Global Banks and Fossil Fuel Firms

Steven Ongenaa, University of Zurich, Swiss Finance Institute, KU Leuven, NTNU Business School, CEPR

5th BIS Workshop
“Research on global financial stability: the use of BIS international banking and financial statistics”
Basel, Friday 15 December 2023
Global fossil fuel consumption

Global primary energy consumption by fossil fuel source, measured in terawatt-hours (TWh).

OurWorldInData.org/fossil-fuels | CC BY
Too-Big-To-Strand: Bond to Bank Substitution in the Transition to a Low-carbon Economy

Winta Beyene (Zurich, SFI)
Kathrin de Greiff (SFI)
Manthos D. Delis (Audencia Business School)
Steven Ongena (Zurich, SFI, KU Leuven, NTNU, CEPR)
Climate Policy Exposure \((CCPI)_{t,i} = \sum_c \text{Relative Reserves}_{t,i,c} \times CCPI_{t,c}\)

- Country-year climate policy index: Climate Change Performance Index (CCPI).

Burck, Hermwille and Bals (2016)

Use other measures of policy stringency.
Can also do exercises with US state level variation in policy and location of oil wells owned by US firms.
Climate Change Performance Index: Advantages

○ Why an index?
  1. It is a transparent measure; not conditional to subjective choices (when constructing a measure, for example)
  2. There are many different climate policies across countries. An index makes global comparison possible and easy

○ Why the CCPI?
  1. It covers 90 percent of global GHG emissions
  2. Presented at the UN’s annual climate change policy conference; used by policy institutions (e.g. World Bank, Financial Stability Board) and financial industry (e.g. Black Rock, NN Investment)
  3. Unique section on the national and international climate policy of a country
  4. It is a comprehensive measure of a country’s climate policy
     – Singular climate policy instruments (carbon taxes, government expenditure on environmental protection, reduction in fossil fuel subsidies) not comprehensive and clean enough

Burck, Hermwille, and Bals, 2016
Variation in the climate policy stringency
Climate Change Performance Index: Evolution and change overtime

Panel A: Evolution of the CCPI overtime

Panel B: Annual change (%) in the CCPI
Bond markets vs banks in funding fossil fuel firms?

1. **Pricing of stranded asset risk** of fossil fuel firms by the corporate bond market and by banks. Strong evidence of stranded asset risk being priced “more” by the corporate bond market than by banks.

2. **Bond to bank substitution**: If the bond market prices climate policy risk more than the banking sector, ceteris paribus, some firms who would issue bonds otherwise instead try to obtain bank loans.
   
   e.g., Rajan, JF, 1992; Becker and Ivashina, JME 2014
   
   Fossil fuel firms substitute from issuing bonds to obtaining bank loans as their stranded asset risk exposures increase.

3. Similar effects play within the set of banks that both underwrite and lead manage (within-bank)

   Hence Bond-to-bank substitution is unlikely to arise from differences in banks that underwrite corporate bonds from banks that lead syndicated bank loans.
### Climate Change Performance Index (CCPI)

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<tr>
<th>Year</th>
<th>Brazil (BRA)</th>
<th>Thailand (THI)</th>
<th>China (CHN)</th>
<th>USA</th>
<th>Norway (NOR)</th>
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### Extra Basis Points

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<th>Bonds</th>
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<td><strong>AISD = 231</strong></td>
<td><strong>Spread = 195</strong></td>
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<tr>
<td><strong>Extra Basis Points</strong></td>
<td><strong>31</strong>*</td>
<td><strong>82</strong></td>
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<tr>
<td><strong>Fossil Fuel Firms</strong></td>
<td><strong>31</strong>*</td>
<td><strong>82</strong></td>
</tr>
<tr>
<td><strong>Fossil Fuel Firms with all their 2014 reserves in Great Britain versus Australia (+30 index points)</strong></td>
<td><strong>3</strong></td>
<td><strong>43</strong></td>
</tr>
</tbody>
</table>
With Increasing Risk of Stranded Assets ...

