Relationship between Profitability and Sustainability through a Difference-in-differences Approach using The Paris Agreement as a Shock to ESG Ratings

By: Edgar Chicurel Flores

uc3m | Universidad Carlos III de Madrid

Introduction

- **ESG** → Tool to measure the key sustainable metrics of a company's performance.
- ***Environmental:*** Energy efficiency usage, resource intake, waste management and climate change contribution.
- ***Social:*** Human rights, labor standards, inclusion with society and relationship with institutions in the community.
- ***Governance:*** Internal organization system of a company.

Introduction

- Should companies invest in becoming more socially and environmentally conscious by sacrificing part of their profits today?
- Two scenarios:
  - Company is doing well in the market because of other external reasons and then decides to become more sustainable with the extra profits it has.
  - Invested in being more sustainable, and therefore is doing well in the market.
- Do stock prices and return on assets (ROA), truly reflect a company's commitment to sustainability through the ESG variables?

Introduction

- **Positive relation** between stock prices and sustainable commitment. Cause of this relation is **unknown.**
- **Causal relation** will help investors and companies make clearer decisions regarding sustainability.
- After the Paris Agreement in 2016 there was a significant change in ESG ratings.
- By looking at this event as a shock to sustainable ratings, the problem is then approached with a **Difference-in-differences.**

Literature Review

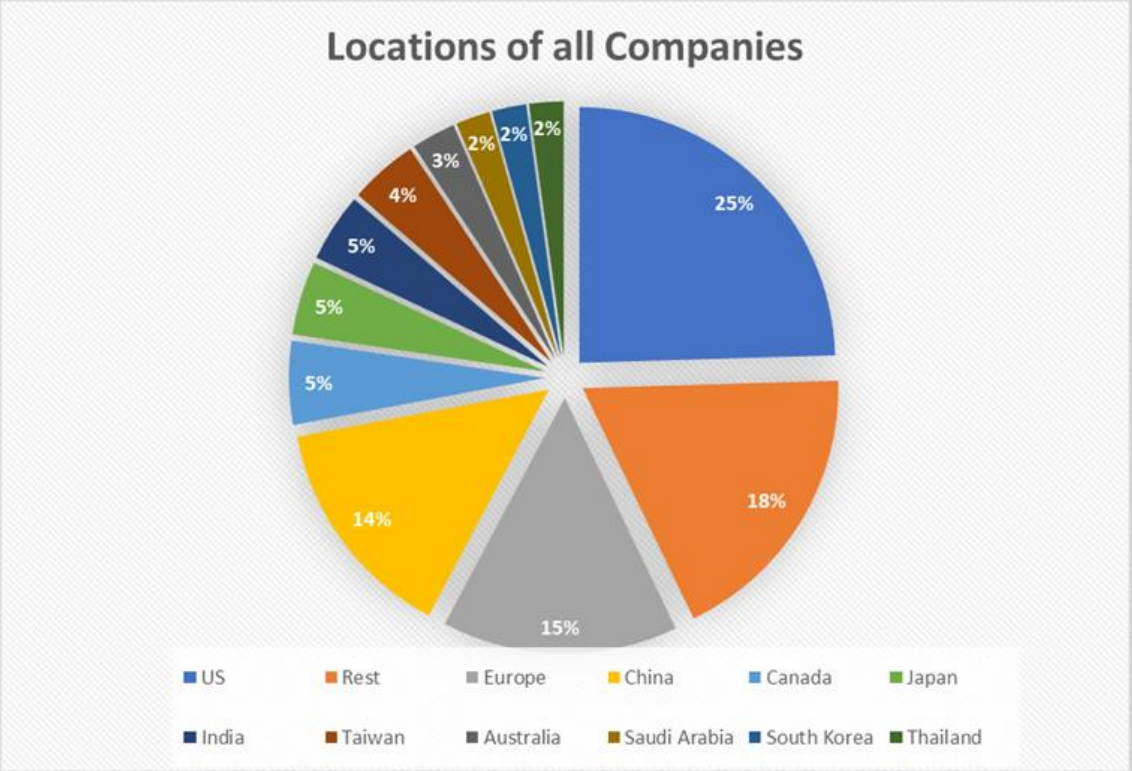
- Global Investment Alliance: sustainable investments increased from **$13.3 trillion** in 2012 to **$30.7 trillion** in 2019.
- (Milton Friedman 1970): The sole responsibility of a company is to increase its shareholders value, therefore, to increase profits.
- (Walley and Whitehead, 1994): Costs of adhering to sustainable standards will lowering profitability.
- (Porter and van der Linde, 1995) and (Fish Alexander et al., 2019): Improvement in ESG standards can lead to an enhancement in profitability.

