Sustainability or Greenwashing:

Evidence from the Asset Market for Industrial Pollution

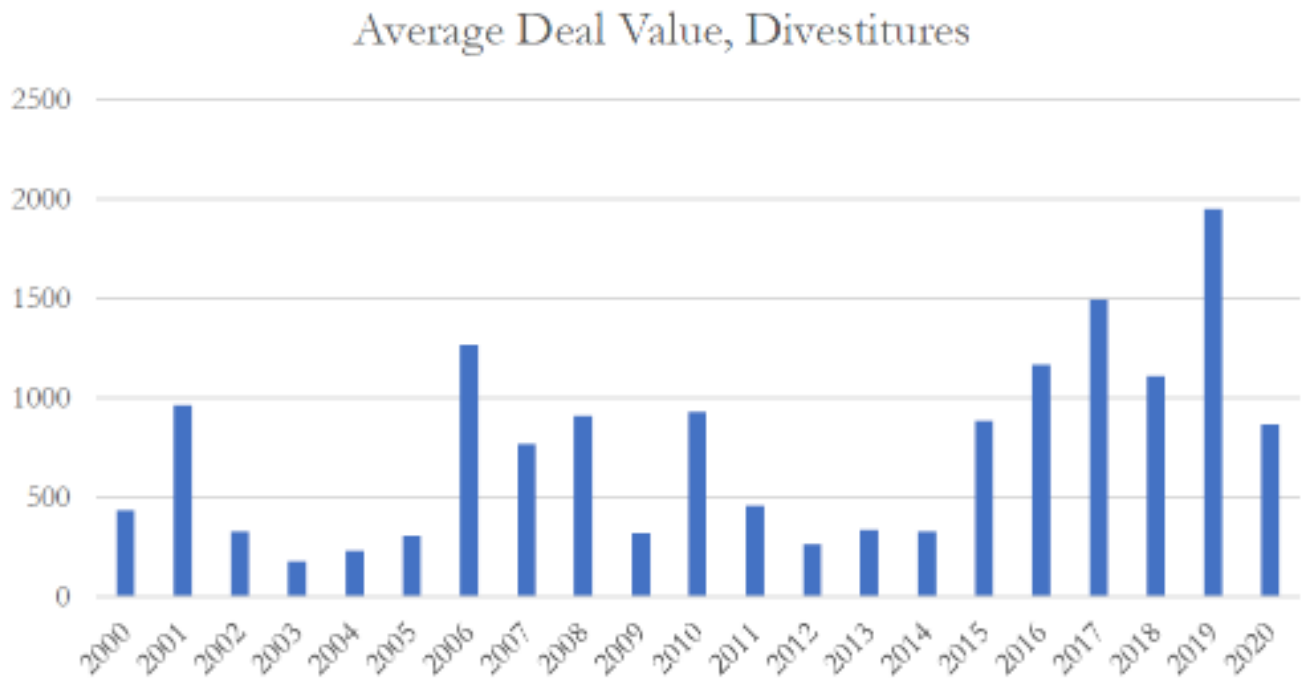
Ran Duchin (BC)
Janet Gao (Georgetown)
Qiping Xu (UIUC)

Discussion by **Clement Mazet-Sonilhac** (Bocconi)

