The EU Taxonomy and the Equity Market

Marinelli Laura [1] Battiston Stefano [1,2]

[1]University Ca' Foscari of Venice, Italy

[2]University of Zurich, Switzerland

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Università Ca'Foscari Venezia

Universität Zürich[UZH]

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The Policy Context

In the field of Sustainable Finance, there is a wide variety of definitions of **Greenness**:

- Heterogeneous ESG scores (Berg, Koelbel, and Rigobon (2019))
- Confusion and lack of consensus among practitioners
- Greenwashing

$\rightarrow$ The EU came up with the EU Taxonomy on Sustainable Activities to overcome this problem.

The EU Taxonomy on Sustainable Activities

European Regulation, adopted in 2020.

$\rightarrow$ A **classification system** of the economic activities contributing to the Low-Carbon Transition.

$\rightarrow$ A **science-based language** around the concept of sustainability.

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- Increase *transparency* and contrast *greenwashing*
- Incentivize private investments in Taxonomy-aligned activities

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- Increase *transparency* and contrast *greenwashing*
- Incentivize private investments in Taxonomy-aligned activities

From 2023, EU companies must declare their *alignment* to the Taxonomy.

The Research Context

This work:

- Computes a **firm-level estimate of alignment** to the Taxonomy
- Investigates if the impact of the Taxonomy is **reflected** in equity markets, specifically for the economic sector of Utilities
- We find that stocks of aligned firms exhibit an **outperformance** with respect to little-aligned firms.

Only few quantitative works on the financial effect of the Taxonomy: Sautner, Yu, et al. (2022) and Bassen et al. (2022).

$\rightarrow$ Find a positive effect of alignment on loans margin and cross-section of stock returns, respectively.

Research Questions

HP$_1$: *Is the Taxonomy alignment observable in different regional equity markets?*

$\Downarrow$

Do investors take into account firms' alignment to low-carbon transition objectives in their investment decisions?

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HP$_2$: *Do they allocate capital in favour of Taxonomy-aligned activities?*

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HP$_2$: *Do they allocate capital in favour of Taxonomy-aligned activities?*

We test these hypotheses in 3 different markets:

- The global market
- The EU market
- The North American market (Canada+US)

Related Literature

Literature on *climate risks pricing*, where climate transition risks are proxied by:

- Firms' Carbon Emissions
  e.g., Bolton and Kacperczyk (2021a), Bolton and Kacperczyk (2021b), Alessi, Ossola, and Panzica (2021a), and Alessi, Ossola, and Panzica (2021b)
- Firms' ESG Scores
  e.g., Pástor, Stambaugh, and Taylor (2022) and Görgen et al. (2020)
- Occurrence of climate-relevant events
  e.g., Monasterolo and De Angelis (2020) and Ramelli et al. (2021)
- Periods with high coverage of climate change news or earnings calls about climate risks
  e.g., Engle et al. (2020) and Sautner, Van Lent, et al. (2021)
- Green Bonds
  e.g., Zerbib (2019)

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Methodology

Steps of the methodology:

1. The Taxonomy Alignment Coefficient
2. The Portfolios' Construction
3. The Long-Short Portfolio
4. The Empirical Strategy

1° Step: The Taxonomy Alignment Coefficient

Alessi and Battiston (2022) estimate the alignment to the Taxonomy for different economic sectors with the Taxonomy Alignment Coefficient, TAC.

Similarly, we estimate the *firm-level* alignment for the firms in the electricity sector as:

$$TAC_{i,T} = R^{E}_{i,T} \cdot C^{R}_{i,T}$$

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$$TAC_{i,T} = R^{E}_{i,T} \cdot C^{R}_{i,T}$$

- $R^{E}_{i,T}$ is the firm's share of revenues from electricity
- $C^{R}_{i,T}$ is the firm's share of capacity coming from renewable energy sources (Solar, Wind, Biomass, and Hydro), in year T (2010 - 2021).
- TAC=[0,1] (0 for no alignment, 1 for full alignment)

Data sources: Bloomberg and Thomson&Reuters

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Why the Electricity Sector?

The TAC is computed for firms in the Electricity Sector:

- The most suitable for the purpose of the study
- One of the key sectors for the low-carbon transition
- Global, EU and NA markets

Descriptives of the Taxonomy Alignment Coefficient

	Global		EU		US + Canada	
	Mean(TAC)	n. of firms	Mean(TAC)	n. of firms	Mean(TAC)	n. of firms
TAC 2010	0.17	178	0.23	51	0.1	48
TAC 2011	0.18	178	0.23	51	0.1	48
TAC 2012	0.19	178	0.24	51	0.1	48
TAC 2013	0.2	178	0.24	51	0.1	48
TAC 2014	0.22	178	0.26	51	0.13	48
TAC 2015	0.24	178	0.29	51	0.16	48
TAC 2016	0.25	178	0.31	51	0.17	48
TAC 2017	0.27	178	0.32	51	0.17	48
TAC 2018	0.29	174	0.31	51	0.2	47
TAC 2019	0.3	170	0.33	51	0.21	47
TAC 2020	0.35	169	0.34	51	0.22	47
TAC 2021	0.35	163	0.35	51	0.22	47

Table: The first column of each sample contains the mean of the firms' TAC in year T; the second column contains the number of firms with a TAC estimate in at least one of the 11 years.

