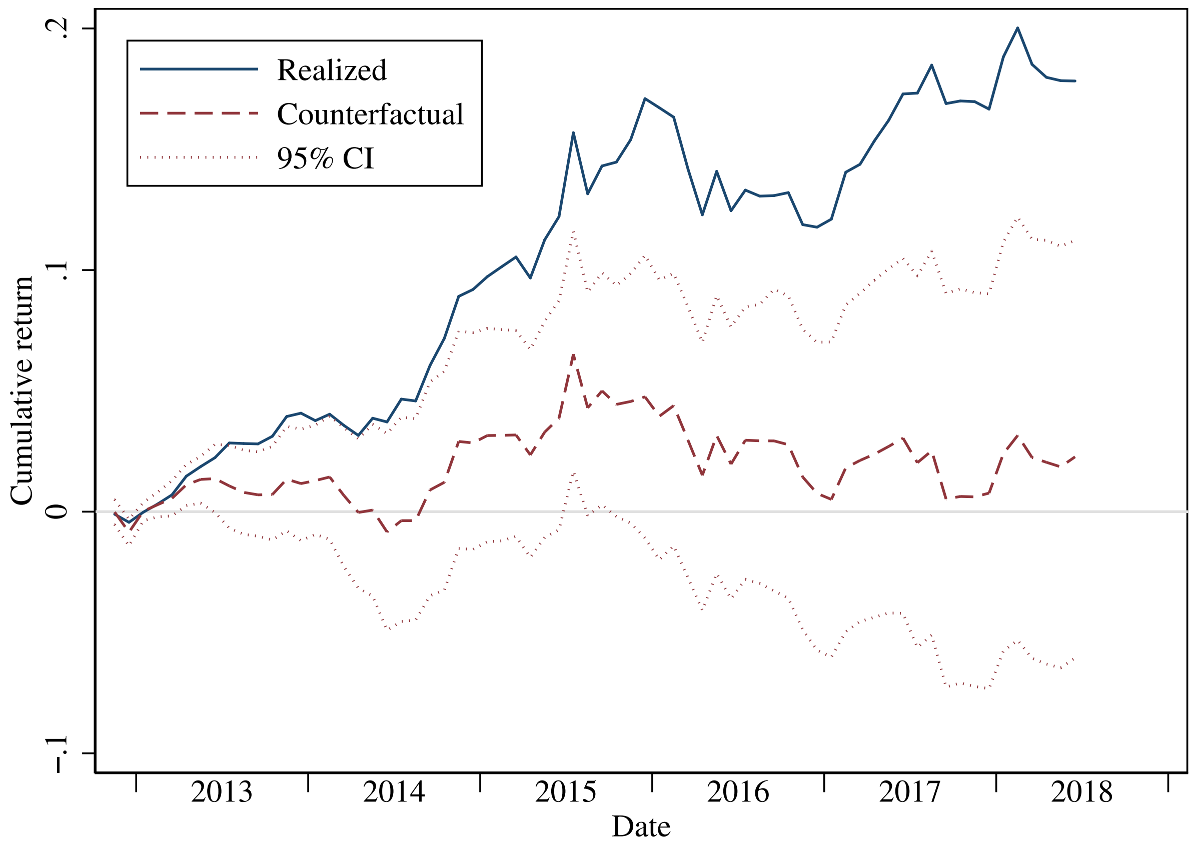


Figure A.4. Version of paper's Figure 5 using AR(1) innovations in MCCC. Details are the same as in Figure 5 in the paper, but the analysis replaces ΔC with the AR(1) innovation in the MCCC index. Details on constructing the AR(1) innovations are above.