↑ Climate Policy Exposure ⇒ Δ Expected Loss > 0

Expected Loss

Risk-free Return

Syndicated Bank Loan

Corporate Bond

EL₀

r₁

r₀

Interest Rate

Bonds charge more and extra

Stranding assets move to banks
Pecking Order Theory
“Financial Graduation”

*Increasing risk, hence increasing cost of financing →*

→ *Information asymmetry leading to higher cost of financing from external parties*

<table>
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<tr>
<th>Internal Financing</th>
<th>External Financing</th>
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</thead>
<tbody>
<tr>
<td>Retained Earnings</td>
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<td>Multiple banks</td>
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<tr>
<td>Bank syndicate</td>
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</table>

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Large banks and fossil fuel firms?

4. **Heterogeneity among banks**: Is stranded assets risk increasingly concentrated in a few large exposures for some large banks? Too-Big-To-Strand (TBTS)?

→ Across all syndicated loans, **large banks** acting as lead managers charge a lower all-in spread drawn than small banks do, and ...

→ There is a migration towards the very **largest lead manager banks** along fossil fuel firm’s Climate Policy Exposure.

→ Correlated with the **support factor** which is part of the (all-in) bank credit ratings.
“There is No Planet B”,
But for Banks “There are Countries B to Z”:
Domestic Climate Policy and Cross-Border Lending

Emanuela Benincasa (Zurich, SFI)
Gazi Kabas (Tilburg, Zurich, SFI)
Steven Ongena (Zurich, SFI, KU Leuven, NTNU, CEPR)
Do banks react to the heterogeneity in national climate policy?

What does this heterogeneity mean for cross-border lending?
Do banks refocus cross-border lending from “green” to “brown” firms and countries?

- Evidence that banks exploit the lack of global coordination in climate policies by increasing cross-border lending to “brown” firms in “brown” countries

- Exploit the Climate Change Performance Index (CCPI) as a global measure of climate policy stringency to estimate effects of cross-border bank lending in the syndicated loan market
  - Isolate credit supply by using loan fixed effects
  - Use change in the green party share in the parliament as instrument to estimate causal effects of domestic climate policy stringency
We compare lenders within the same loan saturating the model with loan fixed effects.

We control for variables (culture, distance, quality of institutions, bank regulation, bank competition, economic, and demographic conditions) that are associated with cross-border lending. 

Qian and Strahan, JF 2007; Mian, JF 2008; Houston, Lin, and Ma, JF 2012; Ongena, Popov, and Udell, JFE 2013; Karolyi and Taboada, JF 2015

Green Party share in the parliaments as an IV for climate policy stringency

- Relevance condition: Higher Green Party share can predict stringent policies, thanks to party’s mandate
- Exclusion restriction: To the extent that election cycles are orthogonal to economic cycles, IV can satisfy this assumption
- We also instrument with the log(time in years since a country’s GDP per capita crosses 5,000 USD)
Differential CCPI Germany-US = 6 index points in year 2015
Main results

1. Increase in cross-border loan share by 0.5 p.p. (mean loan share = 7.59 percent, 3.3 percent relative to the mean)

Differential CCPI Germany-US = 6 index points in year 2015
Differential CCPI Germany-US = 6 index points in year 2015

1. Increase in cross-border loan share by 0.6 p.p. (mean loan share = 7.59 percent, 3.3 percent relative to the mean)
2. Increase in cross-border loan share by 5.5 percent
3. Decrease in domestic loan share by 15 percent
Underlying mechanism

Results show that a more stringent climate policy leads to an increase in cross-border lending

- Remaining question: What is the economic mechanism at play?

