



Frankfurt School
FS-UNEP Collaborating Centre
for Climate & Sustainable Energy Finance

The Cost of Debt of Renewables vs Fossil Fuel Firms: Evidence from the U.S. Energy Sector

K. Kempa, U. Moslener & O. Schenker

IAEE Meeting Ljubljana
August 28, 2019



Cost of Debt: A Mostly Neglected Determinant of the Energy Transition

- Capital costs are an important determinant of the profitability in capital intensive sectors such as energy.
 - In particular for renewables (Hirth & Steckel, 2016)
- But often neglected in empirical and theoretical analysis.
- This paper aims at shedding light at the evolution of the costs of debt for U.S. renewable and fossil fuel firms and
- explores the role of environmental policy on costs of debt

Do Costs of Debt differ between RE versus Fossil Fuel Firms?

Type-specific markups over market interest rate due to

- (Perception) of type-specific **technology risks**. “Old, known” technology risks vs. “New, unknown” technology risks.
 - Learning might lead to convergence over time.
- (Perception) of type-specific **policy risks**.
 - E.g. environmental policy may increase relative profitability risks for fossil fuel firms
- Research Question: **How do changes in these risks affect cost of debt?**

Data

- **Bank loans:** Syndicated loans to U.S. firms outside the electricity production sector – renewables & fossil fuel firms (BICS), 2000-2018 from *Bloomberg*.
 - Loan Amount, Maturity, Spread, Secured
- **Firm characteristics** of borrowers from *Compustat*
 - Profitability, Total Assets, Leverage, Mod. Z-Score
- Total 1845 Loan Observations (216 in subsector Renewable Energy)

Data – Descriptive Statistics

	Renewable Firms		Fossil Fuel Firms	
	Mean	Std. Dev.	Mean	Std. Dev.
Loan Spread at Close	332.74	195.68	264.27	223.24
Loan Maturity (Months)	61.05	39.49	54.44	34.76
Loan Amount rel. to Total Assets	0.27	0.39	0.89	8.61
Fraction Loan Secured	0.92	0.27	0.50	0.50
Profitability	0.01	0.24	0.09	0.24
Leverage	0.36	0.30	0.36	0.29
Total Assets	6.98	1.66	7.76	1.92

Estimation

$$Y_{j,i,t} = \beta_0 + \beta_1 L_{j,i,t} + \beta_2 F_{i,t-1} + \vartheta_t + \mu_j + \varepsilon_{j,i,t}$$

