Scope 3 Emissions:
A Discussion of Deng, Hung, and Wang

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The Effect of Mandatory Carbon Disclosure Along Global Supply Chains

- Setting: 2013 UK carbon disclosure mandate
  - Requires reporting of Scopes 1 and 2 emissions but not Scope 3 emissions
- Design: difference-in-differences
  - Benchmark: non-UK firms (entropy balancing or propensity-score matching)
- Data: S&P Trucost
- Main Findings
  - "Affected UK firms exhibit an increase in Scope 3 emissions following the disclosure mandate"
  - "Foreign suppliers of the affected UK firms exhibit a greater increase in Scope 1 emissions relative to suppliers of non-UK firms"

Green
Weather & Science

Carbon Dioxide Just Took an Ominous, Record-Breaking Jump

The world's gold standard CO2 observatory experienced its biggest year-over-year increase as climate change-fueled disasters worsen.

The Mauna Loa Observatory atmospheric research facility on the island of Hawaii in 2009. *Photographer: Chris Stewart/AP*

By Kendra Pierre-Louis

May 11, 2024 at 4:40 AM GMT+8

The Effect of Mandatory Carbon Disclosure Along Global Supply Chains

- What I like
  - Important research question
  - Novel data
  - Plausibly causal inference

- What I do not like
  - Difficult for the discussant to raise major concerns

- Advice from Matthew Spiegel (RFS Executive Editor 2005–2011)
  - Spiegel (2012 RFS) “Reviewing Less—Progressing More”
  - Accept it “as is”!

Scope 3 Emissions

- “Affected UK firms exhibit an increase in Scope 3 emissions following the disclosure mandate”
  - Definition of Scope 3 emissions (Greenhouse Gas Protocol)
  - Measurement of Scope 3 emissions
  - Mechanism

- “Carbon outsourcing, an alternative strategy for reducing direct emissions, increases unreported Scope 3 emissions following the disclosure mandate”
  - Evidence from the economics literature

Figure [1.1] Overview of GHG Protocol scopes and emissions across the value chain

