

Environmental Risks and Loan Contract Terms

Diwen Gao

(Job Market Candidate 2022/2023)

Bayes Business School, City, University of London

<https://sites.google.com/view/diwengao>, diwen.gao@bayes.city.ac.uk

Overview

This paper investigates whether and how firm-level environmental risks are reflected in banks' credit policies, **in absence of intense regulatory scrutiny**.

- Quasi-natural experiment - the Deepwater Horizon Oil Spill in 2010.
- An exogenous shock to banks' view of the materiality of environmental risks to business operations.
- I find that following the oil spill, banks start to take into account weak environmental performance as a fundamental risk to firms, by requiring **higher** loan interest rates and **more restrictive** covenants on firms with environmental concerns.
- However, it is driven by banks with **green expertise**, that is, an information advantage accumulated through prior relationships with environmentally friendly firms.
- Other banks tend to issue loans with **shorter maturities** and **more collateral** to mitigate environmental risks.

Research Question

Recent literature shows that significantly higher interest rates on loans to the fossil fuel industry [1] and brown firms in general [2] are required by banks after the ratification of the Paris Agreement in 2015.

- 1 *Is it driven by greenwashing incentives from public and regulatory pressures, or a change in the perception of firms' fundamental risk?*
- 2 *Does it apply to all banks or only a subset of them?*

Deepwater Horizon Oil Spill

- The largest marine oil spill in history → consequences of the oil spill were **economically significant** to both BP and banks who had active lending relationship with BP.

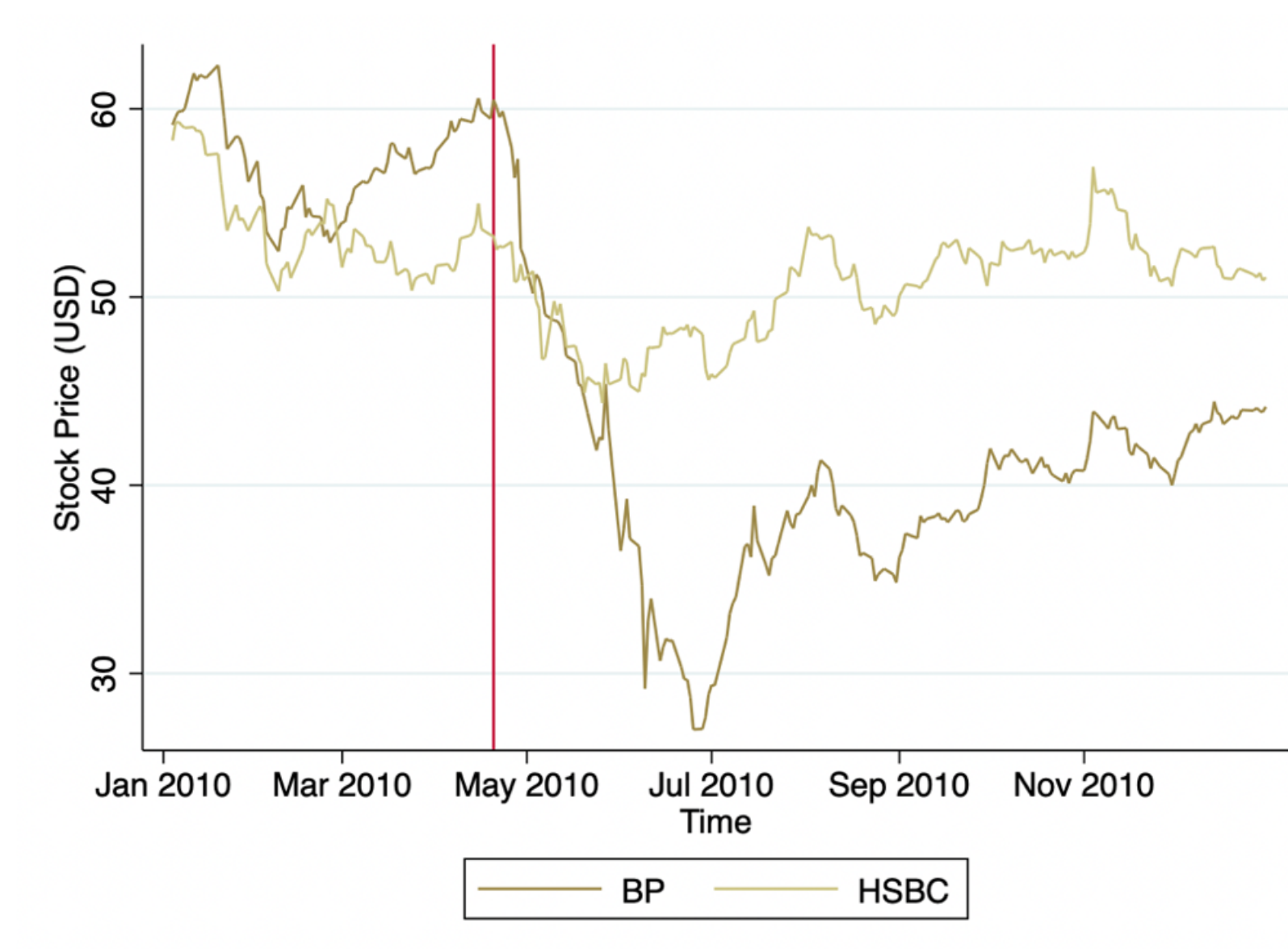


Figure 1: Stock Market Reaction

- **Public attention** of environmental issues, and thus **regulatory pressure** were **much lower** than in more recent years → examine whether banks take firm-level environmental risks into account, absent external pressures.