The Energy Share of Capacity by Sources

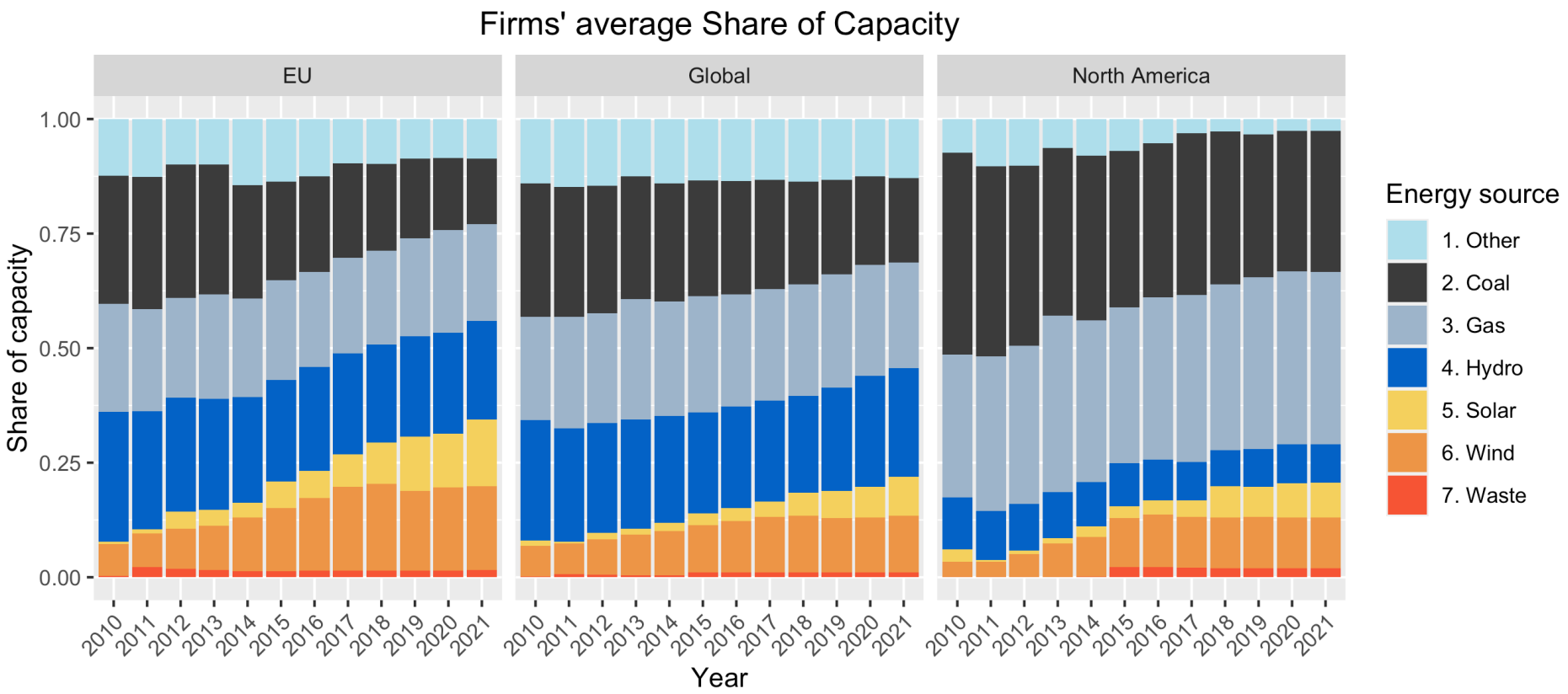

Figure: The yearly average share of capacity by energy source for firms in the global, European and Northern American electricity sector

Methodology

Steps of the methodology:

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2° Step: The High TAC and Low TAC portfolios

1. Group each firm *i* in our sample into:
   - The High TAC (HT) portfolio: if $\text{TAC}_{i,T} > Q_{0.7}$ of the TAC Distribution in T
   - The Low TAC (LT) portfolio: if $\text{TAC}_{i,T} < Q_{0.3}$ of the TAC Distribution in T

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2. Divide both the LT and HT into "Small" (SLT, SHT) and "Big" (BLT, BHT)

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2. Divide both the LT and HT into "Small" (SLT, SHT) and "Big" (BLT, BHT)
3. Compute the daily portfolios' returns as an *equally weighed sum* of firms' returns (refer to Annexes)

Summary Statistics of the Portfolios

	Global				EU				US + Canada			
	$Q_{0.3}$	$Q_{0.7}$	Low TAC ($<= Q_{0.3}$)	High TAC ($>= Q_{0.7}$)	$Q_{0.3}$	$Q_{0.7}$	Low TAC ($<= Q_{0.3}$)	High TAC ($>= Q_{0.7}$)	$Q_{0.3}$	$Q_{0.7}$	Low TAC ($<= Q_{0.3}$)	High TAC ($>= Q_{0.7}$)
TAC 2010	0	0.14	72	51	0	0.24	17	15	0	0.1	16	12
TAC 2011	0	0.14	66	51	0.02	0.23	15	15	0	0.1	14	10
TAC 2012	0	0.16	59	51	0.02	0.23	15	15	0	0.1	14	13
TAC 2013	0	0.13	54	51	0.013	0.22	15	15	0.001	0.1	14	14
TAC 2014	0.003	0.16	51	51	0.02	0.25	15	15	0.001	0.12	14	14
TAC 2015	0.008	0.18	51	51	0.04	0.33	15	15	0.02	0.16	14	14
TAC 2016	0.02	0.2	51	51	0.05	0.37	15	15	0.022	0.15	14	14
TAC 2017	0.04	0.2	51	51	0.07	0.37	15	15	0.026	0.17	14	14
TAC 2018	0.05	0.24	50	50	0.07	0.39	15	15	0.026	0.2	14	14
TAC 2019	0.08	0.3	49	49	0.08	0.42	15	15	0.07	0.2	14	14
TAC 2020	0.1	0.4	49	49	0.1	0.43	15	15	0.07	0.2	14	14
TAC 2021	0.11	0.4	47	47	0.11	0.47	14	14	0.05	0.2	14	14

Table: Quantile values of the TAC each year, and the number of firms corresponding to the HT and LT portfolios

