

Green Products

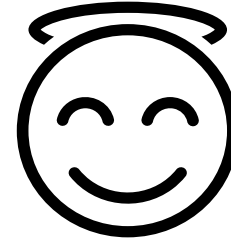
Wan-Chien Chiu, Po-Hsuan Hsu, Kai Li, Joy Tianjiao Tong

AFA: Corporate Finance: ESG and Sustainable Finance
January 5, 2025

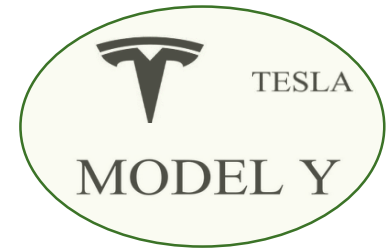


Pollution
Climate Change

Green Technology Innovation Product



Nike Inc. claim:
“**Space Hippiie**” has the
lowest carbon footprint
of any of its footwear



The European Union Intellectual Property Office (2021, p. 5)

*“The role of **IP in environmental protection** has traditionally been studied by focusing on technology and innovation, using **patent filings** as the principal indicator of innovative activity in this sphere....*

*However, to date virtually no studies have considered **trademark filings as an indicator of innovation** related to **environmental protection**.”*

What we do

Large sample

- USPTO trademark (1981-2020)
- Identify “green marks” to measure green product (lines)
- Green products/service
 - User side, not just producer side (e.g., green patent)
 - Use in commerce requirement = no false claim
 - Legal protection / well defined in trademarks

Research questions

- 1) Who produce green products?
- 2) Do green products enhance firm-level environmental and financial performance?
- 3) Why do firms develop green products?

Identify USPTO green marks

- **EUIPO (2021) green trademark taxonomy**

- Machine learning + human interventions
- Elaborate search & NOT keyword search
- Generate 375 green expressions

Ref	Expression
-----	------------

73	+electric +vehicle –cigarette –door –horn –lock –sunroof–alternator –alarm –temperature –theft –antitheft –washers –7 –37
----	--

Green expression (Ref. 73) means:

a term is green if it contains the word electric and the word vehicle, and does not contain the word cigarette or the word door or the word horn or the word lock or the word sunroof or the word alternator or the word alarm or the word temperature or the word theft or the word antitheft or the word washers, **except if Nice Class 7** Machines and Machine Tools, Parts or **Nice Class 37** Construction, Repair, Cleaning.

STATUSDOCUMENTSMaintenance?

DownloadPrint Preview

Generated on: This page was generated by TSDR on 2024-10-20 15:46:30 EDT

Mark: MODEL Y

US Serial Number: 87377617

US Registration Number: 6075303

Filed as TEAS RF: Yes

Register: Principal

Mark Type: Trademark

TM5 Common Status Descriptor:

Application Filing Date: Mar. 20, 2017

Registration Date: Jun. 09, 2020

Currently TEAS RF: Yes

LIVE/REGISTRATION/Issued and Active

The trademark application has been registered with the Office

Status: Registered. The registration date is used to determine when post-registration maintenance documents are due.

Status Date: Jun. 09, 2020

Publication Date: Feb. 27, 2018

Notice of Allowance Date: Apr. 24, 2018

Mark Information

Related Properties Information

Goods and Services

Note:

The following symbols indicate that the registrant/owner has amended the goods/services:

- Brackets [...] indicate deleted goods/services;
- Double parenthesis ((...)) identify any goods/services not claimed in a Section 15 affidavit of incontestability; and
- Asterisks *...* identify additional (new) wording in the goods/services.

For: Electric vehicles

International Class(es): 012 - Primary Class

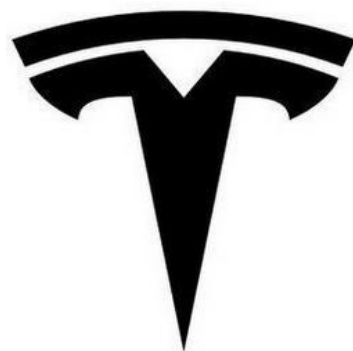
U.S Class(es): 019, 021, 023, 031, 035, 044