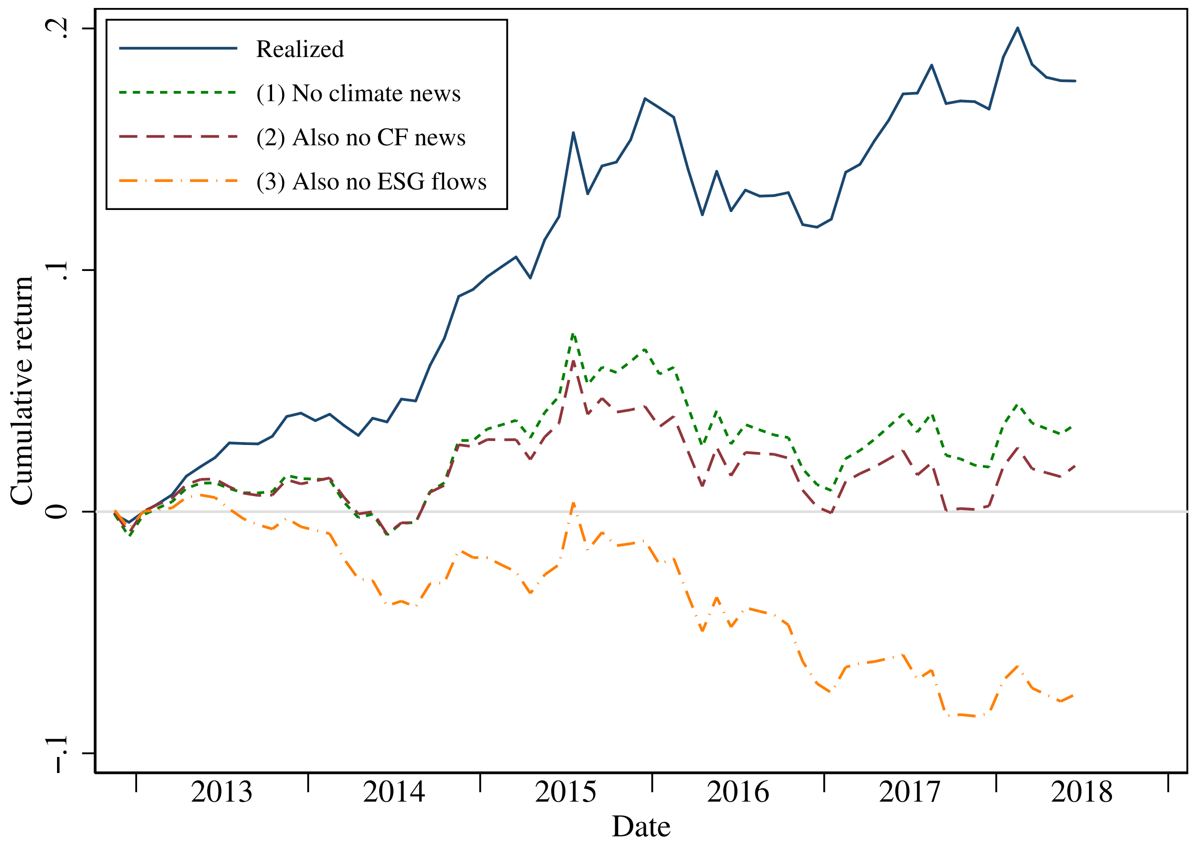


Figure A.5. Version of paper's Figure 6 using AR(1) innovations in MCCC. Details are the same as in Figure 6 in the paper, but the analysis replaces ΔC with the AR(1) innovation in the MCCC index. Details on constructing the AR(1) innovations are above.

4. Earnings news and stock returns

Table A.3

How much stock return variance is explained by measures of earnings news?

This table shows results from panel regressions of quarterly stock returns on contemporaneous earnings-news measures and quarter fixed effects. Earnings announcement ret. is the stock's sum of the three-trading-day excess returns (stock minus market) around earnings announcements and management earnings forecasts (if available) during the quarter. Delta earnings forecast is the change in analysts' mean long-term earnings growth rate forecast for the stock during the quarter. The bottom row shows the R-squared from a regression of stock returns on quarter fixed effects only. The gap between that R-squared and the R-squared in the penultimate row measures the fraction of return variance explained by the earnings-news variable. Robust t-statistics clustered by quarter are in parentheses.