The Energy Share of Capacity of the Portfolios

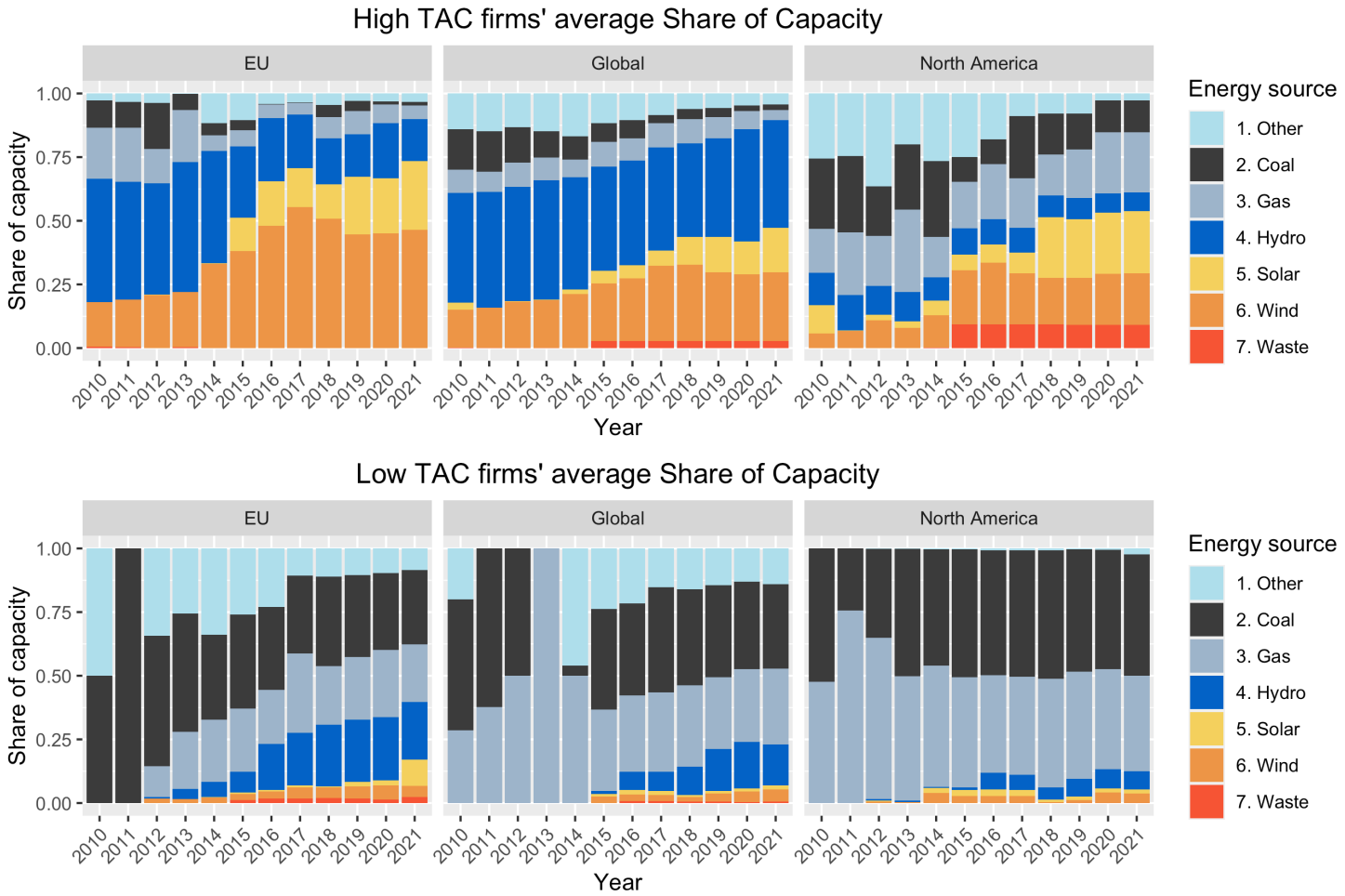

Figure: Average annual share of capacity for High TAC and Low TAC portfolios

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3° Step: The Long-Short Portfolio

Finally, the "High-Minus-Low TAC" portfolio (the ΔTAC):

$$\Delta TAC_t = \frac{1}{2} \cdot (HTS + HTB) - \frac{1}{2} \cdot (LTS + LTB) \tag{1}$$

- Equally Weighted
- Takes a long position (buy) on the High-aligned portfolio and a short position (sell) on the Low-aligned portfolio.
- It allows to better understand the role of Taxonomy-alignment in determining financial performance.