3^{rd} FinPro Workshop

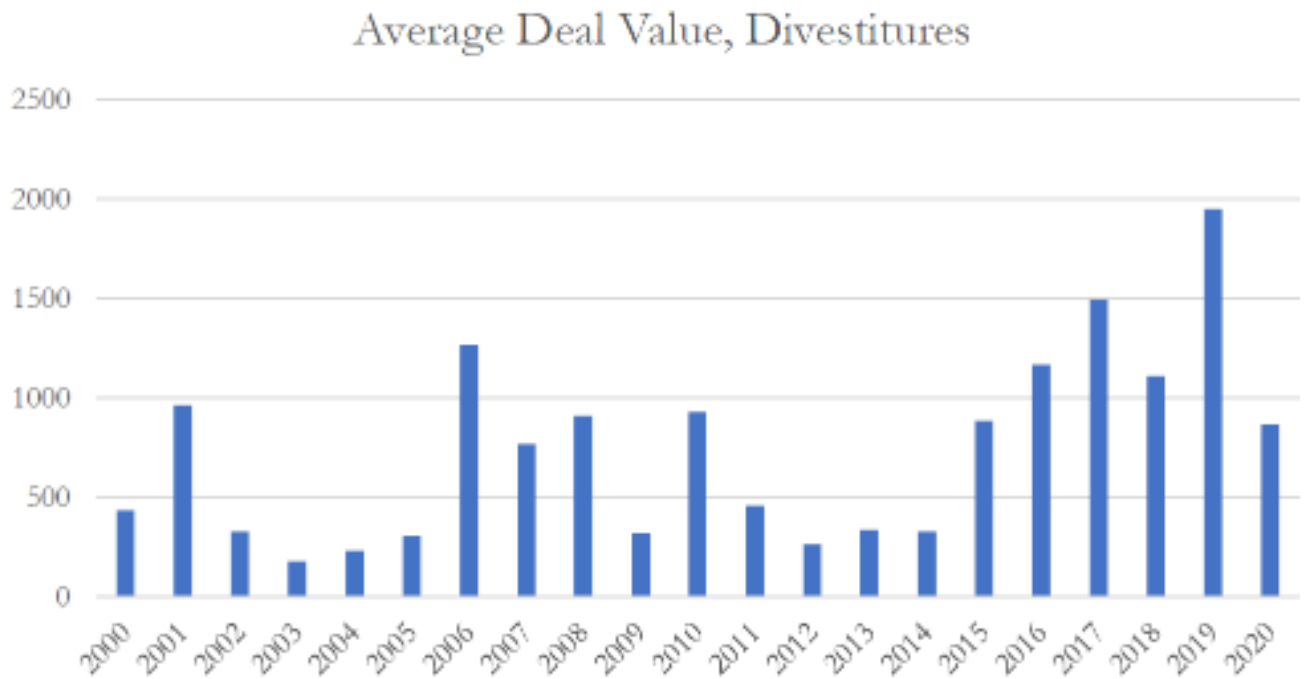
Rome, June 8-9 2023

Motivation



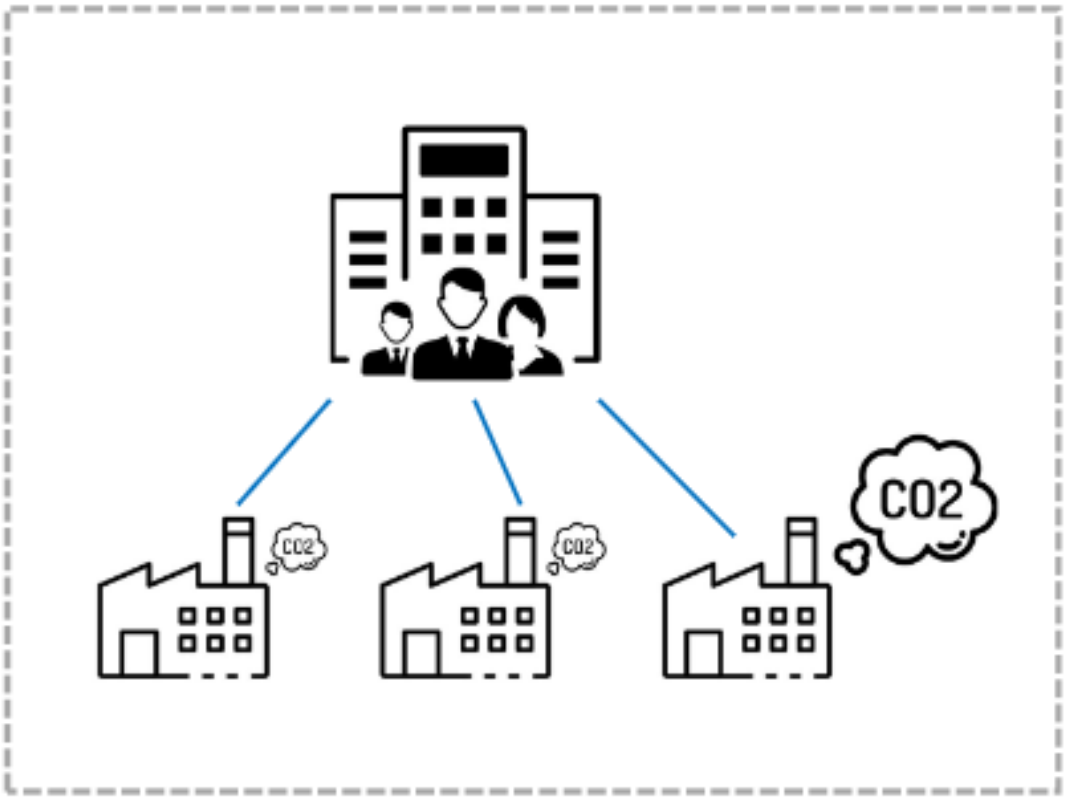
- Pressures from activists, regulators, and governments → **divestment** of polluting assets
  - Broccardo et al. 2020, Oehmke and Opp 2022, Edmans et al. 2022, Green and Vallee 2022

Motivation



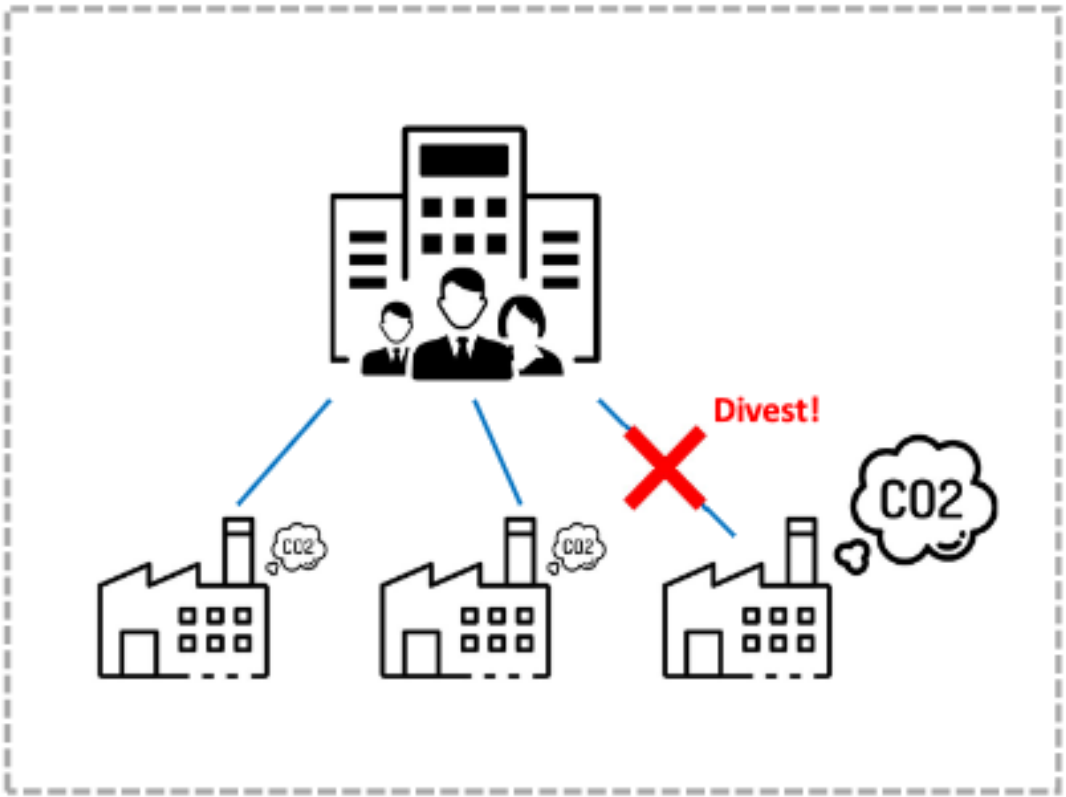
- Pressures from activists, regulators, and governments → **divestment** of polluting assets
  - Broccardo et al. 2020, Oehmke and Opp 2022, Edmans et al. 2022, Green and Vallee 2022
- This trend reflects mounting concerns about climate change, **but how effective such divestment is?**

How effective divestment is?