Class Status: ACTIVE

First Use: Mar. 13, 2020

Use in Commerce: Mar. 13, 2020

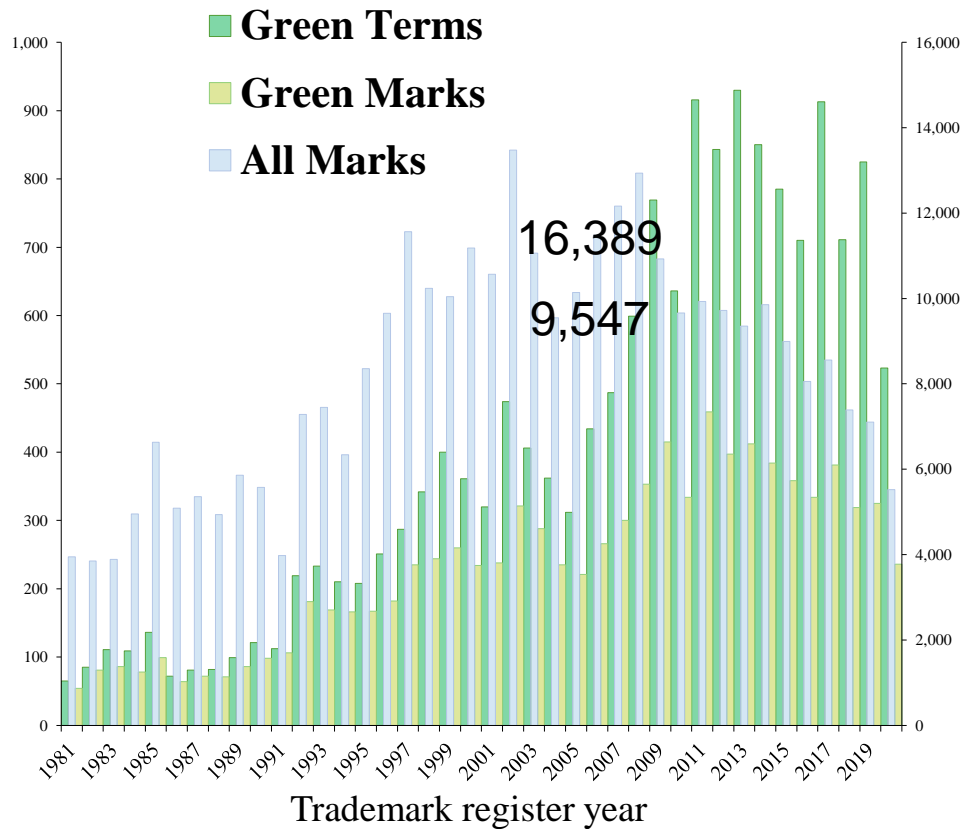
Nice class	12
Mark word	MODEL Y
(Term-level)	Electric vehicles.
Green expressions	73
Group	Transportation
Category	General transport



	Nice class	Mark word	Goods and Services (Term-level)	Green expression s matched Ref.	Group	Category
6251645 (19-Jan-21)	9	T	Solar energy equipment, namely, photo-voltaic solar modules in the shape of panels or roofing tiles for converting electromagnetic radiation into electrical energy;	162	Energy Production	Solar Energy
6251645 (19-Jan-21)	9	T	Equipment for use in connection with collecting and converting solar energy into electricity, namely, inverters.	224	Energy Production	Solar Energy

This trademark = 1 green mark and 2 green terms

USPTO registered trademarks U.S. public firms 1981-2020



Green products by category

Group	#Green Terms	%Group	Category	#Green Terms	%Category within a group
Energy Production	3,853	23.51%	Other Energy	2,089	54.22%
			Solar Energy	1,287	33.40%
			Biofuels	285	7.40%
			Wind Energy	192	4.98%
Energy Conservation	3,140	19.16%	Energy Saving	1,110	35.35%
			Storage Of Electricity	971	30.92%
			Energy Management	964	30.70%
			Low Energy Lighting	95	3.03%
Pollution Control	2,439	14.88%	Water Purification	1,288	52.81%
			Pollution General	733	30.05%
			Air Purification	381	13.98%
			Biodegradable	77	3.16%
Climate Change	2,190	11.55%	Environmental Services	1,117	50.97%
			Carbon Monitor	122	5.57%
			Carbon Brokerage	91	4.16%
			Process Waste	1,370	87.48%
Waste Management	1,566	9.56%	Waste Disposal	196	12.52%
			Recycling	1,053	84.17%
			Other Reusable	74	5.92%
			Reusable Bags	54	4.32%
Reusable	1,251	7.63%	Reusable Bottles	49	3.92%
			Refilling Cartridge	21	1.68%
			Ecology	519	53.12%
			Sustainability	458	46.88%
Environmental Awareness	977	5.96%	General Transport	412	45.18%
			Electric Engines	358	39.25%
			Other Vehicles	101	11.07%
			Electric Motor	20	2.19%
Transportation	912	5.56%	Hydrogen Vehicle	7	0.77%
			Hybrid Vehicle	5	0.55%
			Electric Car	5	0.55%
			Electric Bike	4	0.44%
Agriculture	61	0.37%	Fertiliser Alternatives	35	57.38%
			Pesticide Alternatives	25	40.98%
			Other Agriculture	1	1.64%