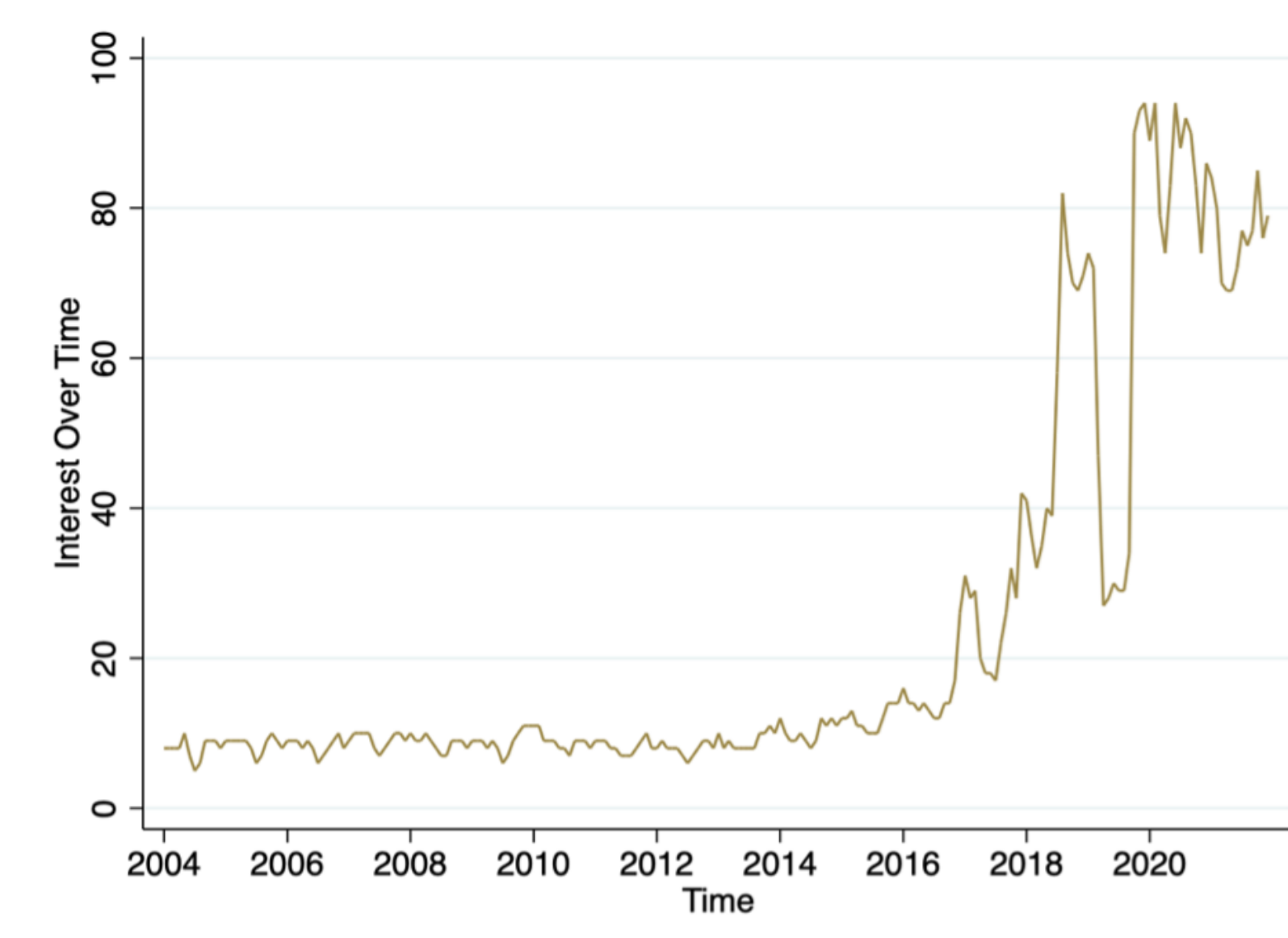


Figure 2: Attention to Environmental Issues

Regression Specification

I estimate a triple difference-in-differences model over the period 2007 - 2013:

$$y_{i,l,t} = \alpha_0 + \beta_1 \bar{E}_i + \beta_2 Treated_l + \beta_3 Post_t + \beta_4 \bar{E}_i \times Treated_l + \beta_5 \bar{E}_i \times Post_t + \beta_6 Treated_l \times Post_t + \beta_7 \bar{E}_i \times Treated_l \times Post_t + \gamma' X_{i,t-1} + \lambda' Z_{l,t} + FE_{i,t} + \epsilon_{i,l,t}$$

- $Treated_l$: bank that has **active loan(s)** with BP at the time of the oil spill.
- \bar{E}_i - an **ex-ante** measure of average firm environmental performance.
- **Borrower-time** fixed effects - absorb firm-level time-varying unobserved shocks, including demand → **supply driven** credit adjustment [3].