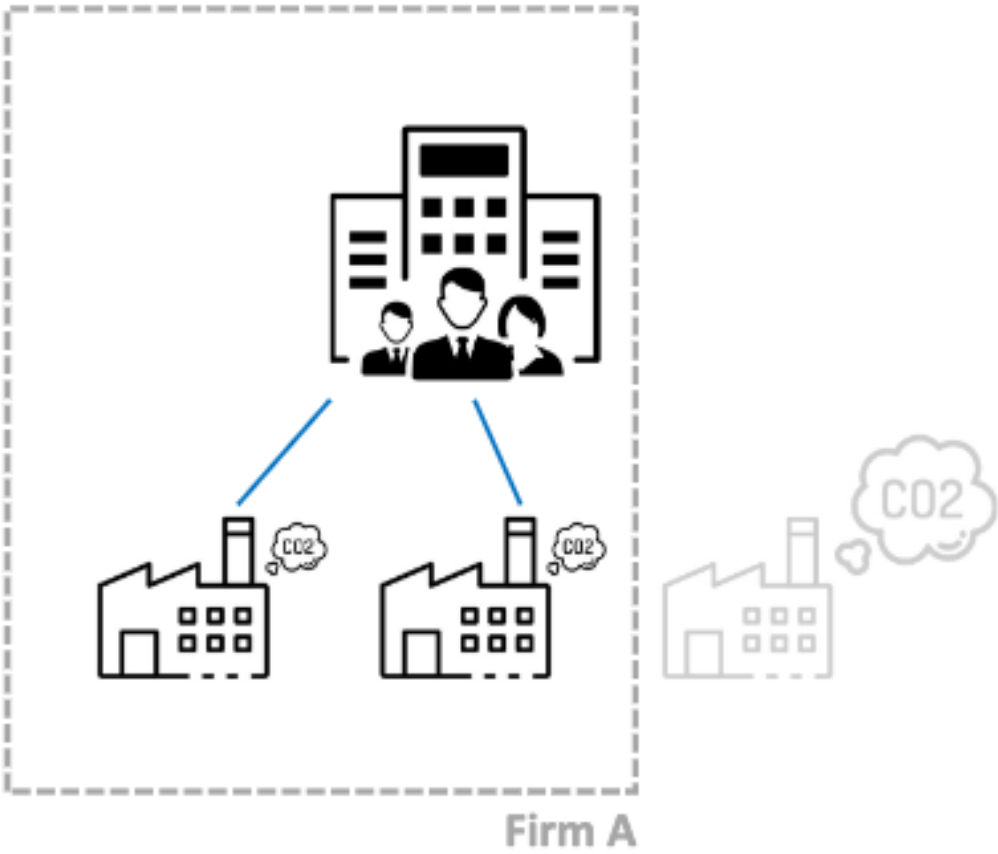
Firm A

How effective divestment is?



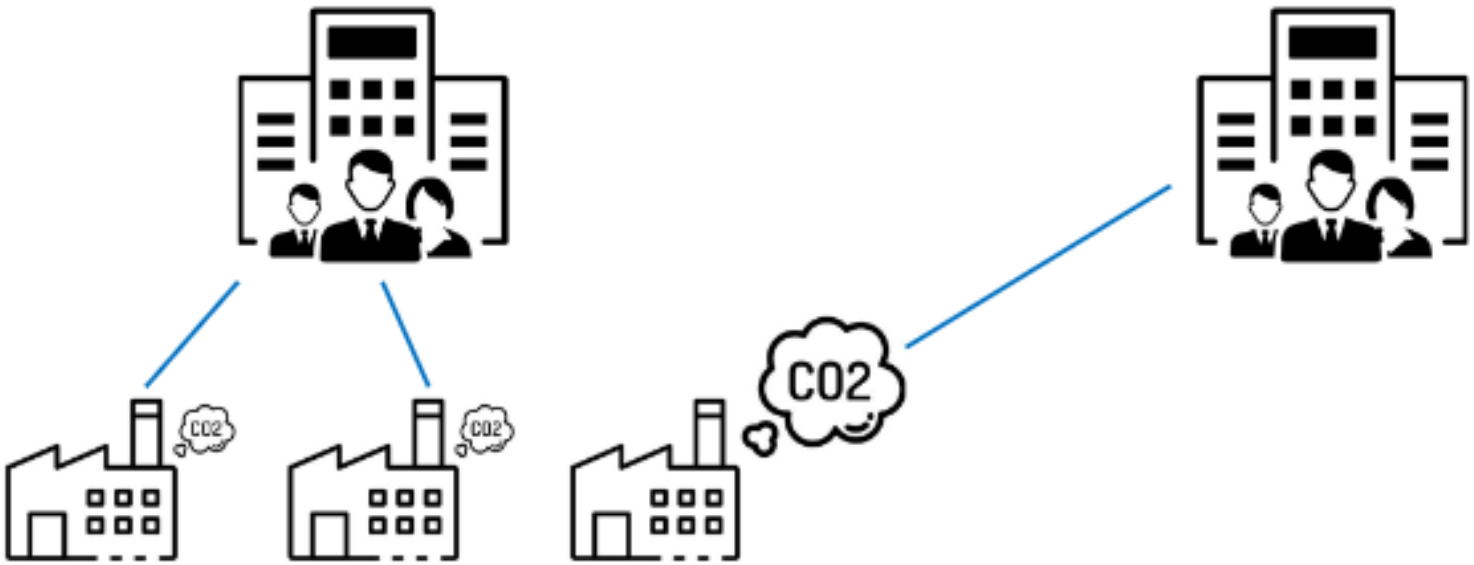
- A firm facing environmental pressures divest polluting plants

How effective divestment is?



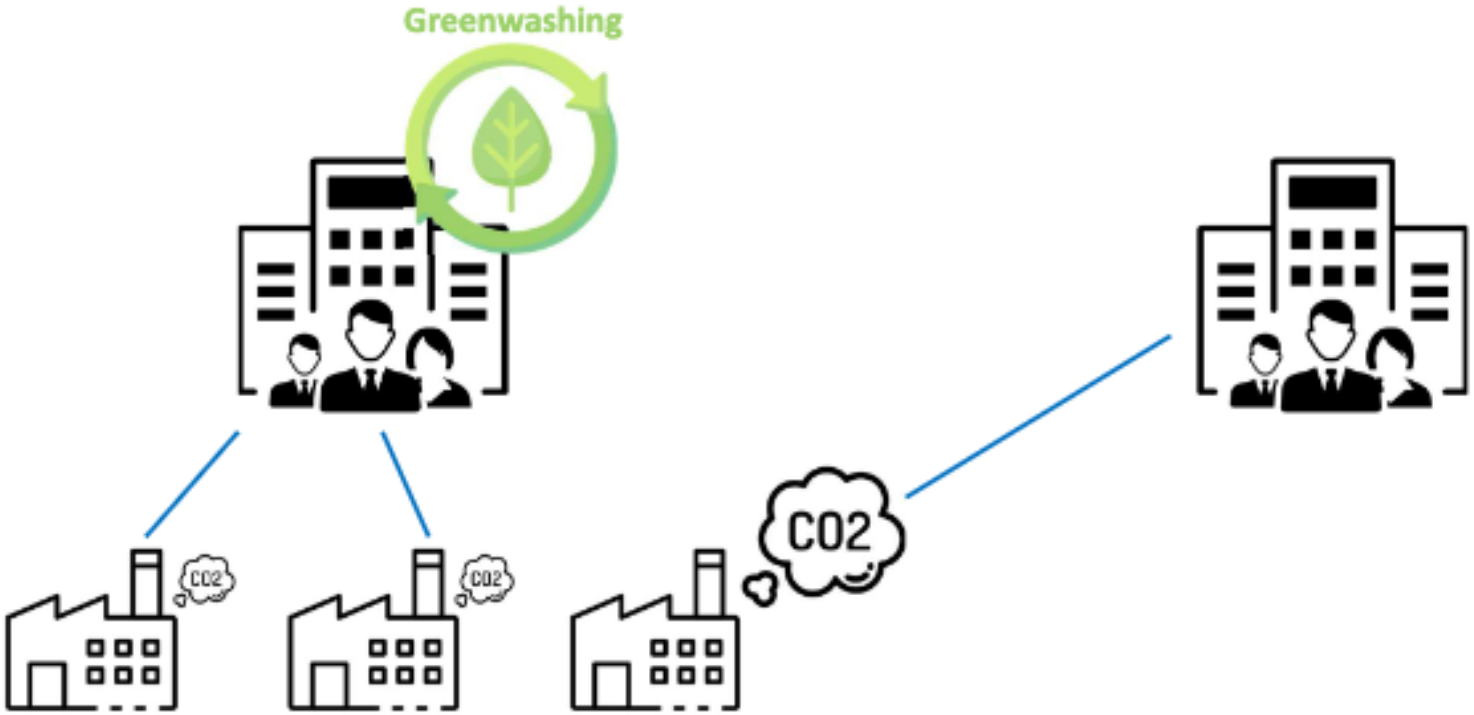
- A firm facing environmental pressures divest polluting plants
- And redraws its boundary in a manner perceived as environmentally friendly

How effective divestment is?