	(1)	(2)
Earnings announcement ret.	1.017	
	(22.57)	
Delta earnings forecast		0.290
		(8.84)
Observations	60057	64134
R^2	0.371	0.225
R^2 (FEs only)	0.201	0.222

5. Results using alternative alphas

Table A.4
Versions of paper's Table 5 using alternative alphas

This is the same as Table 5 in the paper, except we use different measures of the green factor's alpha as the dependent variable. Panel A shows results using Fama and French (2015) five-factor alphas, Panel B shows results using Carhart (1997) four-factor alphas, and Panel C shows results using Pástor and Stambaugh (2003) four-factor alphas. We estimate these alphas in time-series regressions of the monthly green factor on the other factors, using data from November 2012 to June 2018. We set each month's "alpha" equal to the estimated intercept plus residual.

Panel A: Fama-French five-factor alphas

	(1)	(2)	(3)
Delta Climate concerns (same month)	0.00466	0.00357	0.00143
	(0.93)	(0.68)	(0.24)
Delta Climate concerns (prev. month)	0.0166	0.0154	0.0148
	(3.13)	(2.75)	(2.63)
Earnings announcement returns		0.0803	0.321
		(0.20)	(0.70)
Delta Earnings forecasts		0.274	0.0547
		(0.60)	(0.11)
ESG flows			-0.0638
			(-0.71)
ESG assets			-0.000923
			(-0.38)
Constant	-0.00000248	0.000117	0.00539
	(-0.00)	(0.11)	(1.08)
Observations	68	68	68
R^2	0.155	0.162	0.109

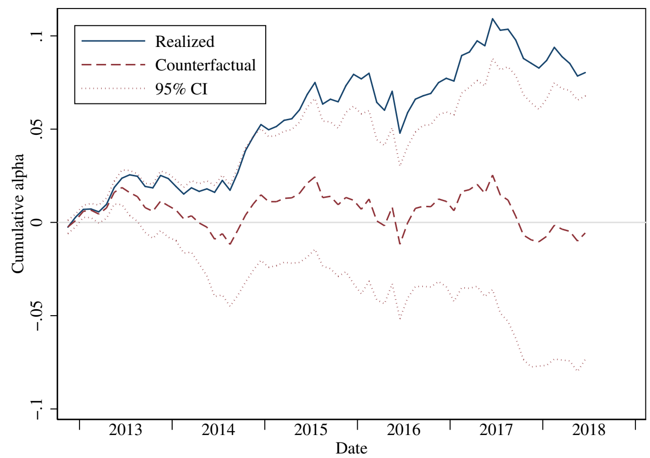
Panel B: Four-factor Carhart alphas

	(1)	(2)	(3)
Delta Climate concerns (same month)	0.00646	0.00523	0.00538
	(1.37)	(1.13)	(1.13)
Delta Climate concerns (prev. month)	0.0102	0.00920	0.00929
	(2.05)	(1.79)	(1.84)
Earnings announcement returns		0.194	0.158
		(0.47)	(0.36)
Delta Earnings forecasts		0.137	0.157
		(0.38)	(0.45)
ESG flows			0.0448
			(0.69)
ESG assets			-0.00192
			(-0.97)
Constant	-0.000144	-0.0000666	0.00234
	(-0.15)	(-0.07)	(0.53)
Observations	68	68	68
R^2	0.099	0.105	0.123