Literature Review

- (Henisz Witold et al., 2019): 68% of studies displayed a positive correlation, 24% no correlation, 8% a negative correlation, but **no causality.**
- (Cornell and Damodaran, 2020): Do market prices reflect these sustainable mindsets?
- (Statman, 2000) looked at multiple stocks in a sustainable fund and compared them to stocks outside the fund.
- (Bauer Rob et al., 2004) biased results because of aspects such as portfolio management.

Data

- MSCI Sustainable Index → rated sustainable if company was “A” or higher and not sustainable if “BBB” or lower.
- 167 companies were used for the financial sector and 145 companies for the energy sector.
- Yearly and Monthly data on stock growth rate.
- Yearly data on ROA.



Methodology

- Paris Agreement in 2016 will serve as an external shock to sustainable ratings because it shifted the assessment of credit rating companies (Moody's Investors Service, 2016).
- DID using Paris Agreement as external shock:

$$Profitability = \alpha + \beta_0 PostParisAgreement + \beta_1 SustainablePath + \beta_2 PostParisAgreement \times SustainablePath + \varepsilon$$

- Y = monthly stock growth rate, yearly stock growth rate and yearly ROA.

Results DID

Yearly Data Regressions		
Variables	Dependent Variable (Y) = ROA	Dependent Variable (Y) = Stock Growth Rate
Financial Market		
Time Dummy Paris Agreement	−0.0441	−0.0026**
	[0.1538]	[0.001]
Sustainable Path Dummy	−0.563**	−0.0035**
	[0.245]	[0.0017]
Time Dummy Paris Agreement × SustainablePath	0.0696	0.0035**
	[0.2323]	[0.0017]
Energy Market		
Time Dummy Paris Agreement	−2.181***	−0.0125
	[0.609]	[0.0209]
Sustainable Path Dummy	−0.3102	−0.014
	[1.1978]	[0.0135]
Time Dummy Paris Agreement × SustainablePath	−0.6523	0.0569*
	[1.3035]	[0.0293]

Methodology

- Triple DID to see effect in OECD countries:

$$Profitability = \alpha + \beta_0 PostParisAgreement + \beta_1 SustainablePath +$$
$$\beta_2\, PostParisAgreement \times SustainablePath + \beta_3\, OECD +$$
$$\beta_4 OECD \times PostParisAgreement + \beta_5 OECD \times SustainablePath +$$
$$\beta_6 OECD \times PostParisAgreement \times SustainablePath + \varepsilon$$

Results Triple DID

- Financial sector stock price growth rate from sustainable companies in the OECD was **5.63%** less than sustainable companies from outside the OECD. → India, Thailand and other Asian countries, experienced higher growth.
- Energy sector, we observe the same result but with bigger difference of **10.4%** → India, Qatar, Saudi, Thailand, etc. have recently observed a big growth without caring too much about climate change, emissions and sustainable practices.

Conclusion

- Paper examines how a company's profitability, specifically ROA and stock growth rate, was affected by being rated sustainable in the MSCI Sustainability Index during the Paris Agreement.
- Financial sector no significant results and for energy sector 5.69% higher yearly stock growth rate.
- Sustainable companies outside the OECD grew more
- Main assumption: Parallel trends assumption in some time frames is not clearly observed but show causal results.