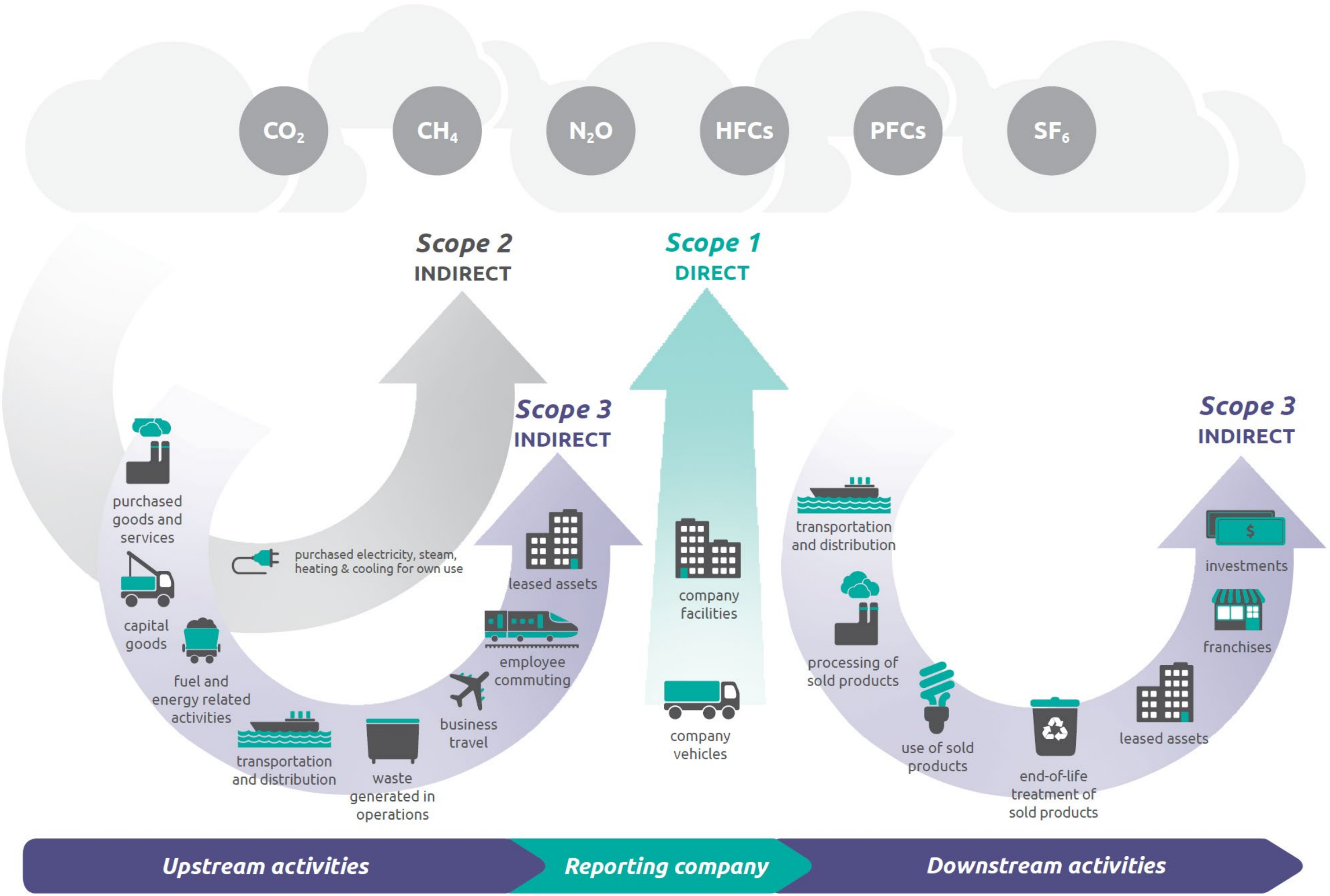

Table [5.3] List of scope 3 categories

Upstream or downstream	*Scope 3 category*
Upstream scope 3 emissions	**1.** Purchased goods and services **2.** Capital goods **3.** Fuel- and energy-related activities (not included in scope 1 or scope 2) **4.** Upstream transportation and distribution **5.** Waste generated in operations **6.** Business travel **7.** Employee commuting **8.** Upstream leased assets
Downstream scope 3 emissions	**9.** Downstream transportation and distribution **10.** Processing of sold products **11.** Use of sold products **12.** End-of-life treatment of sold products **13.** Downstream leased assets **14.** Franchises **15.** Investments

Measurement of Scope 3 Emissions

- **“During our sample period, Scope 3 emissions are limited to the upstream emissions, which are estimated from the expenditures that a firm uses to purchase its inputs from all sectors.”**
  - Measurement error
    - “Our study suggests several ways to mitigate the measurement errors and corroborate the inference (e.g., including firm fixed effects, using a balanced sample, and corroborating with Scope 1 emissions from suppliers).”
      - “Measurement error, fixed effects, and false positives in accounting research” by Jared Jennings, Jung Min Kim, Joshua Lee & Daniel Taylor (2023 RAST)
      - Scope 1 emissions from suppliers: How to allocate?
  - Maybe it is better to simply acknowledge the intrinsic limitation

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CDP Technical Note: Relevance of Scope 3 Categories by Sector