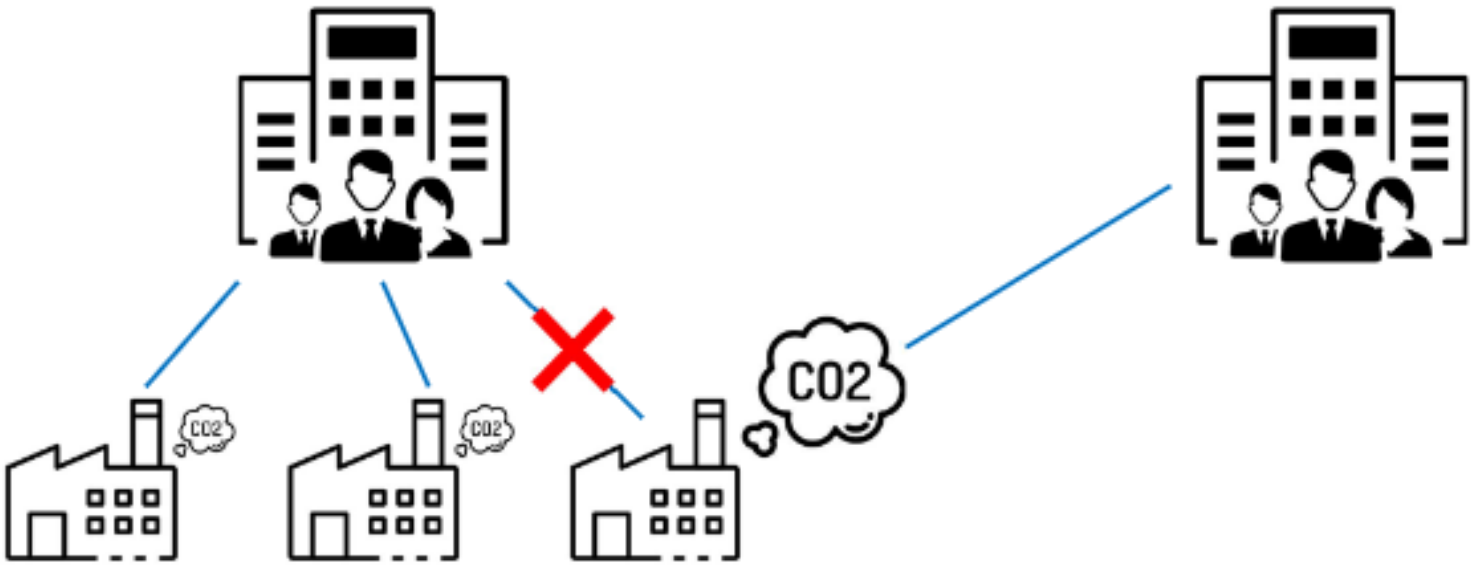
"Sadly, selling off assets or shares by itself **does nothing to save the planet**, because someone else will buy them." *The Wall Street Journal, January 23rd, 2022.*

How effective divestment is?



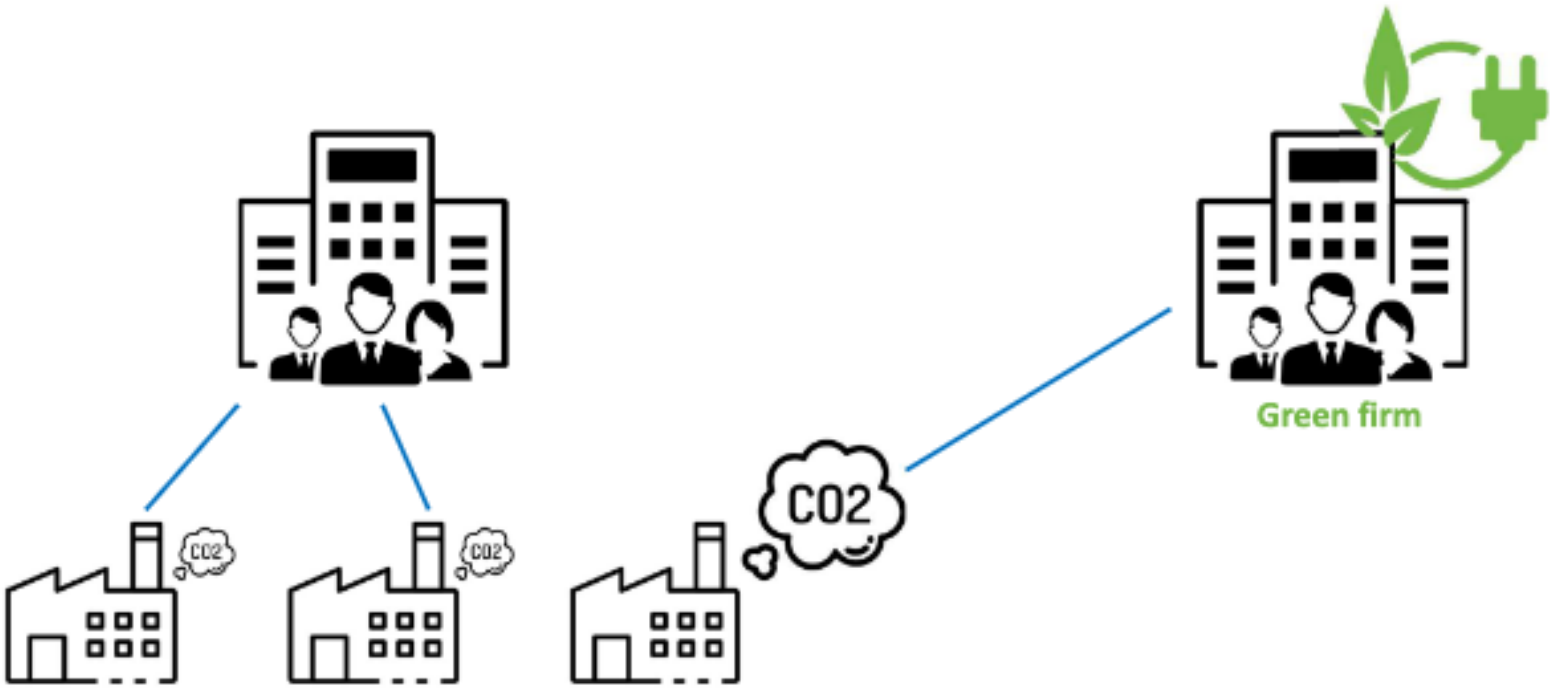
"Divesting can take away the option of engaging high-carbon companies to do better." *ESG Clarity, May 13th, 2022*