- Our conjecture: *Race-to-the-bottom*
  - Regulatory heterogeneity among countries’ climate policy can be viewed as a form of regulatory arbitrage
  - Banks can circumvent climate policies by using cross-border lending (international banking)
  - Banks may want to increase their cross-border lending to protect their loan portfolio from the risks entailed by strict domestic climate policy, leading to a *race-to-the-bottom* behavior
Climate Change and Bank Deposits

Özlem Dursun-de Neef (Monash)
Steven Ongena (Zurich, SFI, KU Leuven, NTNU, CEPR)
Motivation

► Abnormally warm temperatures are becoming more common

• 2023 so far is the second warmest year on record behind 2016 (World Meteorological Organization)
  
  • August 2023 was the hottest August on record – around 1.5°C warmer than the pre-industrial average for 1850-1900
  
  • June to August of 2023 was the warmest summer
Motivation

► How do people react to abnormally warm temperatures?

• Attention to climate change increases with abnormally warm weather
  (see, e.g., Kahn and Kotchen, 2011; Cavanagh et al., 2014; Lang, 2014; Duan and Li, 2021)

• This leads to actions or changes in financial preferences that help people fight climate change
  (see, e.g., Li et al., 2011; Herrnstadt and Muehlegger, 2014; Choi et al., 2020)
Our research question:

- Do people revise their beliefs about climate change upward when they experience temperatures warmer than usual?
- As a reaction, do they move their deposits away from climate-unfriendly banks?
Climate-unfriendly banks

- Which banks are climate-unfriendly banks?
Climate-unfriendly banks

► **Banking on Climate Chaos Report:**

► The top 60 fossil-fuel-financing banks pumped $5.5 trillion into the fossil fuel industry since the Paris Agreement
Climate-unfriendly banks

- **Banking on Climate Chaos Report:**
  - total fossil fuel financing for each bank
    - lending
    - underwriting

<table>
<thead>
<tr>
<th>Bank</th>
<th>Total Fossil Fuel Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP MORGAN CHASE</td>
<td>$434.1 B</td>
</tr>
<tr>
<td>CITI</td>
<td>$332.9 B</td>
</tr>
<tr>
<td>WELLS FARGO</td>
<td>$316.7 B</td>
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<tr>
<td>BANK OF AMERICA</td>
<td>$279.7 B</td>
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<tr>
<td>RBC</td>
<td>$252.5 B</td>
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<tr>
<td>MUFG</td>
<td>$219.6 B</td>
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<tr>
<td>BARCLAYS</td>
<td>$190.5 B</td>
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<tr>
<td>MIZUHO</td>
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<td>SCOTIABANK</td>
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<td>BNP PARIBAS</td>
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<tr>
<td>MORGAN STANLEY</td>
<td>$153.4 B</td>
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</table>
Climate-unfriendly banks

How do depositors know whether their bank is a climate-unfriendly bank?
To Fight Climate Change, Change Your Bank

ESG and responsible investing get a lot of attention. The fossil-fuel investments of large banks like JPMorgan Chase, Citi, Wells Fargo and Bank of America fly under the radar.

July 28, 2022 at 9:00 PM GMT+10

By Tanja Hester
Tanja Hester is the author of “Wallet Activism” and “Work Optional,” and host of the podcast “Wallet Activism.”
Outline

► Motivation
► Data
► Methodology and Results
► Conclusion
Data

- Monthly temperatures from the National Oceanic and Atmospheric Administration (NOAA)
  - 1900 – 1999: historical average temperatures
  - Monthly abnormal temperature = local temperature – historical average
Data

- Monthly temperatures from the National Oceanic and Atmospheric Administration (NOAA)
  - 1900 – 1999: historical average temperatures
  - Monthly abnormal temperature = local temperature – historical average

- Branch-level deposits from Federal Deposit Insurance Corporation (FDIC)
  - Aggregated at the bank-county-year level

- Bank characteristics from Call Reports and county controls
  - Size, capital ratio, loan loss reserves, interest income, ROA, cash, deposit ratio
  - Population, percentage of people above 25 with at least a college degree, income per capita, and median age

- Our final sample
  - 561,444 bank-county-year observations from 2010 to 2021
Fossil-fuel-financing banks