Cumulative Portfolios' Returns

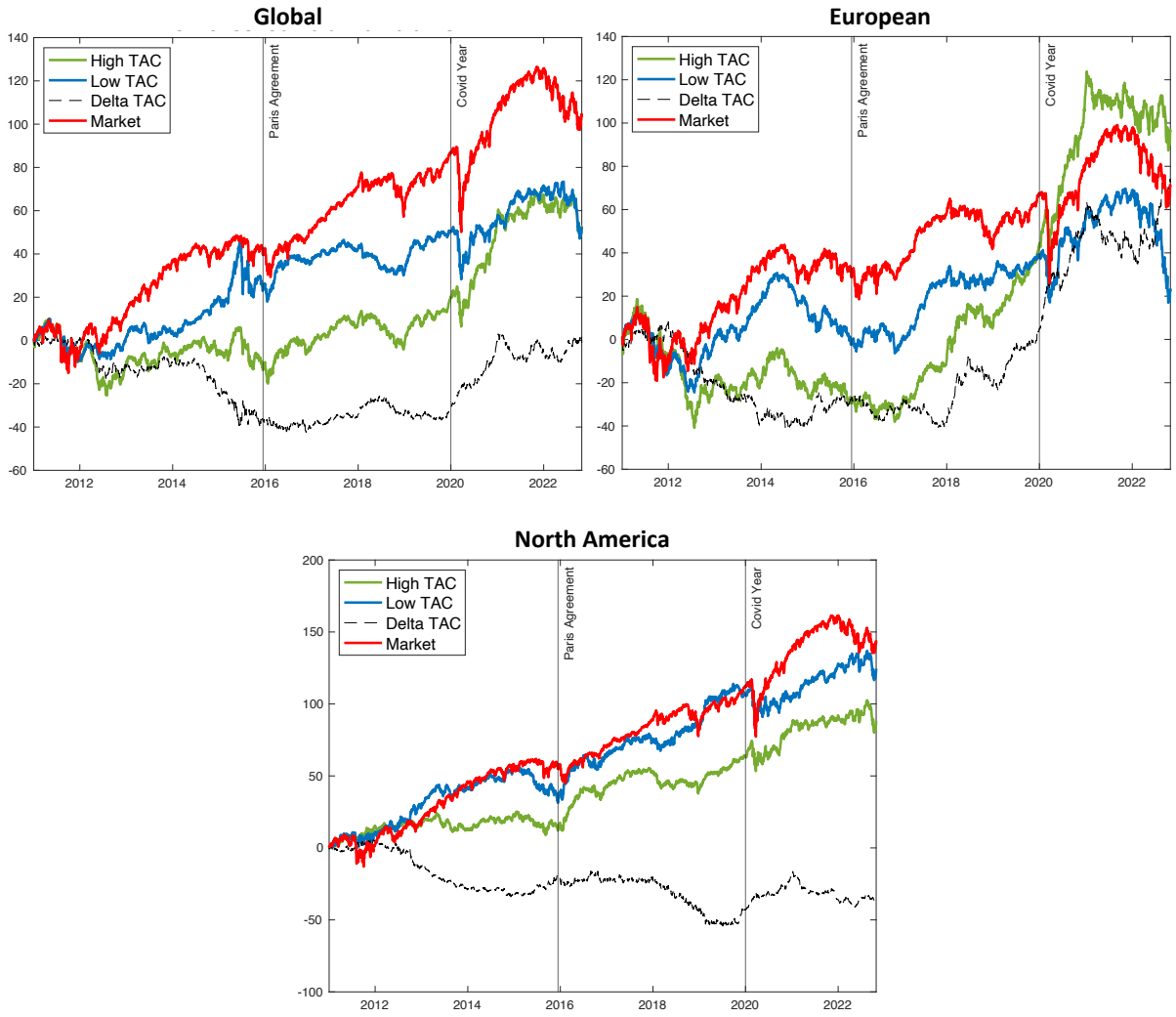

Figure: Cumulative returns of portfolios for different markets

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Empirical Strategy

Starting from a CAPM specification, we progressively add the Fama-French risk factors, up the full model specification:

$$R_t^p = \alpha^p + \beta_M R_{M,t} + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \\ + \beta_{RMW} RMW_t + \beta_{CMA} CMA_t + \beta_{MOM} MOM_t + \epsilon_t^p \quad (2)$$

Where p= HT, LT, ΔTAC

- OLS estimation
- HAC standard errors (Newey-West estimator)

The $\alpha^{\Delta TAC}$

We interpret the α starting from Fama and French, 1993:

$\rightarrow$ It **should be equal to zero** if the market is in equilibrium and the chosen risk factors capture all the relevant risks.

$\rightarrow$ If not, α is significantly different from zero, a sign that investors demand assets with **an additional, omitted firm-specific factor**: the alignment to the Taxonomy.

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- $\hat{\alpha}^{\Delta TAC} > 0$: High TAC portfolio outperforms Low TAC one
- $\hat{\alpha}^{\Delta TAC} < 0$: High TAC portfolio under-performs Low TAC one

The regression periods

Regression 3 is run over different time periods:

(A) Over the full sample period (2011-2022)

(B) Over the sample without the years of Covid (2011-2019)

(C) Over the sample from 2017 to 2022 (the first policy developments related to the Taxonomy)

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Then, we identify three sub-periods to capture a progressive change in α:

- From Jan 2011 to Nov 2015 (Before the Paris Agreement)
- From Dec 2015 to Dec 2019 (After the Paris Agreement)
- From Jan 2020 to Oct 2022 (The years of the pandemic)

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Finally, we display the rolling α estimates over the full sample periods.

All the regressions are run separately for the 3 different regional markets.

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The Global Market

Dependent Variable: ΔTAC						
	(A)		(B)		(C)	
Model Specification	Jan 2011 - Oct 2022		Jan 2011 - Dec 2019		Jan 2017 - Oct 2022	
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2
3 Fama-French	-0.003	2%	-0.018	8%	0.026^{**}	9.5%
	(0.010)		(0.011)		(0.011)	
5 Fama-French	0.001	3%	-0.021^{*}	8%	0.030^{***}	11%
	(0.010)		(0.011)		(0.011)	
5 Fama-French + MOM	0.001	3%	-0.020^{*}	8.3%	0.028^{**}	12.5%
	(0.010)		(0.011)		(0.011)	
Observations	3,085		2,347		2,347	
Note:					*p<0.1; **p<0.05; ***p<0.01	

Table: Results from 3 model specifications (3 Fama French, 5 Fama French, and 5 Fama French plus the Momentum factor), on the three different sample periods

The Global Market: sub-sample periods

Dependent Variable: Δ TAC							
	3 Fama-French		5 Fama-French		5 Fama-French + MOM		
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2	Obs
1st Jan 2011 - 2nd Nov 2015	-0.034^{*}	8%	-0.042^{**}	10%	-0.038^{**}	10.4%	1,260
	(0.018)		(0.017)		(0.017)		
2nd Nov 2015 - 31st Dec 2019	-0.001	10%	-0.0004	10.3%	-0.0004	10.2%	1,087
	(0.013)		(0.013)		(0.013)		
31st Dec 2019 - 31st Oct 2022	0.048^{***}	16%	0.052^{***}	17.5%	0.049^{***}	20.4%	738
	(0.018)		(0.019)		(0.019)		
Note:							*p<0.1; **p<0.05; ***p<0.01

Table: Regression results from the 3 model specifications for three sub-samples periods