This paper



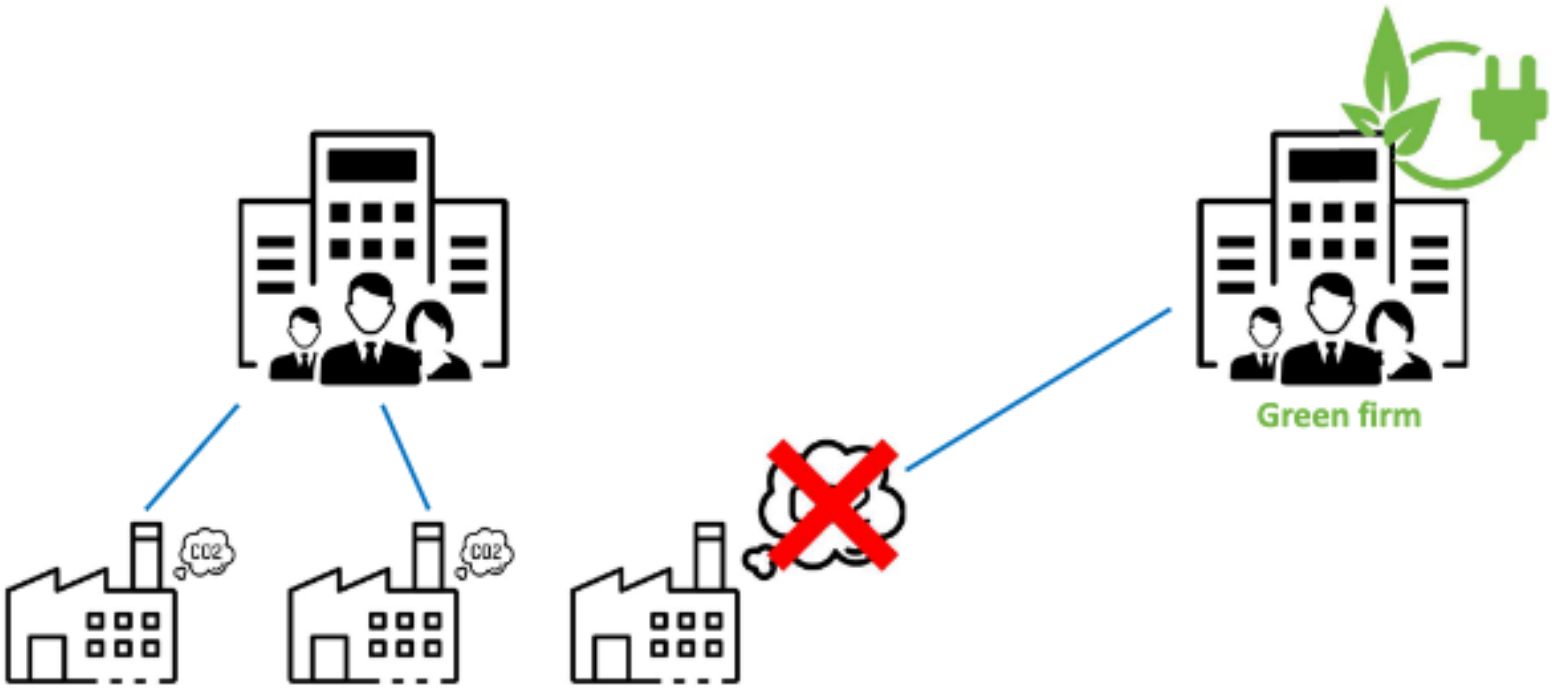
- Combines data about **900 divestitures** of polluting plants with plants' toxic emissions
- Studies how pollution levels change around the transfer of ownership
- Compares the buyers and sellers of polluting plants
- Estimate the gains from trading these plants

Best-case scenario



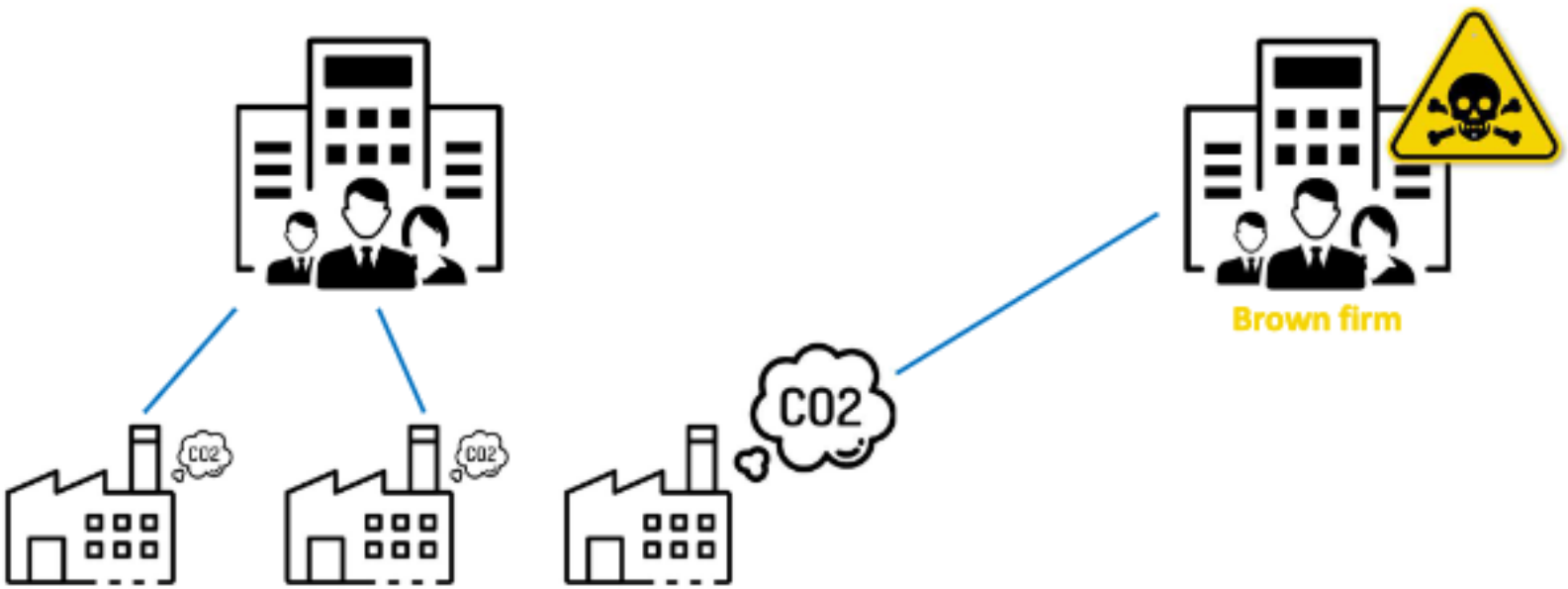
- Divestitures of polluting assets reallocate assets to owners likely to treat pollution (Magill et al. 2015 ; Broccardo et al. 2020)