CDP Climate Change Questionnaire

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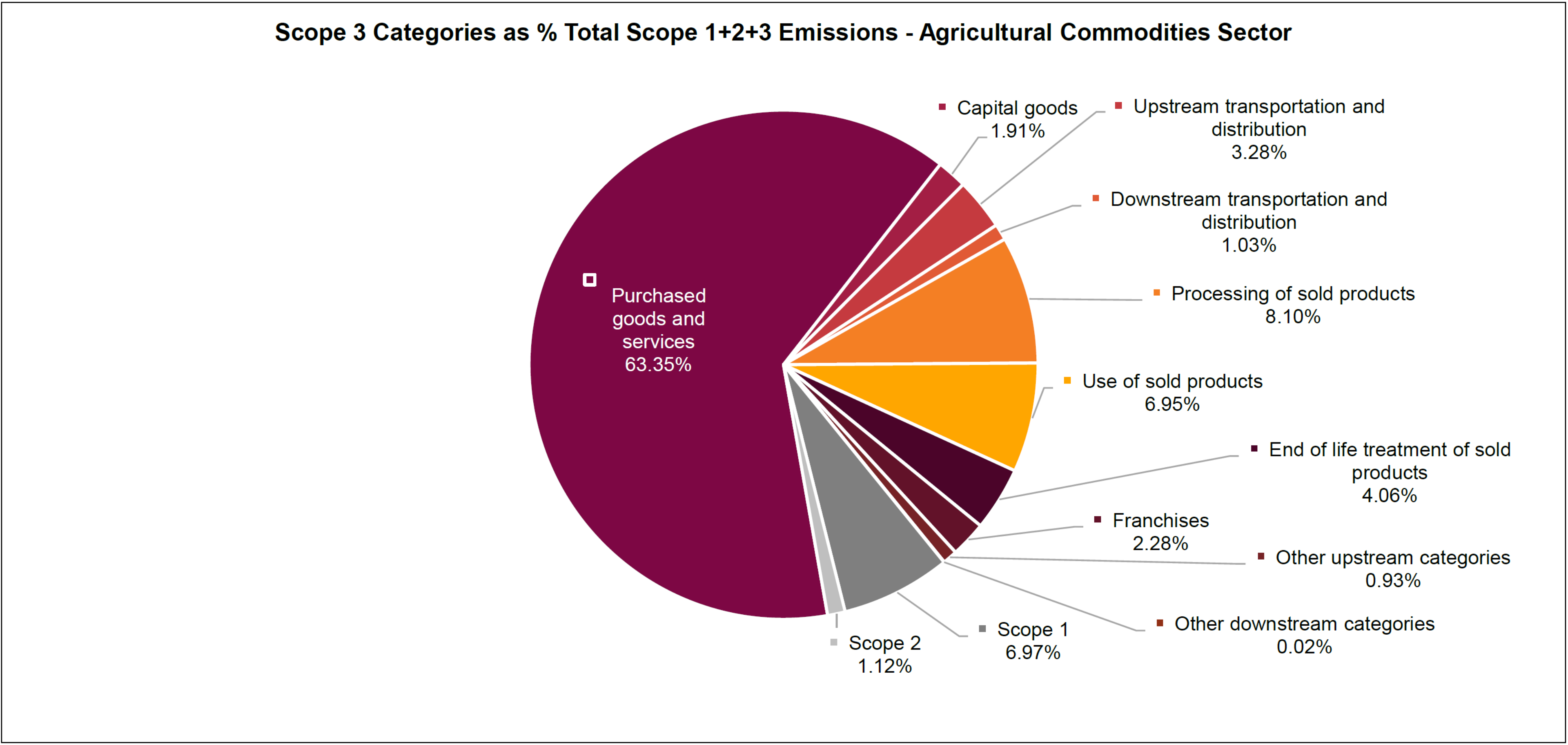