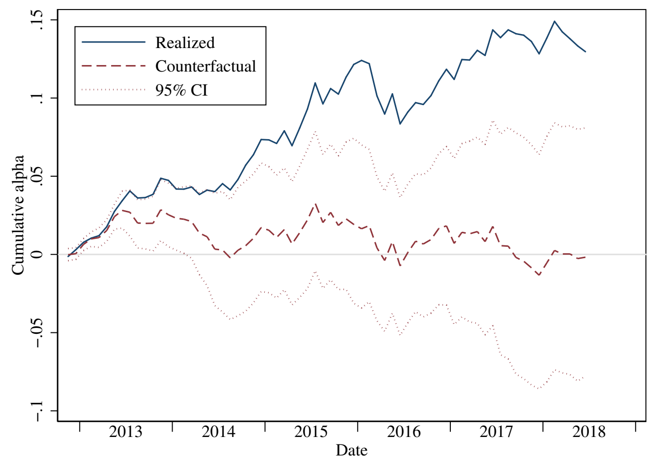
Panel C: Four-factor Pástor-Stambaugh alphas

	(1)	(2)	(3)
Delta Climate concerns (same month)	0.00731	0.00543	0.00424
	(1.40)	(1.04)	(0.74)
Delta Climate concerns (prev. month)	0.0177	0.0161	0.0158
	(3.33)	(2.99)	(3.00)
Earnings announcement returns		0.290	0.418
		(0.72)	(0.92)
Delta Earnings forecasts		0.223	0.103
		(0.50)	(0.23)
ESG flows			-0.0231
			(-0.28)
ESG assets			-0.00112
			(-0.50)
Constant	-0.000130	-0.00000603	0.00377
	(-0.13)	(-0.01)	(0.83)
Observations	68	68	68
R^2	0.182	0.194	0.187

Panel A: Carhart four-factor alphas



Panel B: Pástor-Stambaugh four-factor alphas



Panel C: Fama-French five-factor alphas

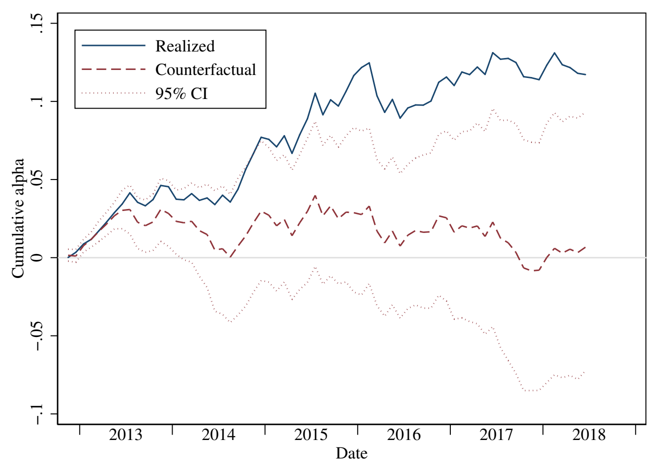


Figure A.6. Versions of paper's Figure 7 using alternative alphas. This is the same as Figure 7 in the paper but replaces the green factor's Fama-French three-factor alpha with either the Carhart (1997) four-factor alpha (in Panel A), Pástor and Stambaugh (2003) four-factor alpha (in Panel B), or Fama and French (2015) five-factor alpha (in Panel C). Details on computing these alphas are in the previous table.

6. Results using the measures of Engle et al. (2020)

Table A.5

Robustness of paper's Table 4 to including the measures of Engle et al. (2020)

The columns in this table are the same as column 3 in the paper's Table 4, except we control for extra measures of changes in climate concerns. These extra controls are derived from the climate indexes of Engle et al. Engle et al. create two climate indexes, one using data from the Wall St. Journal (denoted here as EngleWSJ) and one using data from Crimson Hexagon (denoted here as EngleCH). Columns 1 and 2 include those indexes' AR(1) innovations, downloaded from the authors' website. These innovations are residuals from a full-sample AR(1) regression. In columns 3 and 4, we apply the same method to the Engle et al. indexes as we apply to the Ardia et al. indexes. For clarity, "Delta C [Ardia]" denotes the paper's ΔC variable, which is denoted "Δ Climate concerns" in the paper's Table 4. Delta C [EngleWSJ] and Delta C [EngleCH] are computed in the same way as Delta C [Ardia]. For example, "Delta C [EngleWSJ](t)" $= EngleWSJ_t - [\sum_{\tau=1}^{T} \rho^{\tau-1}(1-\rho)EngleWSJ_{t-\tau}] - \rho^T EngleWSJ_{1-t-T}$, where $T = 36$ and $\rho = 0.94$. Data begin in November 2012 but end before June 2018 due to the limited availability of the Engel et al. measures.