Best-case scenario



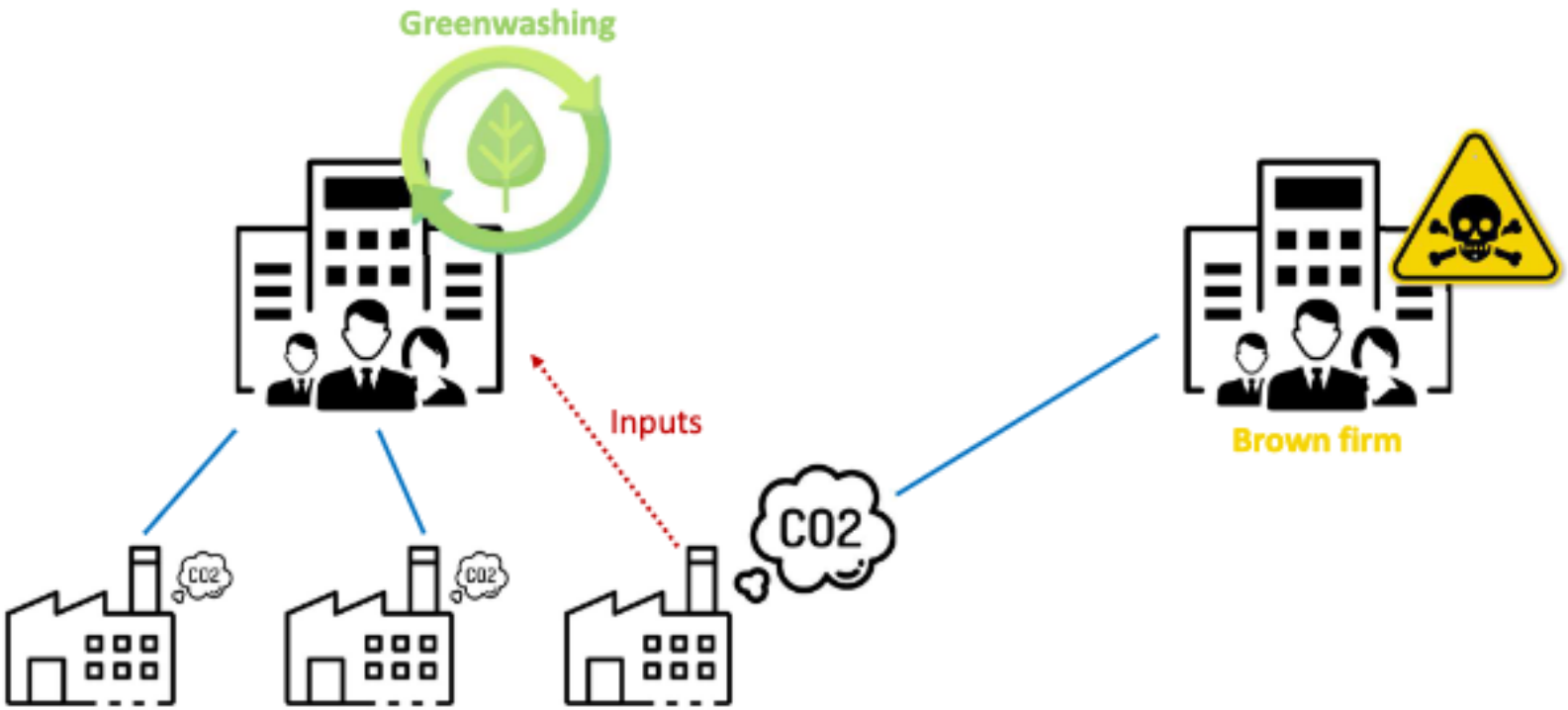
- Divestitures of polluting assets reallocate assets to owners likely to treat pollution (Magill et al. 2015 ; Broccardo et al. 2020)

Worst-case scenario



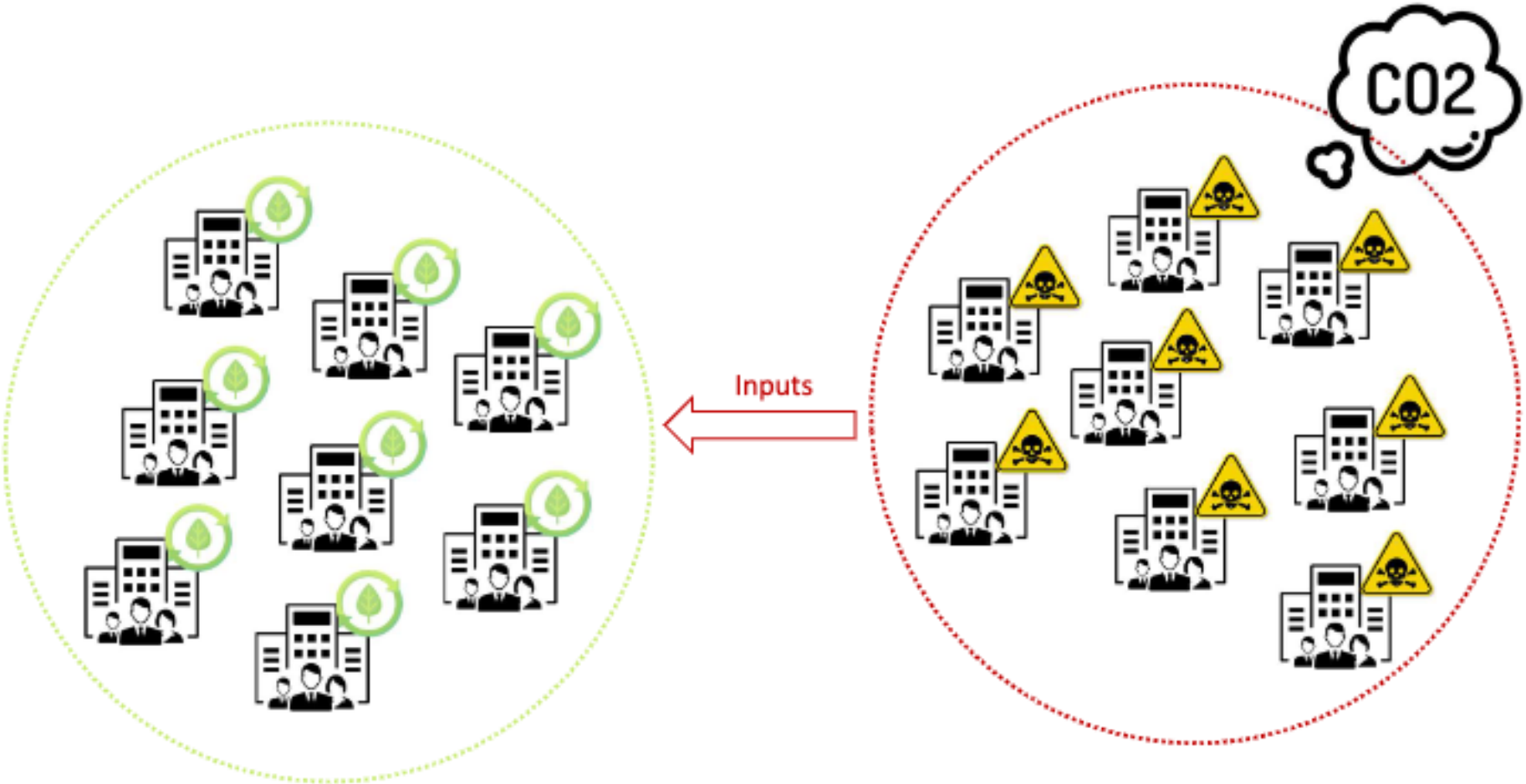
- Divestitures of polluting assets respond to external environmental pressures by transferring ownership from firms that face stronger pressures to firms that face weaker pressures