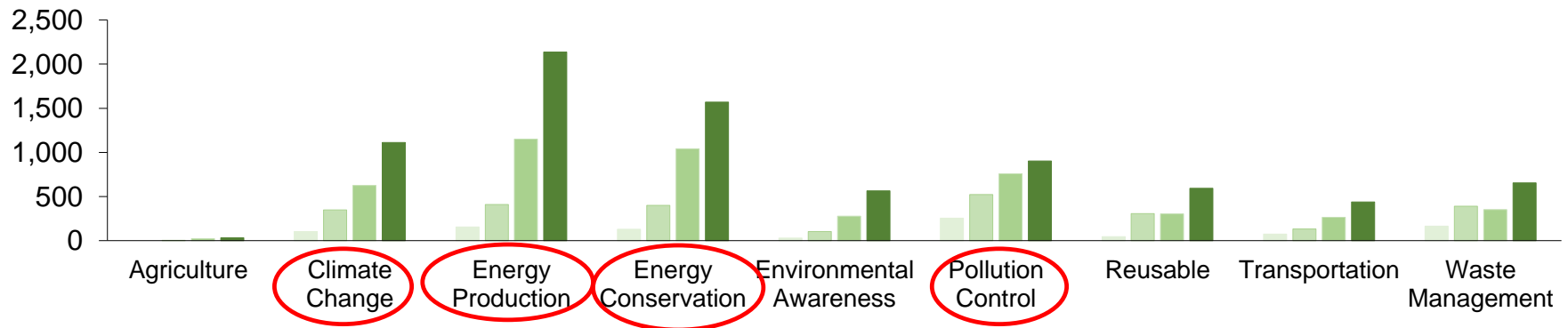
9 green groups
35 green category

Green products (# Green terms)

Nine industry sectors (2-digit-SIC)