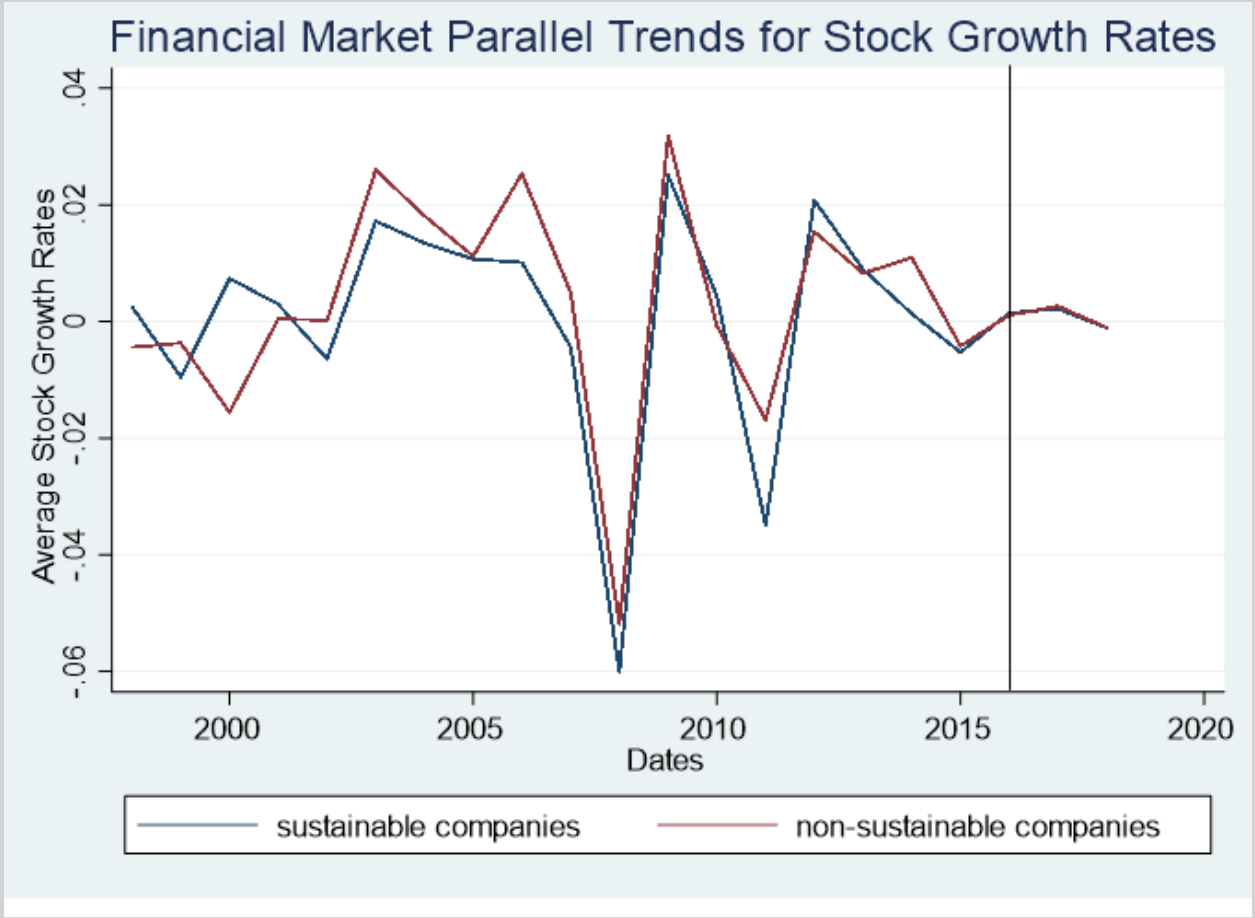
Extra Slides

Descriptive Statistics

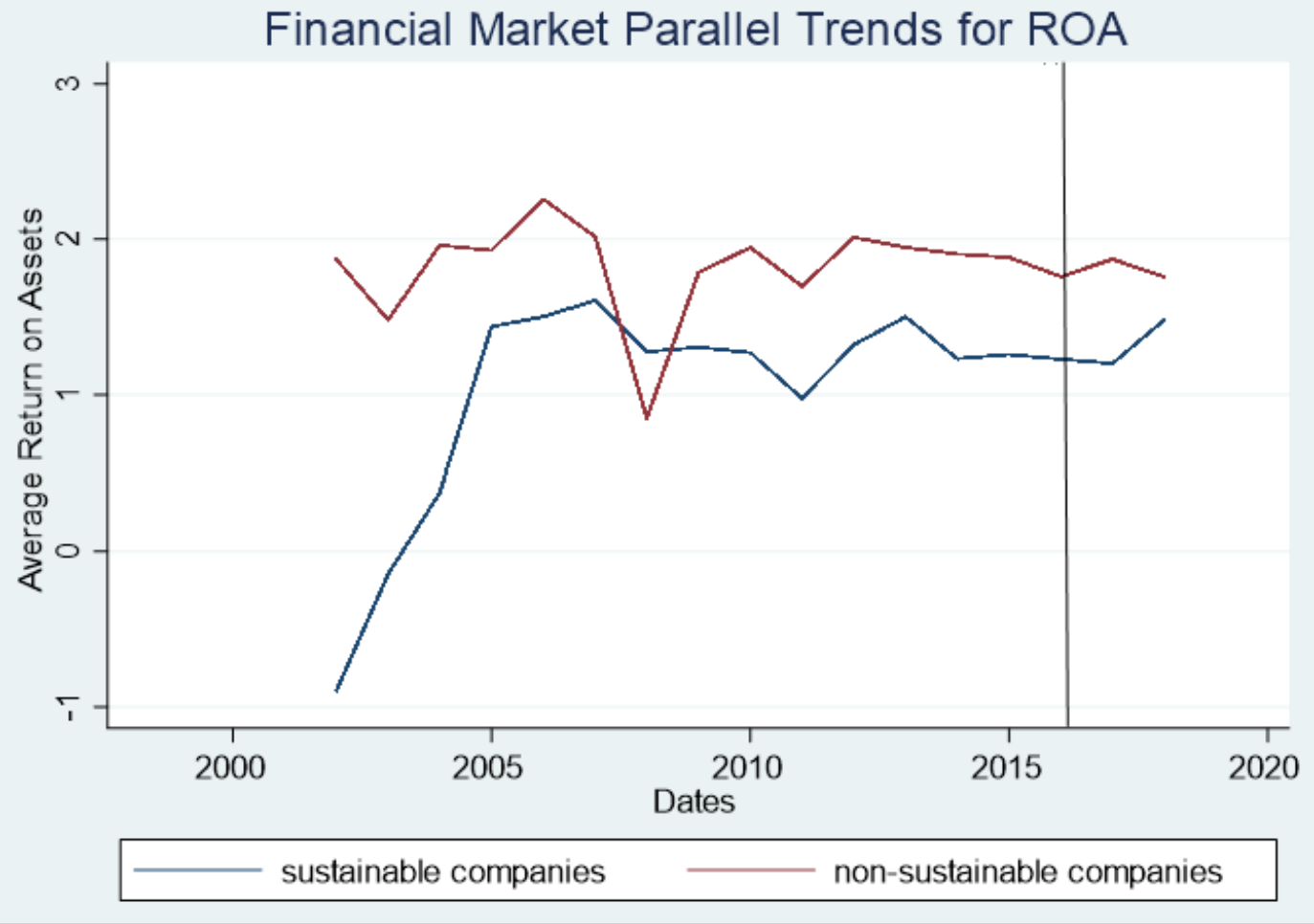
Variable	Observations	Mean	Std. Dev.	Min	Max	Median
Monthly Energy Stock Prices Growth Rates	27,062	0.0025745	0.10206	-2.3724	1.6806	0.0051393
Monthly Financial Stock Prices Growth Rates	26,924	0.00089025	0.11603	-4.75	1.558	0.0036656
Yearly Energy Stock Prices Growth Rates	2410	0.030218	0.3779	-2.3884	1.9989	0.053185
Yearly Financial Stock Prices Growth Rates	2349	0.020052	0.32884	-3.8761	1.8322	0.02405
ROA Energy	2,236	5.4149	9.5102	-80.8	44.83	4.825
ROA Financial	2,004	1.6559	2.6462	-58.15	22.8	1.33
Profit Margins Energy	2,174	13.8	18.623	-99.38	96.3	12.335
Profit Margins Financial	1,952	35.209	20.469	-96.18	98.2	37.8
Sustainability Dummy Energy	3045	0.36552	0.48165	0	1	0
Sustainability Dummy Financial	3,423	0.30704	0.46133	0	1	0
OECD Dummy Energy	3,045	0.67586	0.46813	0	1	1
OECD Dummy Financial	3,423	0.52761	0.49931	0	1	1