Definition

- Green firm - firm whose environmental performance is above median.
- Green bank - bank who has relatively strong (above the median) green expertise (GE), which is measured as:

$$GE_{j,t} = \frac{\text{Amount of loans by bank } j \text{ to green firms in the last 5 years}}{\text{Total amount of loans by bank } j \text{ in the last 5 years}}$$

Data

- Firm-level environmental performance data – Refinitiv.
- Tranche-level syndicated loan data – LPC DealScan.
- Firm and bank-level financial data – Compustat and SNL Financial.

Results

- **Green** banks incorporate firm-level environmental risks in their **loan pricing** and adjust **covenant requirements** following the oil spill.

	(1)		(2)		(3)		(4)	
	$AISD_{i,l,t}$		$\#Covenants_{i,l,t}$					
	B	G	B	G	B	G	B	G
$Treated_l$	-41.01 (40.920)	-74.36 (48.340)	-0.088 (0.418)	-1.380* (0.782)				
$\bar{E}_i \times Treated_l$	0.319 (0.831)	1.206 (0.948)	-0.006 (0.010)	0.016 (0.011)				
$Treated_l \times Post_t$	51.32 (44.297)	130.7** (52.914)	0.192 (0.501)	1.778* (0.920)				
$\bar{E}_i \times Treated_l \times Post_t$	-0.428 (1.323)	-2.067** (0.882)	0.014 (0.020)	-0.031** (0.015)				
N	1,388	762	1,388	762				
Adj. R^2	0.763	0.671	0.724	0.789				
Loan Characteristics	YES	YES	YES	YES				
Loan Purpose FE	YES	YES	YES	YES				
Firm-Time FE	YES	YES	YES	YES				

Results (cont.)

- **Brown** banks issue loans with **shorter maturities** and **more collateral** to mitigate firm-level environmental risks.

	(1)		(2)		(3)		(4)		(5)		(6)	
	$LoanAmount_{i,l,t}$		$Maturity_{i,l,t}$		$Secured_{i,l,t}$							
	B	G	B	G	B	G	B	G	B	G	B	G
$Treated_l$	-0.206 (0.171)	-0.651 (1.332)	0.315 (0.249)	1.060* (0.606)	-0.193** (0.091)	0.092 (0.130)						
$\bar{E}_i \times Treated_l$	-0.008 (0.005)	0.008 (0.021)	0.0003 (0.005)	-0.0124 (0.009)	0.007*** (0.003)	-0.001 (0.002)						
$Treated_l \times Post_t$	0.744*** (0.214)	1.156 (1.774)	-0.718* (0.387)	-1.450 (0.977)	0.204** (0.093)	0.067 (0.621)						
$\bar{E}_i \times Treated_l \times Post_t$	-0.011 (0.008)	-0.020 (0.033)	0.023** (0.010)	0.017 (0.014)	-0.009** (0.004)	0.002 (0.010)						
N	1,388	762	1,388	762	1,388	762						
Adj. R^2	0.654	0.753	0.585	0.532	0.889	0.899						
Loan Characteristics	YES	YES	YES	YES	YES	YES						
Loan Purpose FE	YES	YES	YES	YES	YES	YES						
Firm-Time FE	YES	YES	YES	YES	YES	YES						

- Brown banks assign more green co-leads in the syndicate and rely on their green expertise to produce advanced information on firms' environmental risks → the lack of expertise prevents brown banks from pricing environmental risks properly.
- Percentage of loans obtained from green banks is **positively** related to firm's subsequent environmental performance.
- Policy implication: given that banks recognise environmental concerns as an additional dimension of firms' fundamental risk, helping banks to develop environmental risk modelling and increasing granularity of environmental data should be the focus of central banks moving forward.

References

- [1] Manthos D Delis, Kathrin De Greiff, and Steven Ongena. Being stranded with fossil fuel reserves? climate policy risk and the pricing of bank loans. *Swiss Finance Institute Research Paper No. 18-10*, 2019.
- [2] Hans Degryse, Roman Goncharenko, Carola Theunisz, and Tamas Vadasz. When green meets green. *Available at SSRN*, (3724237), 2021.
- [3] Asim Ijaz Khwaja and Atif Mian. Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, 98(4):1413-42, 2008.
- [4] Stefano Giglio, Bryan Kelly, and Johannes Stroebel. Climate finance. *Annual Review of Financial Economics*, 13:15-36, 2021.