The Global Market: the rolling $\hat{\alpha}^{\Delta TAC}$

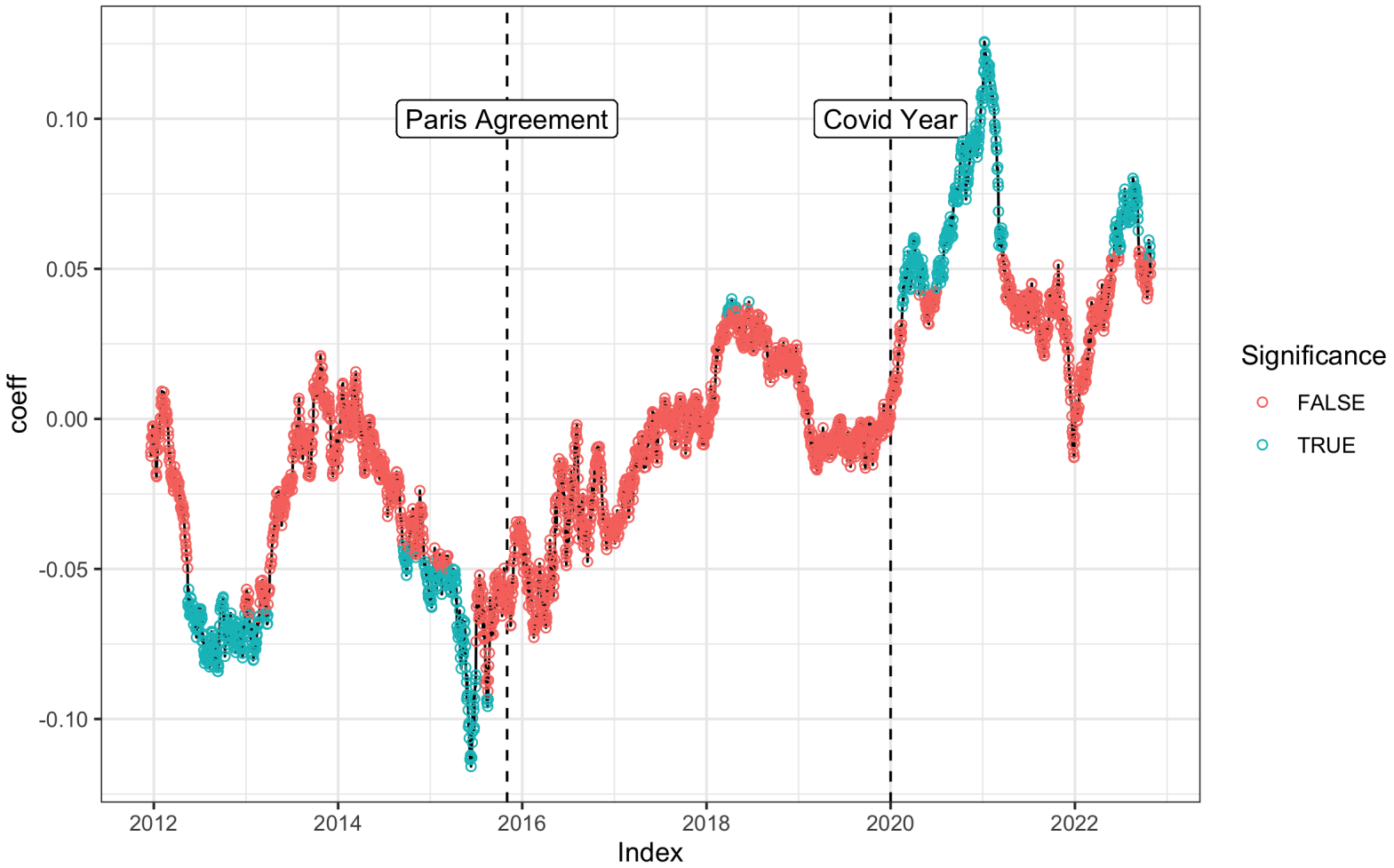

Figure: Estimated α from a rolling regression with a time window of 252 days; significance is "true" for p-values smaller than 5%

The European Market

Dependent Variable: Δ TAC						
	(A)		(B)		(C)	
Model Specification	Jan 2011 - Oct 2022		Jan 2011 - Dec 2019		Jan 2017 - Oct 2022	
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2
FF3	0.026*	3.5%	−0.02	5%	0.065***	9%
	(0.013)		(0.013)		(0.021)	
FF5	0.026*	5.2%	0.001	6%	0.068***	9%
	(0.013)		(0.013)		(0.021)	
FF5 + MOM	0.024*	5.3%	0.0005	6%	0.065***	9.4%
	(0.013)		(0.013)		(0.021)	
Observations	3,085		2,347		2,347	
Note:					*p<0.1; **p<0.05; ***p<0.01	

Table: Results from the 3 model specifications (3 Fama French, 5 Fama French, and 5 Fama French plus the Momentum factor) on the three different sample periods

The European Market: sub-sample periods

Dependent Variable: Δ TAC							
	3 Fama-French		5 Fama-French		5 Fama-French + MOM		
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2	Obs
1st Jan 2011 - 2nd Nov 2015	−0.025	11.3%	−0.025	11.4%	−0.025	11.3%	1,260
	(0.019)		(0.018)		(0.018)		
2nd Nov 2015 - 31st Dec 2019	0.026	2.2%	0.030	3.5%	0.030	3.4%	1,087
	(0.019)		(0.018)		(0.018)		
31st Dec 2019 - 31st Oct 2022	0.094***	12%	0.093***	12.2%	0.090***	13%	738
	(0.035)		(0.034)		(0.034)		
Note:							*p<0.1; **p<0.05; ***p<0.01

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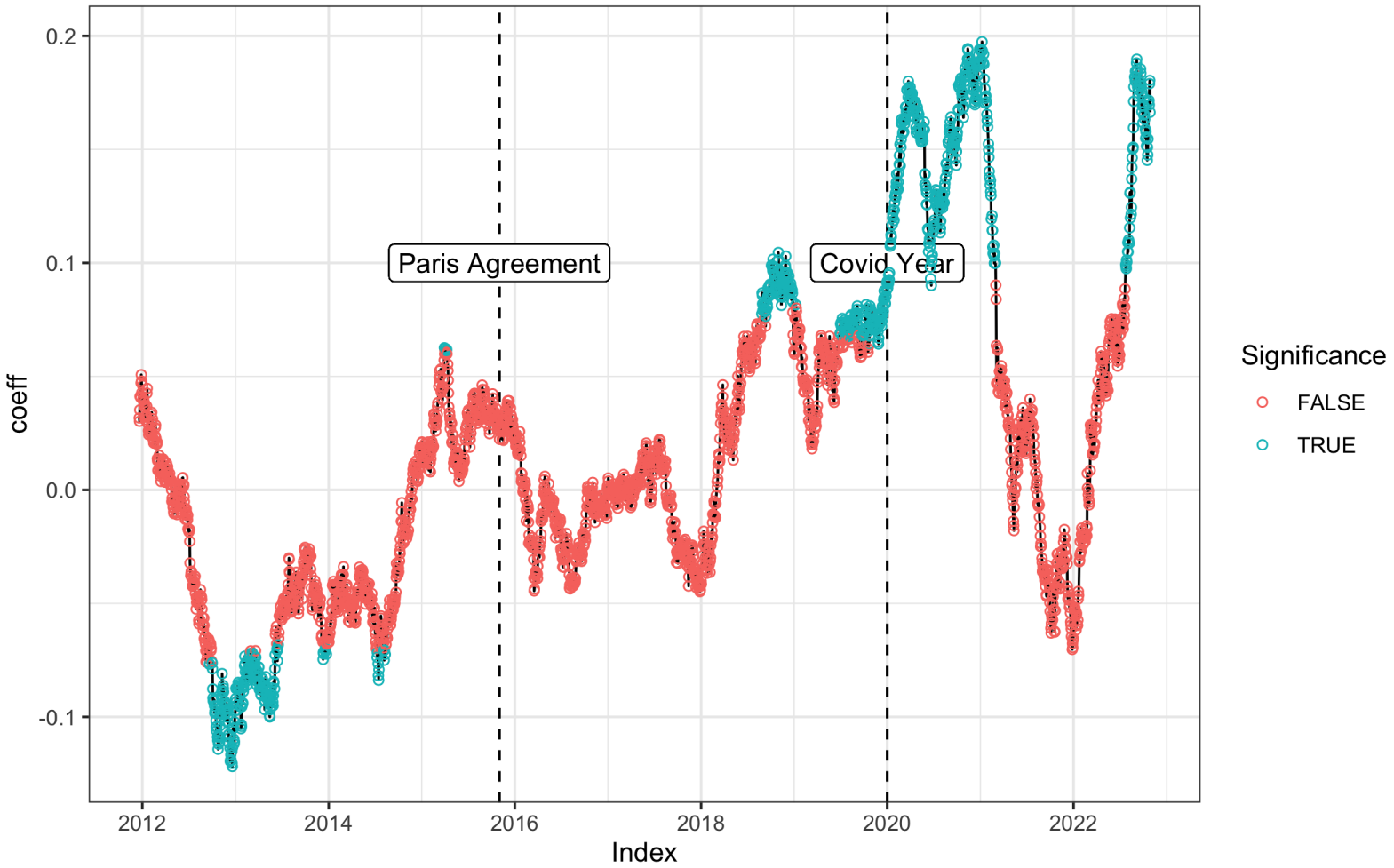