Variable omission problem but (Berg Florian et al., 2019) proved that it is worse for a company to omit data in its performance, we assume there is no significant problem.

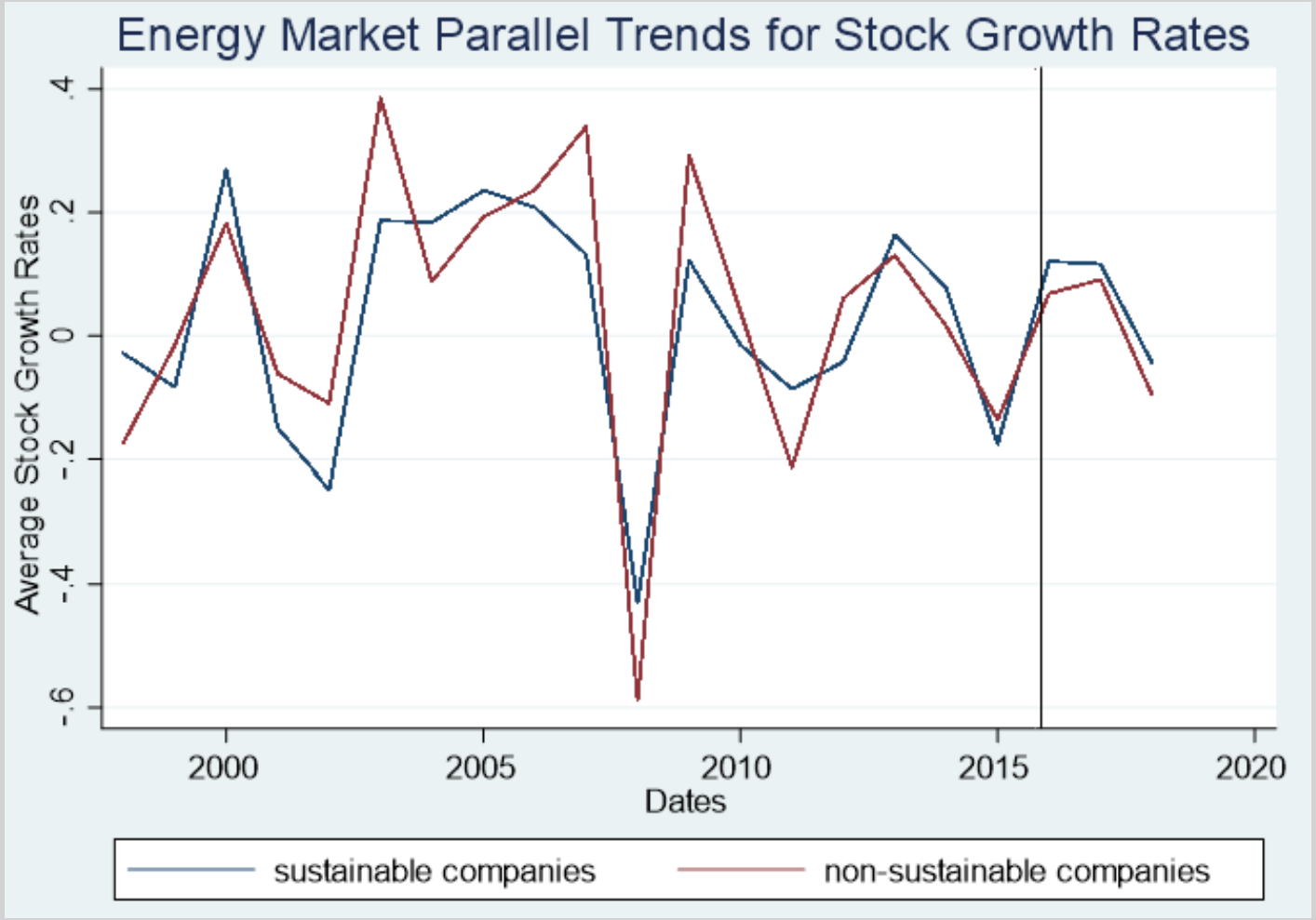
Parallel Trends Financial Sector Stock Growth Rate