Worst-case scenario



- Divestitures of polluting assets respond to external environmental pressures by transferring ownership from firms that face stronger pressures to firms that face weaker pressures

Worst-case scenario



- Divestitures allow sellers to gain from offloading polluting assets to less scrutinized firms without having a real impact on pollution levels

Key findings: worst-case scenario!

- **No change in pollution** (or pollution reduction efforts) at divested plants
- **No reduction in the pollution** levels of sellers' or buyers' other plants
- Sellers are mote likely to divest an asset (i) if it pollutes more and (ii) **after an ESG risk exposure**
- Buyers are (i) more likely to be **private**, (ii) less likely to be covered by **ESG ratings**, and (iii) have **business ties** with the sellers
- Sellers enjoy **better ESG ratings** following a divestment, and are **less exposed to regulatory pressure**

Comments

- Fantastic paper!
  - Important and ambitious question
  - Gather novel data on plant divestments
  - Very rich and polished paper
- Challenges and room for improvement:
  1. What are we measuring exactly?
  2. Missing pieces of the puzzle: innovation, indirect emissions, preferences, funding costs
  3. Minor comments

Comment 1: **What** are we measuring?

- Motivation of the paper seems to be about **climate change** and **carbon emissions**
  - Empirical exercise does not perfectly align with the motivation

Comment 1: **What** are we measuring?

- Motivation of the paper seems to be about **climate change** and **carbon emissions**
  - Empirical exercise does not perfectly align with the motivation
- Main specifications are at the **plant $\times$ chemical level**
  - 770 chemicals covered by the TRI Program
  - These chemicals **are not related** to climate change : (i) cancer or other chronic human health effects and (ii) other environmental effects (affecting biodiversity)

Comment 1: **What** are we measuring?

- Motivation of the paper seems to be about **climate change** and **carbon emissions**
  - Empirical exercise does not perfectly align with the motivation
- Main specifications are at the **plant $\times$ chemical level**
  - 770 chemicals covered by the TRI Program
  - These chemicals **are not related** to climate change : (i) cancer or other chronic human health effects and (ii) other environmental effects (affecting biodiversity)
- The authors plug all these chemicals j in the same regression :

$$Y_{i,j,t} = \beta \cdot \text{Divested}_i \times \text{Post}_{i,t} + \alpha_{i,j} + \tau_{j,t} + \varepsilon_{i,j,t}$$

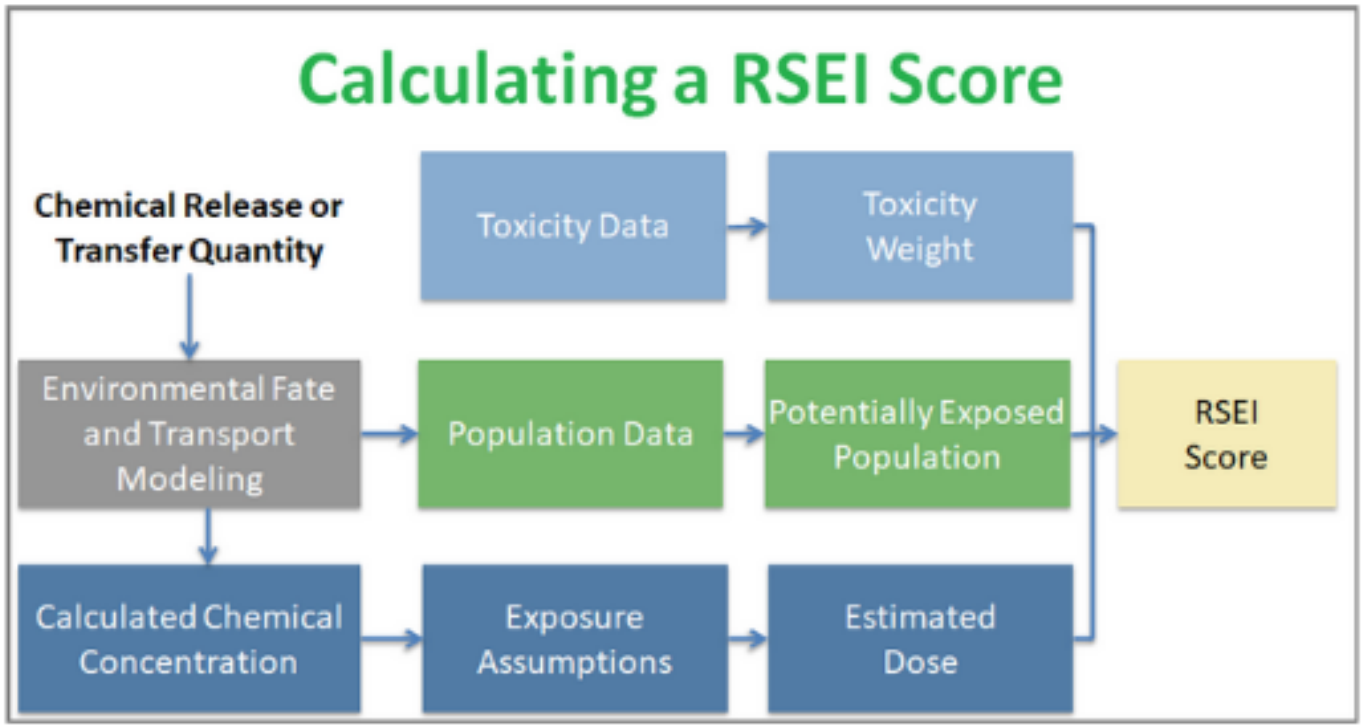
- The β is therefore hard to interpret $\rightarrow$ not clear what is happening at plant-level
  - What is the unit of β? Pound of what?
  - If cancer-causing emissions (e.g., DDT) increase while environmentally damaging emissions decrease, could we still get a zero?