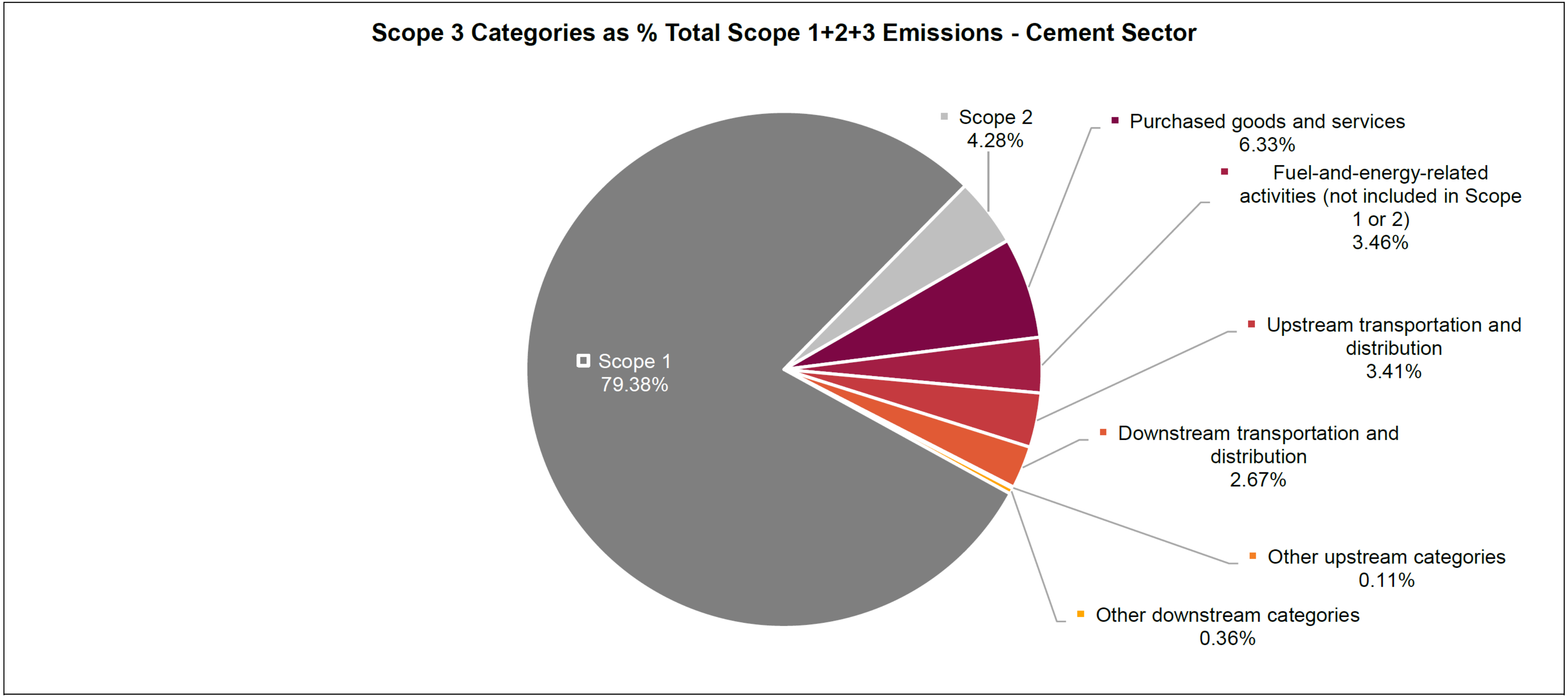
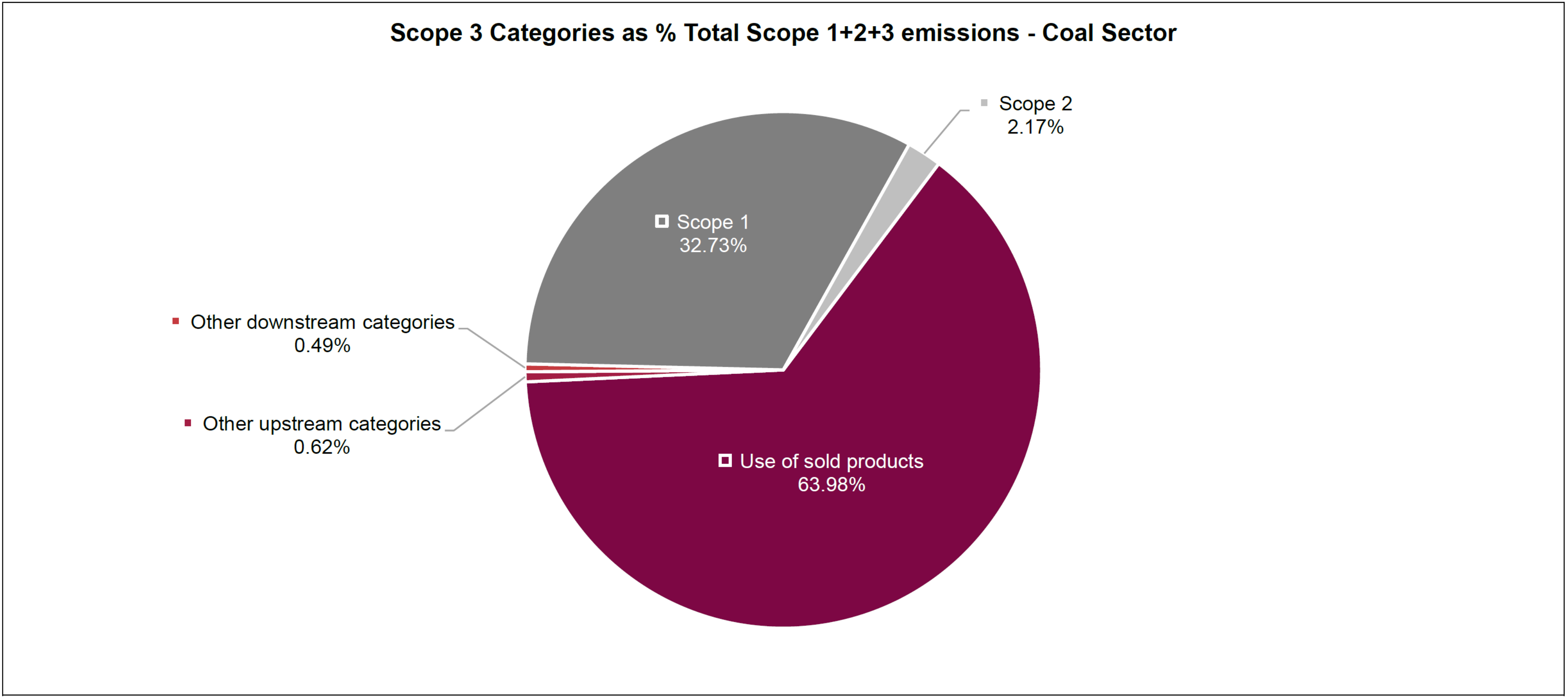