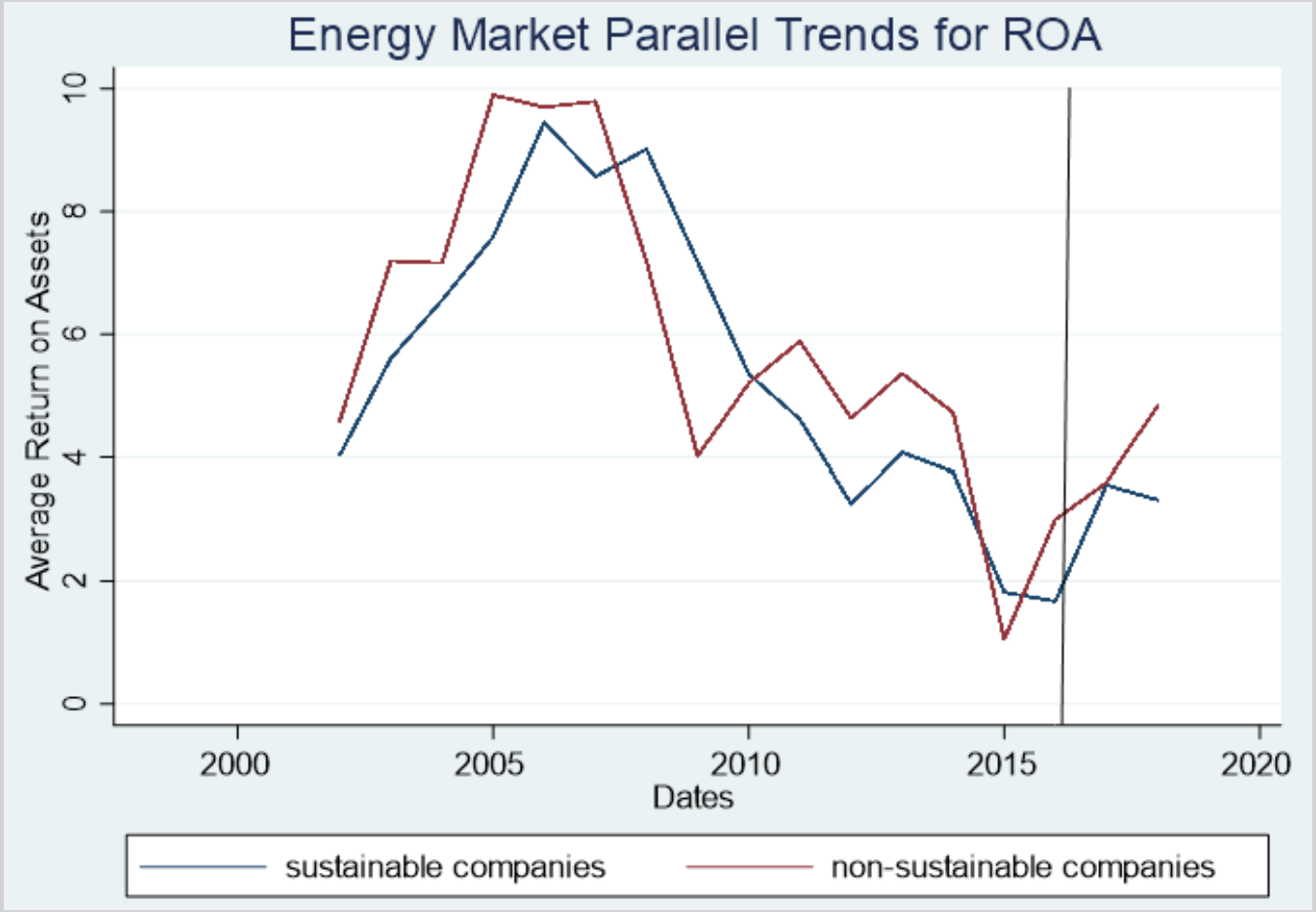
Parallel Trends Financial Sector ROA



Parallel Trends Energy Sector Stock Growth Rate



Parallel Trends Energy Sector ROA



Monthly Stock Price Results

Dependent variable (Y): Monthly Stock Growth Rate					
Variables	Same Month After Paris Agreement	1 Month After	2 Months After	6 Months After	1 Year After
Financial Market					
Time Dummy Paris Agreement	0.0105***	0.0111***	0.0134***	0.0115***	0.014***
	[0.0013]	[0.0014]	[0.0014]	[0.0015]	[0.0018]
Sustainable Path Dummy	−0.0034	−0.00340186	−0.0035	−0.0033	−0.0032
	[0.0028]	[0.0028]	[0.0029]	[0.0028]	[0.0027]
Time Dummy Paris Agreement × SustainablePath	-0.0019	0.00155077	0.0032	0.0007	−0.0016
	[0.0023]	[0.0024]	[0.0028]	[0.0029]	[0.003]
Energy Market					
Time Dummy Paris Agreement	0.003*	0.0041**	0.0038**	0.0045**	0.0096***
	[0.0016]	[0.0017]	[0.0018]	[0.0023]	[0.0034]
Sustainable Path Dummy	−0.0009	−0.0009	−0.0008	−0.0009	−0.0005
	[0.0011]	[0.0011]	[0.0011]	[0.0011]	[0.001]
Time Dummy Paris Agreement × SustainablePath	0.0026	0.0019	0.0013	0.003	−0.0054
	[0.0029]	[0.003]	[0.0032]	[0.0038]	[0.0052]

Triple DID