	(1)	(2)	(3)	(4)
Delta C [Ardia] (same month)	0.00461	-0.00331	0.00681	-0.00297
	(0.52)	(-0.47)	(0.76)	(-0.43)
Delta C [Ardia] (prev. month)	0.0216	0.0280	0.0236	0.0291
	(2.01)	(3.05)	(1.91)	(2.46)
Earnings announcement returns	0.681	0.544	0.616	0.555
	(1.04)	(0.90)	(0.93)	(1.05)
Delta Earnings forecasts	0.644	0.258	0.647	0.331
	(1.02)	(0.44)	(1.01)	(0.63)
ESG flows	0.101	0.0334	0.101	0.0684
	(1.00)	(0.38)	(0.90)	(0.52)
ESG assets	-0.00386	-0.00122	-0.00487	-0.00323
	(-0.90)	(-0.40)	(-1.08)	(-0.51)
EngleWSJ AR1 innov. (same month)	-0.423			
	(-0.56)			
EngleWSJ AR1 innov. (prev. month)	0.292			
	(0.35)			
EngleCH AR1 innov. (same month)		2.989		
		(1.81)		
EngleCH AR1 innov. (prev. month)		-1.110		
		(-0.66)		
Delta C [EngleWSJ] (same month)			-0.568	
			(-0.66)	
Delta C [EngleWSJ] (prev. month)			0.198	
			(0.20)	
Delta C [EngleCH] (same month)				2.711
				(1.25)
Delta C [EngleCH] (prev. month)				-3.557
				(-1.33)
Constant	0.00421	0.00158	0.00596	0.00439
	(0.53)	(0.28)	(0.60)	(0.48)
Observations	56	67	56	67
R^2	0.185	0.228	0.181	0.208

7. Additional results using individual stock returns

Table A.6
Version of paper's Table 6 holding sample constant across columns

This table is the same as Table 6 in the paper, except the observations are held constant across columns, which we accomplish by requiring all the table's regressors to be non-missing in every column. Column 5 exactly matches column 5 in the paper's Table 6.

	(1)	(2)	(3)	(4)	(5)
$g_{i,t-1}$	0.00168	-0.000407	-0.000462	-0.00409	-0.00416
	(1.72)	(-0.36)	(-0.43)	(-0.83)	(-0.85)
$g_{i,t-1} \times \Delta C_t$		0.00757	0.00682	0.00806	0.00806
		(1.21)	(1.13)	(1.15)	(1.15)
$g_{i,t-1} \times \Delta C_{t-1}$		0.0168	0.0162	0.0168	0.0168
		(2.33)	(2.32)	(2.29)	(2.29)
[Earnings announcement ret.]$_{i,t}$			0.316	0.315	0.315
			(12.36)	(12.36)	(12.36)
[Δ Earnings forecast]$_{i,t}$			0.0581	0.0585	0.0587
			(4.38)	(4.44)	(4.45)
$g_{i,t-1}\times$ [ESG flows]$_t$				0.0812	0.0813
				(0.76)	(0.77)
$g_{i,t-1}\times$ [ESG assets]$_{t-1}$				-0.000841	-0.000847
				(-0.33)	(-0.33)
ln(BE/ME)$_{i,t-1}$					-0.000741
					(-0.52)
Observations	114,320	114,320	114,320	114,320	114,320

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