Log
Libor
spread

Loan
specifics

Time-lagged
firm specifics

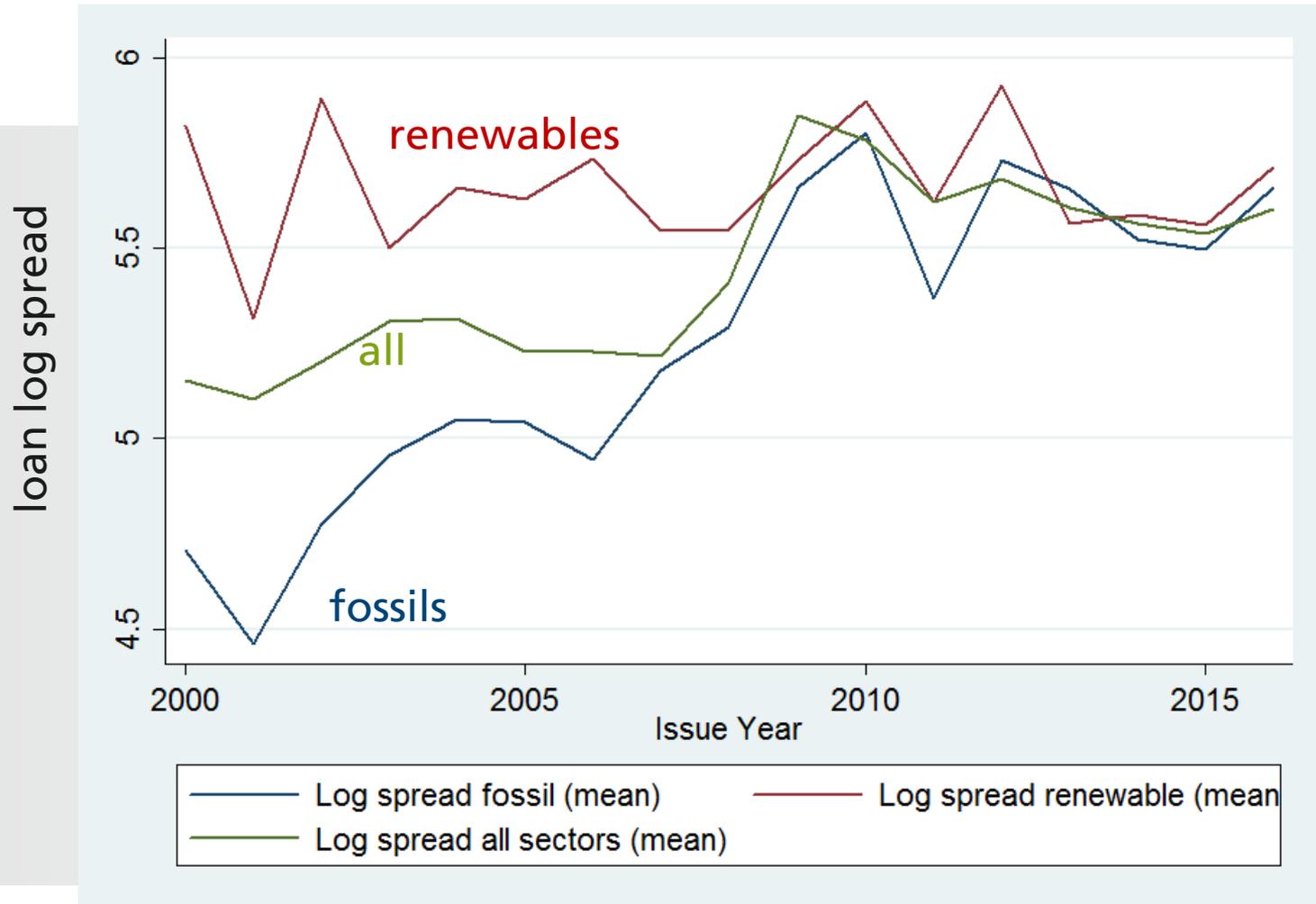
Time & loan-
type FE

Pooled Regression

Loan Maturity (Months)	0.0000	(0.01)
Loan Amount	-0.0040***	(3.42)
Loan Secured	0.4788***	(9.82)
Profitability	0.0520	(0.41)
Leverage	0.2470***	(3.07)
Total Assets	-0.1257***	(7.38)
Mod. Z-Score	-0.0054	(0.42)
Renewable Energy	-0.0591	(0.76)

Standard errors clustered at firm-level

Time matters



Regression Capturing Time Dynamics

... as before(...)
Renewable Energy	0.1646*	(1.83)
D_2005-2009	0.5644***	(3.62)
D_2010-2014	0.3959***	(2.96)
D_>2014	0.3213**	(2.50)
Renewables * D_2005-2009	-0.0507	(0.28)
Renewables * D_2010-2014	-0.2979**	(2.35)
Renewables * D_>2014	-0.3460**	(2.24)

Standard errors clustered at firm-level

Does Environmental Policy Matter?



OECD Environmental Policy Stringency Index attempts

to measure the stringency of environmental policies in a comparable way.

computes relative shadow prices, scores and aggregates them.

U.S. state policies are weighted with market size.

(Botta & Koźluk, 2014)

Source: OECD

The Effect of Environmental Policy on Cost of Debt

...as before	...	
Renewable Energy	0.5865***	(2.91)
Environmental Policy Stringency	0.3126***	(3.67)
Renewables * Environ. Policy Stringency	-0.2655***	(2.92)

Standard errors clustered at firm-level

(Preliminary) Conclusions

We analysed the determinants of cost of debt of U.S. energy firms between 2010 and 2016 using loan and borrower micro data:

We find:

1. There **was** a strong difference between the costs of debt for RE versus fossils in the US.
2. The **difference has vanished** over time.
3. Strong driver might have been **environmental policy**...
4. ... but rather **increasing the cost of debt for fossils**.
5. Next Steps: Extend data and analysis to more countries, extend to bond market

Thank You!

Email: o.schenker@fs.de

Twitter: [@olischenker](https://twitter.com/olischenker)



Frankfurt School
FS-UNEP Collaborating Centre
for Climate & Sustainable Energy Finance

Frankfurt School of Finance & Management
Adickesallee 32-34
60322 Frankfurt am Main
Phone +49 69 154008 – 619
E-Mail: u.moslener@fs.de