Triple DID with yearly data and OECD control			
Variables		Dependent Variable (Y) = ROA	Dependent Variable (Y) = Stock Growth Rate
Financial Market			
Time Dummy Paris Agreement		−0.2437***	−0.0499***
		[0.0827]	[0.0167]
Sustainable Path Dummy		−0.3388	−0.0583**
		[0.2289]	[0.024]
Time Dummy Paris Agreement × SustainablePath		0.1752*	0.0666***
		[0.1043]	[0.0246]
OECD Dummy		0.2666	−0.05315 ***
		[0.4066]	[0.02]
OECD × Time Dummy Paris Agreement		0.4066	0.0433**
		[0.3101]	[0.0201]
OECD × SustainablePath		−0.4342	0.0436
		[0.4854]	[0.0324]
OECD × SustainablePath× Time Dummy Paris Agreement		−0.2415	−0.0563*
		[0.4409]	[0.0328]
Energy Market			
Time Dummy Paris Agreement		−2.4667***	−0.0421
		[0.8997]	[0.0368]
Sustainable Path Dummy		0.6616	−0.0335
		[2.3688]	[0.0362]
Time Dummy Paris Agreement × SustainablePath		1.1513	0.1332**
		[1.3194]	[0.052]
OECD Dummy		−4.0147***	−0.0143
		[1.527]	[0.0218]
OECD × Time Dummy Paris Agreement		0.4408	0.0533
		[1.2245]	[0.0436]
OECD × SustainablePath		0.5836	0.026
		[2.8521]	[0.0393]
OECD × SustainablePath× Time Dummy Paris Agreement		−2.2124	−0.1043*
		[1.2]	[0.0612]