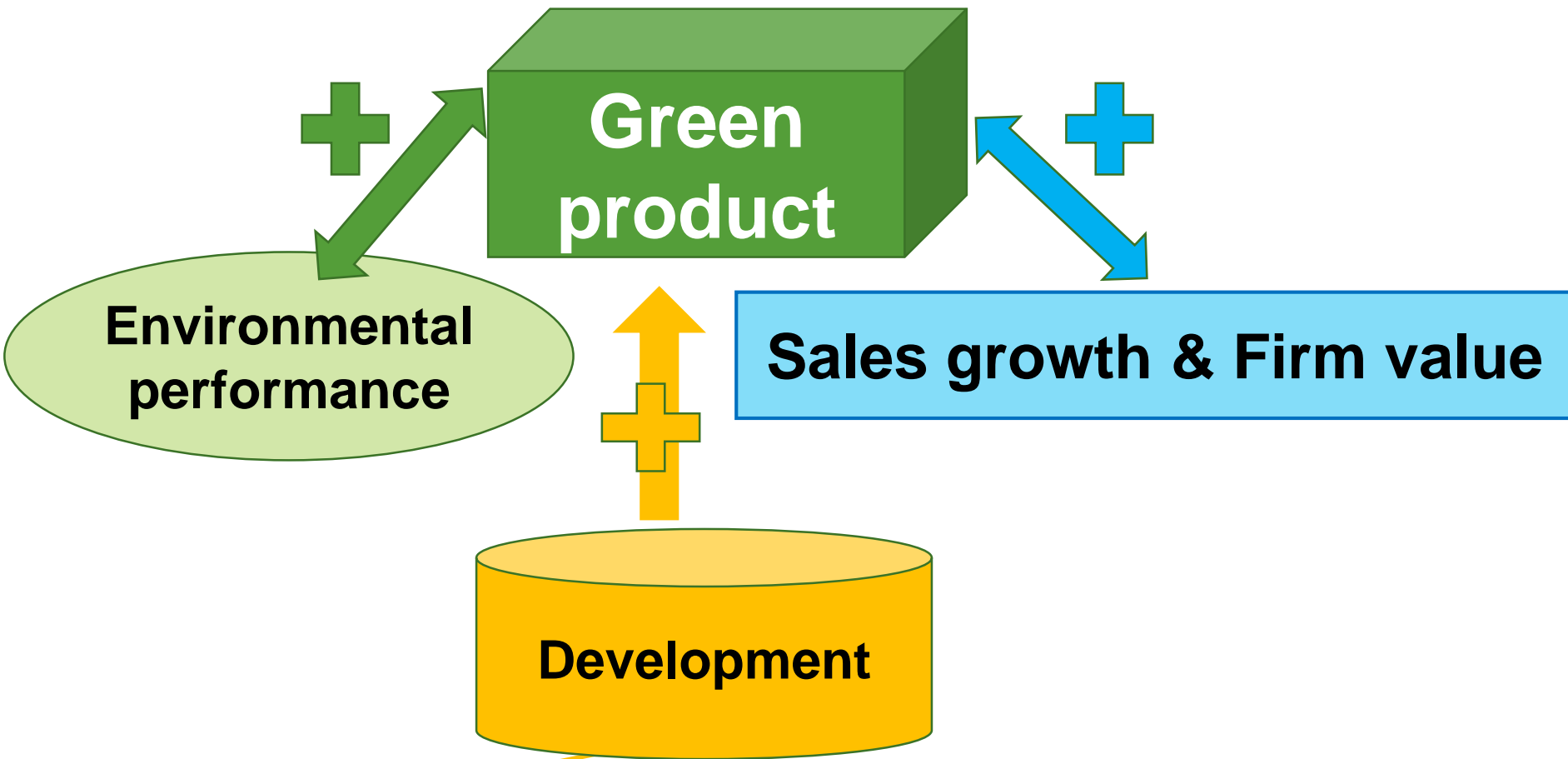
Nine groups (EUIPO green trademark taxonomy)



Firm-year level

- Trademarking firms
 - At least one registered mark in 1981-2020
 - 109,129 firm-year observations 7,865 unique firms

		Mean	Std. Dev.	P25	P50	P75
	Green Marking Firm	0.309	0.462	0	0	1
Green Capacity →	#Green Term	0.133	1.502	0	0	0
	Green Term	0.047	0.260	0	0	0
Green Scope →	Green Category	0.059	0.344	0	0	0
	#All Mark	2.738	9.560	0	0	2
	All Mark	0.672	0.916	0	0	1.099
	#Green Mark	0.077	0.558	0	0	0
	Green Mark	0.039	0.205	0	0	0
	#Non-Green Mark	2.661	9.451	0	0	2
	Non-Green Mark	0.656	0.909	0	0	1.099
	Green Patenting Firm	0.203	0.402	0	0	0
	#Patent	12.895	116.129	0	0	1
	#Green Patent	0.508	8.685	0	0	0
	Green Patent	0.078	0.400	0	0	0



Causal evidence

- Natural disasters in adjacent counties
- Peer's environmental scandals

Green products enhance firm-level E-performance?