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   - The α is also increasing over time
3. For the Global Sample:
   - Similar results and trend of EU, but at a smaller entity
4. The outperformance of the HT portfolio over the LT might be due to an increase in demand for HT assets

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RC1: Drivers of the Results

Is there a technology, among the renewable sources, with a prevailing role?

Wind appears to have a central role, whereas Hydro-power does not produce any significant result:

	Jan 2017 - Dec 2022											
	Wind				Hydro				Renewables w/o Hydro			
	Global		EU		Global		EU		Global		EU	
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2
FF3	0.031***	4%	0.032*	2.5%	0.001	2%	0.016	2.5%	0.049***	6%	0.04*	6%
	(0.011)		(0.017)		(0.013)		(0.016)		(0.017)		(0.024)	
FF5	0.031***	4%	0.034**	3%	0.002	2%	0.015	3%	0.049***	6%	0.041*	6%
	(0.011)		(0.016)		(0.013)		(0.015)		(0.017)		(0.024)	
FF5+MOM	0.031***	4%	0.031*	4%	0.0005	3%	0.014	3%	0.048***	6%	0.039	6%
	(0.011)		(0.017)		(0.013)		(0.015)		(0.017)		(0.024)	
Note:											*p<0.1; **p<0.05; ***p<0.01	

Table: Estimates of α from different specifications of the Fama-French model from portfolios constructed with only-Wind, only-Hydro, and Renewable w/o Hydro data

RC2: The Climate Risk Factors

The literature on *climate risk pricing* finds evidence of significant climate risk factors constructed from firms' *Carbon Emissions* or *ESG scores*.

RC2: The Climate Risk Factors

The literature on *climate risk pricing* finds evidence of significant climate risk factors constructed from firms' *Carbon Emissions* or *ESG scores*.

We check if our α is related to these factors (and not the Taxonomy) by adding them to the regression model:

$$R_t^p = \alpha^p + \beta_M R_{M,t} + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \\ + \beta_{RMW} RMW_t + \beta_{CMA} CMA_t + \beta_{MOM} MOM_t + \\ + \beta_{CMP} CMP_t + \beta_{ESG} ESG_t + \epsilon_t^p \quad (3)$$

1. CMP_t ("Clean-Minus-Polluting") is a portfolio long on low-carbon firms, and short on high-carbon firms
2. ESG_t is a portfolio long on High-ESG firms and short on Low-ESG firms.

RC2: The Climate Risk Factors

	Global Region, 2017-2022 *Dependent variable: Delta TAC returns*		
Mkt_Rf	−0.004	−0.032*	−0.013
	(0.017)	(0.018)	(0.017)
SMB	0.236***	0.221***	0.158***
	(0.041)	(0.036)	(0.035)
HML	−0.080*	−0.056	−0.052
	(0.046)	(0.045)	(0.042)
RMW	−0.168***	−0.078	−0.039
	(0.054)	(0.054)	(0.050)
CMA	−0.192***	−0.162**	−0.123*
	(0.070)	(0.067)	(0.065)
MOM	0.087***	0.080***	0.079***
	(0.018)	(0.019)	(0.018)
CMP		0.252***	0.246***
		(0.025)	(0.024)
ESG			−0.220***
			(0.025)
Constant	**0.028****	**0.023****	**0.024****
	(0.011)	(0.011)	(0.010)
Observations	1,520	1,520	1,520
Adjusted R^2	0.125	0.190	0.239
Note:		*p<0.1; **p<0.05; ***p<0.01	

	European Region, 2017-2022 *Dependent variable: Delta TAC returns*		
Mkt_Rf	0.088***	0.081***	0.082***
	(0.027)	(0.024)	(0.024)
SMB	0.378***	0.237***	0.265***
	(0.066)	(0.063)	(0.064)
HML	−0.338***	−0.248***	−0.252***
	(0.085)	(0.080)	(0.079)
RMW	−0.375***	−0.257***	−0.275***
	(0.099)	(0.095)	(0.094)
CMA	−0.118	−0.008	−0.003
	(0.124)	(0.116)	(0.115)
MOM	0.073**	0.039	0.037
	(0.033)	(0.031)	(0.031)
CMP		0.364***	0.386***
		(0.038)	(0.044)
ESG			0.059
			(0.038)
Constant	**0.065****	**0.061****	**0.060****
	(0.021)	(0.019)	(0.019)
Observations	1,520	1,520	1,520
Adjusted R^2	0.094	0.180	0.182
Note:		*p<0.1; **p<0.05; ***p<0.01	

RC2: The Climate Risk Factors

Following Bolton and Kacperczyk, 2021a:

$$\hat{\alpha}_t = a_0 + a_1 ESG_t + a_2 CMP_t + \epsilon_t \tag{4}$$

Where $\hat{\alpha}_t$ estimated from the rolling regression on the 5 Fama-French Model.