- Presence of fossil-fuel-financing banks
  - They cover around one-third of the deposit market in the U.S.
Climate Change Beliefs

- Annual county-level climate change belief measures from Yale Climate Opinion Maps
  - Percentage of respondents that answer the question “Do you think that global warming is happening?” with a “Yes”
  - Available for the post period 2016 – 2021, excluding 2017
Climate Change Beliefs

• Annual county-level climate change belief measures from Yale Climate Opinion Maps
Outline

- Motivation
- Data
- Methodology and Results
- Conclusion
Empirical Methodology – Impact on Climate Change Beliefs

- The impact of abnormal temperature on climate change beliefs

$$ Belief_{j,t} = \alpha + \beta_1 \text{Abnormal temperature}_{j,t} + \beta_2 C_{j-1,t} + \delta_j + \delta_{s,t} + \epsilon_{j,t}, $$

- Abnormal temperature: 12-month moving average of the monthly abnormal temperatures for abnormally warm months

- County controls: population (log), percentage of people above 25 with at least a college degree, income per capita (log), and median age

- Fixed effects: county fixed effects, state-year fixed effects
Climate Change Beliefs

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<th>(2)</th>
<th>(3)</th>
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<td>0.002***</td>
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Standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01

1°F increase in the abnormal temperature led to a 0.2 percent increase in the climate change beliefs in that county.
Climate Change Beliefs – Cross-sectional Results

• One expects that the increase in climate change beliefs would be more pronounced in counties with less believers
  • 82% of Democrats think global warming has already begun to happen, while only 34% of Republicans agree with that (Gallup survey, 2018)
  • Counties with less believers: Counties with more Republicans – with above-median percentage of residents that voted for the Republican party in the 2016 Presidential election
Climate Change Beliefs – Cross-sectional Results

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Update in climate change beliefs happens only in counties with more Republicans.
Empirical Methodology – Impact on Bank Deposits

- The impact of abnormal temperature on bank deposits

\[
Deposit\ growth_{i,j,t} = \alpha + \beta_1 \times Abnormal\ temperature_{j,t} \times Post \times Fossil\ fuel_i \\
+ \beta_2 \times Abnormal\ temperature_{j,t} \times Fossil\ fuel_i + \delta_{i,t} + \delta_{j,t} + \epsilon_{i,j,t},
\]

- Abnormal temperature: 12-month moving average of the monthly abnormal temperatures for abnormally warm months
- Fossil fuel is a dummy that equals 1 for fossil-fuel-financing banks in the top 60 list
- Post is equal to 1 during 2016 – 2021
- Fixed effects: bank-year fixed effects, county-year fixed effects
### Bank Deposits

<table>
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<tr>
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<th>(1)</th>
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<tbody>
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<td>(0.336)</td>
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<tr>
<td>Abnormal temperature × Post</td>
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<td>Abnormal temperature × Fossil fuel</td>
<td>1.145**</td>
<td>0.938*</td>
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<td>(0.487)</td>
<td>(0.562)</td>
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<td>Abnormal temperature × Post × Fossil fuel</td>
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<td>-1.548*</td>
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<tr>
<td>County × year fixed effects</td>
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</tr>
</tbody>
</table>

Observations: 456,018 | 455,519
Adjusted R-squared: 0.102 | 0.117

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

1°F increase in the abnormal temperature led to a 1.6 pp relative reduction in the deposit growth rate of fossil-fuel-financing banks.
### Bank Deposits

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<td>-0.735**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.336)</td>
<td></td>
</tr>
<tr>
<td>Abnormal temperature × Post</td>
<td></td>
<td>0.815*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.424)</td>
</tr>
<tr>
<td>Abnormal temperature × Fossil fuel</td>
<td>1.145**</td>
<td>0.938*</td>
</tr>
<tr>
<td></td>
<td>(0.487)</td>
<td>(0.329)</td>
</tr>
<tr>
<td>Abnormal temperature × Post × Fossil fuel</td>
<td>-1.863**</td>
<td>-1.548*</td>
</tr>
<tr>
<td></td>
<td>(0.842)</td>
<td>(0.867)</td>
</tr>
<tr>
<td>County fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bank × year fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County × year fixed effects</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