	Environmental scores					
	MSCI E-Score		Sustainalytics E-Score		Refinitiv Innovation Score	
	(1)	(2)	(3)	(4)	(5)	(6)
Green Term	0.009*** (0.003)		0.003** (0.002)		0.013** (0.005)	
Green Category		0.006*** (0.002)		0.002** (0.001)		0.007** (0.004)
Non-Green Mark	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.005 (0.003)	-0.005 (0.003)
Green Patent	0.029*** (0.006)	0.029*** (0.006)	0.010*** (0.003)	0.010*** (0.003)	0.019** (0.008)	0.019** (0.008)
Firm Size	-0.023*** (0.004)	-0.023*** (0.004)	0.009** (0.004)	0.009** (0.004)	0.001 (0.009)	0.001 (0.009)
Firm Age	-0.008*** (0.002)	-0.008*** (0.002)	0.001* (0.001)	0.001* (0.001)	-0.002 (0.004)	-0.002 (0.004)
ROA	-0.015* (0.008)	-0.015* (0.008)	-0.024** (0.010)	-0.024** (0.010)	0.011 (0.020)	0.011 (0.020)
Capex	0.046 (0.038)	0.046 (0.038)	-0.055 (0.041)	-0.055 (0.041)	0.096 (0.102)	0.096 (0.102)
RD	-0.125*** (0.028)	-0.125*** (0.028)	-0.075 (0.058)	-0.075 (0.058)	0.070 (0.062)	0.07 (0.062)
Cash Holdings	0.030*** (0.011)	0.030*** (0.011)	0.024* (0.015)	0.024 (0.015)	-0.038 (0.032)	-0.038 (0.032)
Leverage	0.028*** (0.010)	0.028*** (0.010)	0.020* (0.012)	0.020* (0.012)	-0.035 (0.024)	-0.035 (0.024)
Firm FE	Y	Y	Y	Y	Y	Y
SIC3-by-year FE	Y	Y	Y	Y	Y	Y
Adjusted R-squared	0.503	0.502	0.863	0.863	0.72	0.72
Observations	26,012	26,012	6,695	6,695	14,906	14,906

Green products reduce firm-level GHG emission?

	GHG emission			
	GHG Total Emission (next 2 years)		GHG Scope1 Emission (next 2 years)	
	(1)	(2)	(3)	(4)
Green Term	-1.030** (0.508)		-0.777* (0.399)	
Green Category		-0.805** (0.332)		-0.606** (0.255)
Non-Green Mark	2.737 (1.998)	2.745 (1.999)	0.465 (0.297)	0.471 (0.296)
Green Patent	-0.120 (0.485)	-0.117 (0.485)	-0.026 (0.277)	-0.023 (0.277)
Adjusted R-squared	0.191	0.191	0.764	0.764
Observations	11,826	11,826	11,826	11,826

Green products enhance firm-level financial performance?

	Sales growth		Firm value			
	Sales Growth (next 2 years)		Total Q (next 2 years)		Tobin's Q (next 2 years)	
	(1)	(2)	(3)	(4)	(5)	(6)
Green Term	0.014*** (0.004)		0.041** (0.016)		0.206** (0.091)	
Green Category		0.011*** (0.002)		0.027** (0.012)		0.143** (0.067)
Non-Green Mark	0.012*** (0.002)	0.012*** (0.002)	0.040*** (0.010)	0.041*** (0.010)	0.172*** (0.057)	0.173*** (0.057)
Green Patent	0.008* (0.005)	0.008* (0.005)	0.062 (0.064)	0.063 (0.065)	-0.115 (0.206)	-0.114 (0.206)
Adjusted R-squared	0.305	0.305	0.591	0.591	0.641	0.641
Observations	90,401	90,401	90,401	90,401	90,401	90,401

Product market scope and threat

Firm existing capacity

- Hoberg and Phillips (2024)
 - Product market scope: Firms' existing manufacturing, marketing, research capabilities
- Synergies
 - Bear lower costs in their transformation of green innovation to product lines, leading to higher market value.

Product market threat

- Hoberg, Phillips, and Prabhala (2014)
 - Product market fluidity
- Firms appropriate more profits from new green products when there are fewer rivals who can imitate them

	Sales Growth (next 2 years)		Total Q (next 2 years)		Tobin's Q (next 2 years)	
	(1)	(2)	(3)	(4)	(5)	(6)
Green Term × High Product Market Scope	0.017***		0.056**		0.308**	
	(0.005)		(0.025)		(0.153)	
Green Term × (1 – High Product Market Scope)	0.012**		0.031		0.139	
	(0.005)		(0.020)		(0.106)	
Green Category × High Product Market Scope		0.013***		0.039**		0.233**
		(0.004)		(0.019)		(0.112)
Green Category × (1 – High Product Market Scope)		0.009***		0.016		0.076
		(0.003)		(0.015)		(0.073)
Adjusted R-squared	0.308	0.308	0.594	0.594	0.643	0.643
Observations	73,558	73,558	73,558	73,558	73,558	73,558