Table: Alpha and other Climate Risk factors; 2017-2022

	Global Market	European Market
CMP	0.002	0.006*
	(0.001)	(0.003)
ESG	−0.002	−0.003
	(0.001)	(0.002)
Constant	0.025***	0.057***
	(0.001)	(0.002)
Observations	1,466	1,466
Adjusted R^2	0.002	0.004
Note:	*p<0.1; **p<0.05; ***p<0.01	

RC3: Modifications to portfolios' construction

Results are consistent when we modify portfolios' characteristics such as:

- Use more extreme quantiles (0.2 and 0.8)

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Results are also consistent when:

- Use monthly returns
- Remove EU and NA firms from the global sample
- Use different temporal rolling windows

Refer to Annexes for estimated coefficients.

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Interpretation of the Results

- A significant effect of Taxonomy-alignment is visible in the Utility sector of Electricity at the Global and EU level
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- The effect is positive since 2017, suggesting that investors reward high-aligned activities *more* than low-aligned ones
- Policy implications: the Taxonomy could be inducing a shift in investments towards low-carbon activities, however..
- We question whether this effect is due to the Taxonomy or to the renewable energies alone

Discussion

Data:

- The focus on the electricity sector reduces the cross-sectional coverage of our sample
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Empirical Strategy:

- Only focused on the α
- Potential next step: add the ΔTAC portfolio as a risk factor? Avoid the "Factor Zoo" (Cochrane, 2011)
- The literature finds that the outperformance of a "green factor" is only temporary, and that it manifests in times when climate concerns are high (Pástor, Stambaugh, and Taylor, 2022; Ardia et al., 2022).

Thank you!

Contacts:

laura.marinelli@unive.it
stefano.battiston@bf.uzh.ch

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Portfolios' returns

First, compute firm *i* daily returns:

$$r_t^i = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

Then, the returns of each portfolio as an equally weighted sum of firms' returns:

$$r_t^p = w \cdot \sum_i^N r_t^i$$

where $w = \frac{1}{N}$; p= [SLT, SHT, BLT, BHT]

The Northern American Market

Dependent Variable: Δ TAC		
	Jan 2011 - Oct 2022	
	α	Adj-R^2
FF3	−0.008	1.5%
	(0.009)	
FF5	−0.007	3%
	(0.009)	
FF5 + MOM	−0.007	3%
	(0.009)	
Observations	3,085	
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table: Results of the 3 model specifications (3 Fama French, 5 Fama French, and 5 Fama French plus the Momentum factor) for only the full sample period

The Northern American Market: sub-sample periods

Dependent Variable: Δ TAC							
	3 Fama French		5 Fama-French		5 Fama-French + MOM		
	α-3FF	Adj-R^2	α-5FF	Adj-R^2	α-5FF+MOM	Adj-R^2	Obs
1st Jan 2011 - 2nd Nov 2015	−0.018	10.5%	−0.018	10.3%	−0.018	10.4%	1,260
	(0.014)		(0.016)		(0.016)		
2nd Nov 2015 - 31st Dec 2019	−0.013	1%	−0.013	1%	−0.013	1%	1,087
	(0.021)		(0.026)		(0.026)		
31st Dec 2019 - 31st Oct 2022	0.016	19%	0.016	20%	0.015	22%	738
	(0.017)		(0.018)		(0.018)		
Note:							*p<0.1; **p<0.05; ***p<0.01

Table: Regression results from the 3 model specifications for three sub-samples periods