- Observations: 456,018, 455,519
- Adjusted R-squared: 0.102, 0.117

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

1°F increase in the abnormal temperature led to a 0.8 pp increase in the deposit growth rate of other banks.
### Bank Deposits – Cross-sectional Results

<table>
<thead>
<tr>
<th></th>
<th>More Republicans (1)</th>
<th>Less Republicans (2)</th>
</tr>
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<tbody>
<tr>
<td>Abnormal temperature × Fossil fuel</td>
<td>0.489 (0.402)</td>
<td>1.251 (0.818)</td>
</tr>
<tr>
<td>Abnormal temperature × Post × Fossil fuel</td>
<td><strong>-1.610</strong>* (0.531)</td>
<td>-1.356 (1.330)</td>
</tr>
<tr>
<td>Bank×year fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County×year fixed effects</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>218,194</td>
<td>213,394</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.178</td>
<td>0.191</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01

The reallocation of deposits happens only in counties with more Republicans.
Outline

► Motivation
► Data
► Methodology and Results
► Conclusion
Conclusion

- People revise their beliefs about climate change upward when they experience abnormally warm weather
  - 1°F increase in the abnormal temperature increases climate change beliefs by 0.2 percent
  - More pronounced in counties with more Republicans

- As a result of this upward shift in their climate change beliefs, depositors move their money away from fossil-fuel-financing banks
  - 1°F increase in the abnormal temperature leads to a 1.6 pp reduction in the deposit growth rate
Common Ownership of Banks and Fossil Fuel Firms

Elena Carletti (Bocconi, Unicredit, CEPR)
Anja Duranovic (Utrecht)
Irene Monasterolo (Utrecht)
Steven Ongena (Zurich, SFI, KU Leuven, NTNU, CEPR)
What We Do? What We See?

• Collect common ownership of banks and fossil fuel firms for more than a decade

• Common ownership of banks and fossil fuel firms compared to banks and other firms relatively increases over time, but especially after Paris COP21

• Does this increase access to syndicated bank credit for fossil fuel firms?
• Does this alter syndicated loan terms?
Climate Policy

Climate Awareness

Fossil Fuel Firms

Equity investors

Depositors

Abroad
Potential Take-Aways for Global Financial Stability

1. Stranding risks accumulate on global banks` balances sheets
   1. Pitting (national/international) environmental against financial stability regulators? Too big to strand?
   2. Forging an alliance between fossil fuel firms and banks? Political delay in stranding?

2. Global banks take brown risks abroad away from domestic supervisory scrutiny
   1. May weaken domestic oversight
   2. Need for global environmental/stability coordination

3. Retail depositors may depart from brown banks when it is unusually “hot”
   1. Providing some discipline on stranding risk accumulation
      1. But global banks did collect new (uninsured) deposits when mid-sized banks were distressed
   2. Exacerbating (retail deposit) funding uncertainties for banks
   3. If brown banks are large, small local banks that obtain the deposits may end up taking risks elsewhere (Doerr, Kabas & Ongena, JFQA 2023)

4. Common ownership of fossil fuel firms and banks
   1. Further accumulation of stranding risks on banks` balance sheets and forging of alliances?
Follow-up Research?

1. Do fossil fuel firms start accessing bilateral bank loans again more (after the syndicated loan market start to dry up)? Or non-banks, finance companies, private financiers?

2. In addition to going abroad, will banks also set up off-balance sheet arrangements to finance fossil fuel firms?

3. Does this type of green depositor discipline work, with geographical labor mobility, aging, ...

4. Given also common ownership, will banks assist fossil fuel firms (even more) in working the political system?
   • Do banks in the US also start lobbying politicians in the energy sector committees?