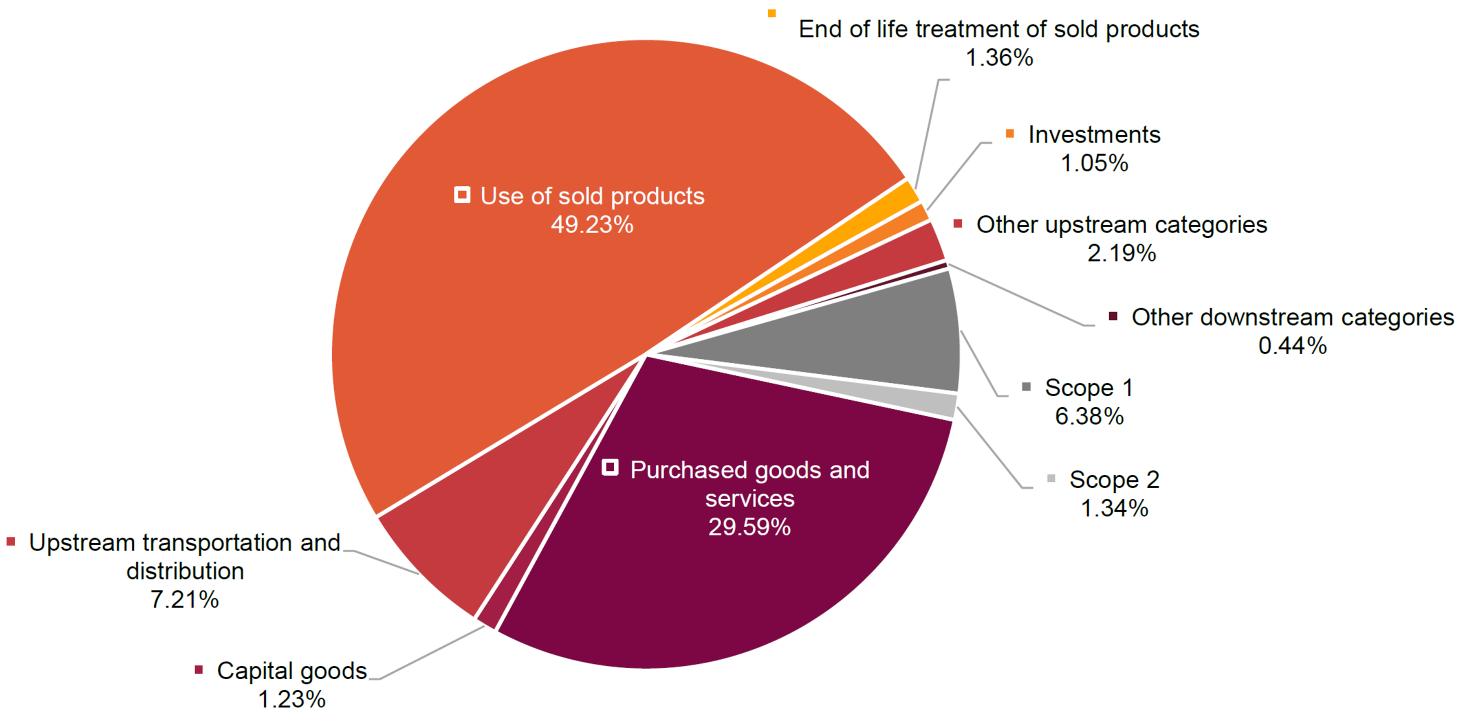
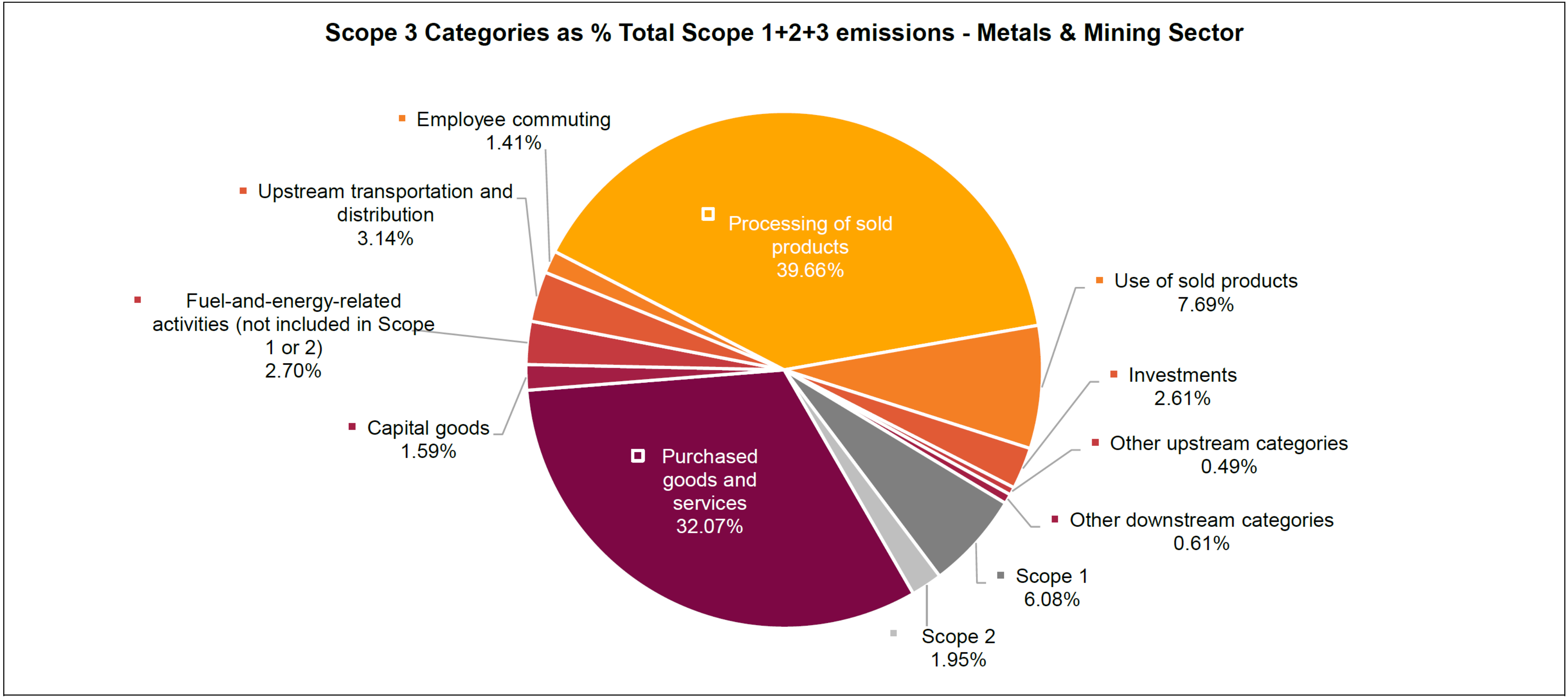