The Northern American Market: the rolling $\hat{\alpha}^{\Delta TAC}$

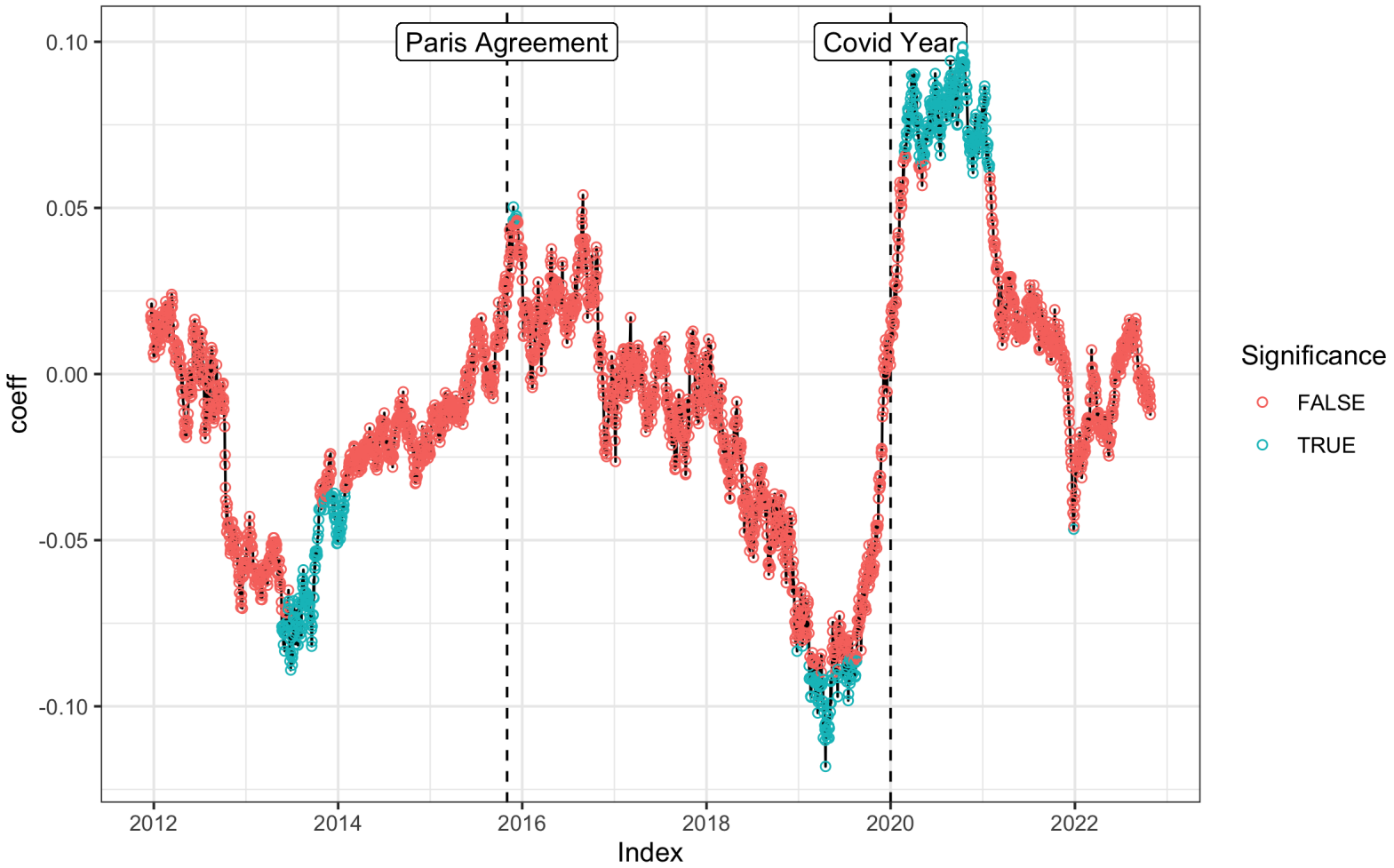

Figure: Estimated α from a rolling regression with a time window of 252 days; significance is "true" for p-values smaller than 5%

RC3: Different Portfolios' Characteristics

	$Q_{0.2}$ and $Q_{0.8}$			Percentage Change			Assumption 2		
		α5FF+MOM	Adj-R^2		α5FF+MOM	Adj-R^2		α5FF+MOM	Adj-R^2
ΔTAC	Pre PA	−0.030*	10%	Pre PA	−0.048**	7%	Pre PA	−0.027*	10%
		(0.018)			(0.021)			(0.015)	
	Post PA	0.13	8%	Post PA	0.001	9%	Post PA	−0.0004	10%
		(0.015)			(0.013)			(0.011)	
	Covid	0.081***	14.4%	Covid	0.046***	20%	Covid	0.067***	21%
		(0.025)			(0.018)			(0.024)	

	$Q_{0.2}$ and $Q_{0.8}$			Percentage Change			Assumption 2		
		α5FF+MOM	Adj-R^2		α5FF+MOM	Adj-R^2		α5FF+MOM	Adj-R^2
ΔTAC	Pre PA	−0.054**	4%	Pre PA	−0.051**	5.5%	Pre PA	−0.019	11%
		(0.022)			(0.021)			(0.016)	
	Post PA	0.034	5%	Post PA	0.023	4%	Post PA	0.008	4%
		(0.023)			(0.019)			(0.018)	
	Covid	0.124***	11%	Covid	0.084**	12%	Covid	0.053	16%
		(0.045)			(0.033)			(0.038)	
Note:								*p<0.1; **p<0.05; ***p<0.01	

	$Q_{0.2}$ and $Q_{0.8}$			Percentage Change			Assumption 2		
		α5FF+MOM	Adj-R^2		α5FF+MOM	Adj-R^2		α5FF+MOM	Adj-R^2
ΔTAC	Pre PA	−0.017	10%	Pre PA	−0.025*	7%	Pre PA	−0.012	7%
		(0.015)			(0.015)			(0.013)	
	Post PA	−0.027	1%	Post PA	−0.025	1%	Post PA	0.008	2%
		(0.029)			(0.028)			(0.019)	
	Covid	0.005	23%	Covid	0.015	21%	Covid	0.018	26%
		(0.025)			(0.018)			(0.022)	
Note:								*p<0.1; **p<0.05; ***p<0.01	

Table: Global sample (Top table); European (Center); US (Bottom)

RC3: Monthly Returns - Global

Table: Global Region, monthly returns

Dependent Variable: Δ TAC						
	(A) Jan 2011 - Oct 2022		(B) Jan 2011 - Dec 2019		(C) Jan 2017 - Dec 2022	
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2
FF3	0.143	3%	−0.305	6%	1.022***	12%
	(0.304)		(0.274)		(0.021)	
FF5	0.261	4%	−0.393	6%	1.144***	15%
	(0.316)		(0.3)		(0.021)	
FF5 + MOM	0.276	4%	−0.392	5%	1.135***	14%
	(0.317)		(0.3)		(0.021)	
Observations	142		108		70	
Note:					*p<0.1; **p<0.05; ***p<0.01	

RC3: Monthly Returns - EU

Table: European Region, monthly returns

Dependent Variable: Δ TAC						
	(A) Jan 2011 - Oct 2022		(B) Jan 2011 - Dec 2019		(C) Jan 2017 - Dec 2022	
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2
FF3	0.824*	1%	0.330	¡1%	1.792***	11%
	(0.456)		(0.401)		(0.634)	
FF5	0.975**	3%	0.291	¡1%	1.711***	10%
	(0.474)		(0.45)		(0.64)	
FF5 + MOM	0.892*	2%	0.283	¡1%	1.695***	9%
	(0.468)		(0.465)		(0.6)	
Observations	142		108		70	
Note:					*p<0.1; **p<0.05; ***p<0.01	

RC3: Countries outside EU and NA

Table: Countries Outside the EU and the North America

Dependent Variable: Δ TAC						
	(A) Jan 2011 - Oct 2022		(B) Jan 2011 - Dec 2019		(C) Jan 2017 - Dec 2022	
	α	Adj-R^2	α	Adj-R^2	α	Adj-R^2
FF3	−0.001	1%	−0.025	3%	0.035**	1%
	(0.017)		(0.020)		(0.016)	
FF5	−0.001	1%	−0.029	4%	0.035**	1%
	(0.017)		(0.020)		(0.016)	
FF5 + MOM	−0.001	1%	−0.028	4%	0.034**	1%
	(0.017)		(0.020)		(0.016)	
Observations	3,085		2,347		1,520	
Note:					*p<0.1; **p<0.05; ***p<0.01	