Comment 1: **What** are we measuring?

- Solution #1: run **plant-level regressions**, aggregating or weighting each chemical by its toxicity (RSEI data)
  - Only done in Table IA.3 Panels C to F of the Internet Appendix, w/o time varying plant controls (e.g., sales from NETS)
  - Fundamental question: can you compare the toxicity of DDT and Benzene?

Comment 1: **What** are we measuring?

The RSEI data (Source: EPA)



7. Focus on long-term health effects. The RSEI model only addresses chronic human toxicity (cancer and non-cancer effects, such as developmental toxicity, reproductive toxicity, neurotoxicity, etc.) associated with long-term exposure. It does not address acute health effects associated with short-term, periodic exposures to higher levels of these same chemicals, and does not address ecological effects.

Comment 1: **What** are we measuring?

- Solution #1: run **plant-level regressions**, aggregating or weighting each chemical by its environmental toxicity (RSEI data)
  - Only done in Table IA.3 Panels C to F of the Internet Appendix, w/o time varying plant controls (e.g., sales from NETS)
  - Can you compare the environmental toxicity of CO_2 and Tetrafluoroethylene?
- Solution #2: group chemicals into broad categories (33 according to TRI, or even broader : human health effects vs. environmental effects) and run split regressions for each category at plant-level
- Solution #3: **add the GhG emissions (GHGRP data)** (CO_2, CH_4, N_2O) and run regressions for at plant-level for these chemicals only

Comment 1: **What** are we measuring? (cont'd)

- Pollution measures: (i) total pollution (total toxic emissions) and (ii) **pollution intensity**

Comment 1: **What** are we measuring? (cont'd)

- Pollution measures: (i) total pollution (total toxic emissions) and (ii) **pollution intensity**
  - Pollution intensity (p. 3): *ratio of chemical's toxic release to cumulative chemical production*
  - Pollution intensity (p. 9): *dividing each chemical's toxic emission by its production ratio (quantity based measure of output growth)*
- You need to help the (non-expert) reader understanding better the rationale behind this key measure of your paper

Comment 1: **What** are we measuring? (cont'd)

- Pollution measures: (i) total pollution (total toxic emissions) and (ii) **pollution intensity**
  - Pollution intensity (p. 3): *ratio of chemical's toxic release to cumulative chemical production*
  - Pollution intensity (p. 9): *dividing each chemical's toxic emission by its production ratio (quantity based measure of output growth)*
- You need to help the (non-expert) reader understanding better the rationale behind this key measure of your paper
- Naive solution: why not to scale (or control) by number of employees or total sales at plant level using the NETS data?
  - Important as sales and acquisitions might have an impact on productivity, total production, labor, etc.

Comment 1: **How** are we measuring? (cont'd)

- All the main regressions are **static DiD with staggered treatment**
- Large recent literature about this design: De Chaisemartin and d'Haultfoeuille (2020), Borusyak et al. (2021), Callaway and Sant'Anna (2021), Goodman-Bacon (2021), Imai and Kim (2021), Sun and Abraham (2021)

Comment 1: **How** are we measuring? (cont'd)

- All the main regressions are **static DiD with staggered treatment**
- Large recent literature about this design: De Chaisemartin and d'Haultfoeuille (2020), Borusyak et al. (2021), Callaway and Sant'Anna (2021), Goodman-Bacon (2021), Imai and Kim (2021), Sun and Abraham (2021)

→ Recommendation: **dynamic DiD** because static β might be biased (Borusyak et al., 2021)

- Allows to :
  - check for pre-trends
  - consider the slowly moving process of pollution reduction
  - **clearly define a time window for analysis** : [-5 ; +5]

Comment 1: **How** are we measuring? (cont'd)

- The authors do not specify what is the estimating sample but if one assumes it's 2000-2020, so some plants will be treated for 19 years and some others (a lot!) for less than 2 years.

Comment 2: Missing pieces?

- A key result is that sellers do not reduce toxic emissions after divesting, do not invest in green plants (subject to all previous comments) $\rightarrow$ **Green-washing**

Comment 2: Missing pieces?

- A key result is that sellers do not reduce toxic emissions after divesting, do not invest in green plants (subject to all previous comments) → **Green-washing**
- What about **green innovation** of both sellers and buyers (Acemoglu et al., 2012, Aghion et al., 2016, Calel and Dechezlepretre, 2016, Bolton et al., 2023).

  → Innovation might have a long-term effect on pollution levels. Use the US-PTO data?

Comment 2: Missing pieces?

- A key result is that sellers do not reduce toxic emissions after divesting, do not invest in green plants (subject to all previous comments) → **Green-washing**
- What about **green innovation** of both sellers and buyers (Acemoglu et al., 2012, Aghion et al., 2016, Calel and Dechezlepretre, 2016, Bolton et al., 2023).

  → Innovation might have a long-term effect on pollution levels. Use the US-PTO data?

- What about **indirect emissions**? The paper measures direct emissions (scope 1) but not scope 2-3 emissions, so part of the pollution reduction efforts might be unobserved.

> A policy implication of our findings is that regulators and ESG ratings should consider Scope 3 pollution, that is, pollution generated by assets along the firm's value chain such as suppliers and strategic partners. This can prevent ESG-rating arbitrage through asset transfers along a firm's value chain.[5]

Comment 2: Missing pieces (cont'd)

- Last interesting channel might be finance :
  - Capital structure of buyers and sellers ? Does it impact the ability to invest in pollution reducrtion technologies?
  - Does selling (buying) off dirty asset lower (increase) the cost of capital of sellers (buyers)?
  - For buyers especially, that could be an important mechanism leading to pollution reduction

Minor comments

- Both divestment and green-washing scrutiny increase after COP-21 (2015). Could you do a special focus on this period ? And what about the Trump election effect?
- Subscript i in specification 1 is misleading as the shock is at plant-level and not plant $\times$ chemicals level (cf. Equation above)
- Pollution intensity definition changes along the paper
- Descriptive statistics about the average number of chemicals per plant would be useful
- RepRisk data : within environmental events, what share is climate change-related compared to other environmental events?
- Explaining more in depth the RSEI score would be helpful
- Why BERT and not FinBERT Could you give detail about your training-validation-test sample for the calibration of BERT, and the performance of the model over the validation and test samples
- Would be useful to see the dynamic DiD at plant level on sales and number of employees

Conclusion

Amazing paper!

I recommend everyone to read it

Hope my comments will be helpful