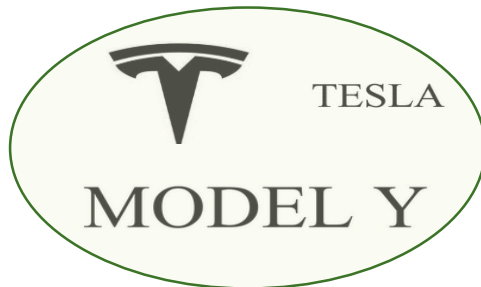
	(1)	(2)	(3)	(4)	(5)	(6)
Green Term × Low Product Market Threats	0.016***		0.064***		0.321***	
	(0.004)		(0.018)		(0.103)	
Green Term × (1 – Low Product Market Threats)	0.012**		0.009		0.051	
	(0.006)		(0.028)		(0.162)	
Green Category × Low Product Market Threats		0.011***		0.040***		0.205***
		(0.003)		(0.014)		(0.073)
Green Category × (1 – Low Product Market Threats)		0.011***		0.006		0.061
		(0.004)		(0.019)		(0.113)
Adjusted R-squared	0.308	0.308	0.594	0.594	0.643	0.643
Observations	73,558	73,558	73,558	73,558	73,558	73,558

Dissecting green product

Synergies/complementarity for firms to extend/transform existing products into green innovation and products



	Sales Growth (next 2 years)	Total Q (next 2 years)	Tobin's Q (next 2 years)
	(1)	(2)	(3)
Core-Business Green Term	0.014*** (0.005)	0.045** (0.021)	0.209* (0.118)
Non-Core-Business Green Term	0.008* (0.005)	0.016 (0.020)	0.109 (0.107)



	(1)	(2)	(3)
Follow-up Green Term	0.011*** (0.004)	0.058*** (0.020)	0.276** (0.116)
Greenfield Green Term	0.020*** (0.006)	0.009 (0.021)	0.072 (0.110)



	(1)	(2)	(3)
Common-Class Green Term	0.015*** (0.005)	0.047** (0.022)	0.214* (0.127)
Unique-Class Green Term	0.008* (0.005)	0.015 (0.018)	0.117 (0.103)

Why do firms develop green products? (1/2)

Natural disaster

- Managerial awareness
- Natural disasters affect firms' operations (Barrot and Sauvagnat 2016), disrupt credit supply (Cortés and Strahan 2017), and change managers' behavior (Bernile, Bhagwat, and Rau, 2017)
- Assumption: Firms located in counties adjacent to disaster-affected counties are indirectly exposed to the environmental repercussions of these events
- Spatial Hazard and Loss Database for the United States (SHELDUS)
- **Adjacent to Natural Disaster**: firm headquarter located in a county adjacent to any disaster-affected county in that year

	Green Term		Green Category	
	(next year)	(next 2 years)	(next year)	(next 2 years)
	(1)	(2)	(3)	(4)
Adjacent to Natural Disaster	0.521***	0.320***	0.352***	0.161***
	(0.140)	(0.089)	(0.089)	(0.057)
Firm characteristics controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
SIC3-by-year FE	Y	Y	Y	Y
Pseudo R-squared	0.565	0.622	0.306	0.332
Observations	3,740	4,681	3,837	4,987

Why do firms develop green products? (2/2)

Environmental scandal

- Public pressure
- RepRisk, a global provider of business intelligence focusing on environmental, social, and governance (ESG) risks
- **Peer Scandal**: indicator variable that takes the value of one if firm i belongs to an SIC3 industry j that is reported to have severe negative environmental news in year t (aggregate firm-level severe negative environmental news events in a year to the SIC3-year level)

	Green Term		Green Category	
	(next year)	(next 2 years)	(next year)	(next 2 years)
	(1)	(2)	(3)	(4)
Peer Scandal	0.325*** (0.125)	0.186** (0.087)	0.137** (0.069)	0.081 (0.054)
Firm characteristics controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Pseudo R-squared	0.358	0.441	0.205	0.233
Observations	7,167	6,609	7,421	7,033

Contribution

- **Green innovation (NOT green patents)**
 - Novel USPTO green mark
 - All activities: technologies, products, services
 - “Users” instead of “Producers” of green technology
- **Do well by doing good**
 - Commercialized green products (1) firm sales growth (2) firm value
 - Value-enhancing
 - 1) Synergies/complementarity existing products
 - 2) Lower product market threat
- **Causal evidence on the determinants of green products**
 1. Managerial awareness: Natural disaster in neighboring counties
 2. Public pressure: Environmental scandals about industry peers

Thank you