

Are Firms with Female CEOs More Environmentally Friendly?

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Abstract

In this paper, we document a previously unknown benefit of women's role in firm management: the enhancement of environmental protection. Through a panel data analysis, we find that firms with female CEOs produce less air and water pollution and greenhouse gas emissions, and receive fewer environmental penalties, compared to firms with male CEOs. Our difference-in-differences analysis shows that firms also reduce air and water toxic releases, greenhouse gas emissions, and receive fewer environmental penalties after experiencing a male-to-female CEO transition. Moreover, firms demonstrate higher awareness of environmental protection, reflected in their 10-K filings, when being led by female CEOs.

Introduction

- Firm leaders' characteristics → Firms' performance and behaviors
 - Overconfidence, Risk-taking behaviors:
 - Military CEOs (Benmelech and Frydman, 2015)
 - Married CEOs (Roussanov and Savor, 2014)
 - Pilot CEOs (Sunder, Sunder and Zhang, 2017)
 - CEOs' social network (El-Khatib, Fogel and Jandik, 2015)
 - CEO's political connection (Fan, Wong and Zhang, 2007)
 - Gender matters
 - Female CEOs are less overconfident in corporation financial and M&A decisions (Huang and Kisgen, 2013)
 - Nonfinancial effect of CEOs' gender, such as **firm environmental protection**, has received less attention.
- Research Question:** Are firms with female CEOs more eco-friendly?
- Motivation (Why studying firms' pollution)
 - A significant part of the world's pollution is caused by firms.
 - 22% of the greenhouse gas, 30% of the total air toxicity (U.S. EPA, 2018)
 - Serious influence of firm pollution.
 - Harms public health (Ebenstein et al., 2015; Ilsen, Rossin-Slater, and Walker, 2017)
 - Lowers labor productivity (Zivin and Neidell, 2012)
 - Influences industrial production (Greenstone, 2002)
 - Address endogeneity concerns.
 - Firm with a female CEO may be intrinsically financially different from a firm with a male CEO.
 - In comparison to financial indicators, nonfinancial outcome variables are less likely to be a major consideration in decisions regarding CEO appointments.
 - Identification strategy: difference-in-differences around executive transitions.

Data

- CEO Turnover Data
 - Execucomp
 - 1992 - 2017
 - 47,089 firm-year observations, 7,787 CEOs and 4,186 turnover events.
- Emission and Penalties Data
 - EPA Toxics Release Inventory (TRI)
 - 1987 - 2014
 - 2,525,090 plant-year level observations, 49,157 plants and 13,480 (parent) firms.
 - Manually matched the TRI firm names to the Execucomp firm names.
 - EPA Greenhouse Gas Reporting Program (GHGRP)
 - 2008 - 2017, Green house gas emission
 - EPA Enforcement and Compliance History Online (ECHO)
 - 1996 - 2017, Penalties
- Compustat & EDGAR

Findings

- Female CEOs → More Eco-friendly
 - Panel data analysis
 - Firms with female CEOs
 - Cause **less air and water pollution**
 - Produce **less greenhouse gas emissions**
 - Receive a **fewer number of environmental penalties**
 - Mention **more emission-related words in their 10-K filings**
 - Difference-in-differences (DID) analysis
 - Firms **reduce air and water pollution releases, reduce greenhouse gas emissions, receive fewer environmental penalties**, and mention **more emission-related words in their 10-K filings** after experiencing male-to-female CEO transitions.

Empirical Results

Table 1. Total, Air and Water Toxics Releases

	Total		Air		Water	
	Total Toxics Releases	Total Toxic Air Emissions	Total Surface Water Discharge	Total Underground Injection		
Female	-0.5005** (-2.09)	-0.5952* (-1.95)	-1.0074* (-1.93)	-0.1266* (-1.80)		
Post * Female	-0.6584** (-2.07)	-0.8376* (-1.94)	-0.8620* (-1.83)	-0.2074** (-1.99)		
Post	-0.1085** (-1.98)	-0.1283 (-1.43)	0.0774 (0.75)	0.0212 (0.46)		
Firm-year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by Firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9527	6159	8953	5736	9551	6180
R-squared	0.921	0.934	0.877	0.898	0.908	0.923

Table 2. Greenhouse Gas Emissions and Air Pollution

	Carbon Dioxide (CO2)	# of CO2 Emission Plant	Nitric Oxide (NO)	Sulfur Dioxide (SO2)
	Female	-0.0474** (-2.18)	-0.4058** (-2.39)	-0.0068 (-1.05)
Post * Female	-0.0707*** (-2.72)	-0.2933** (-2.14)	-0.0005** (-2.13)	-0.0021** (-2.16)
Post	0.0171 (0.44)	0.0245 (0.52)	0.0003*** (2.6528)	0.0022** (2.57)
Firm-year Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Cluster by Firm	Yes	Yes	Yes	Yes
Observations	3161	1764	3171	1773
R-squared	0.863	0.883	0.785	0.795

Table 3. Number of Penalties

	# of Cases with Fed Penalty	# of Cases with State/Local Penalty	# of Cases with Penalty	# of Plants with Penalty
	Female	-0.0690** (-2.39)	-0.0698** (-2.17)	-0.1174** (-2.29)
Post * Female	-0.0720** (-2.19)	-0.0796** (-2.49)	-0.1442** (-2.25)	-0.1178** (-2.27)
Post	0.0099 (1.13)	0.0111 (1.02)	0.0153 (1.14)	0.0015 (0.14)
Firm-year Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Cluster by Firm	Yes	Yes	Yes	Yes
Observations	10325	6513	10315	6505
R-squared	0.388	0.410	0.559	0.582

Table 4. Amount of Penalties

	Fed Penalty Amount	State/Local Penalty Amount	Amount of Cost Recovery Awarded	Total Penalty Amount
	Female	-0.8402** (-2.24)	-0.5564** (-2.17)	-0.0274** (-2.16)
Post * Female	-0.8046** (-2.14)	-0.8633*** (-2.76)	-0.0438** (-2.23)	-1.1930** (-2.23)
Post	0.1120 (1.12)	0.0182 (0.20)	-0.0003 (-0.01)	0.0849 (0.71)
Firm-year Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Cluster by Firm	Yes	Yes	Yes	Yes
Observations	10327	6515	10312	6500
R-squared	0.310	0.334	0.458	0.486

Table 5. Environmental Awareness

	Number of Emission-related Words		Frequency of Emission-related Words	
	Female	21.46*** (5.67)	21.24** (5.39)	3.229** (1.97)
Post * Female	26.48*** (5.26)	26.75*** (5.04)	4.813** (2.19)	5.343** (2.32)
Post	-0.194 (-0.15)	0.105 (0.08)	0.0289 (0.05)	0.0800 (0.13)
Firm-year Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Cluster by Firm	Yes	Yes	Yes	Yes
Observations	5018	4696	3183	3000
R-squared	0.600	0.601	0.586	0.586

• Dependent variables take the logarithm in Table (1) - (4).
• Control variables include Total Asset (log), Leverage, ROA, Market-to-Book, Operating Cash Flow / Total Assets, Sale Growth, and Cash Flow Volatility.



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