Scope 3 Categories as % Total Scope 1+2+3 Emissions - Agricultural Commodities Sector
Purchased goods and services 63.35%
Capital goods 1.91%
Upstream transportation and distribution 3.28%
Downstream transportation and distribution 1.03%
Processing of sold products 8.10%
Use of sold products 6.95%
End of life treatment of sold products 4.06%
Franchises 2.28%
Other upstream categories 0.93%
Other downstream categories 0.02%
Scope 1 6.97%
Scope 2 1.12%


Scope 3 Categories as % Total Scope 1+2+3 Emissions - Cement Sector
Scope 1
79.38%
Scope 2
4.28%
Purchased goods and services
6.33%
Fuel-and-energy-related activities (not included in Scope 1 or 2)
3.46%
Upstream transportation and distribution
3.41%
Downstream transportation and distribution
2.67%
Other upstream categories
0.11%
Other downstream categories
0.36%

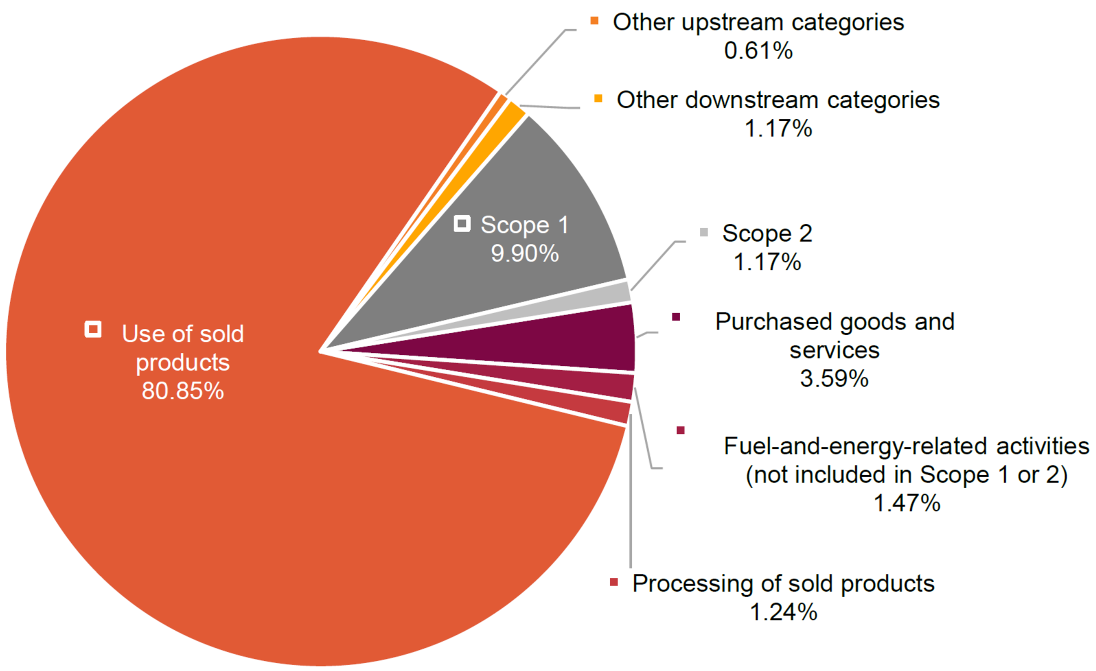

Scope 3 Categories as % Total Scope 1+2+3 emissions - Coal Sector
Scope 2
2.17%
Scope 1
32.73%
Other downstream categories
0.49%
Other upstream categories
0.62%
Use of sold products
63.98%

Scope 3 Categories as % Total Scope 1+2+3 Emissions - Construction Sector




Scope 3 Categories as % Total Scope 1+2+3 emissions - Metals & Mining Sector
Employee commuting 1.41%
Upstream transportation and distribution 3.14%
Fuel-and-energy-related activities (not included in Scope 1 or 2) 2.70%
Capital goods 1.59%
Processing of sold products 39.66%
Purchased goods and services 32.07%
Use of sold products 7.69%
Investments 2.61%
Other upstream categories 0.49%
Other downstream categories 0.61%
Scope 1 6.08%
Scope 2 1.95%

Scope 3 Categories as % Total Scope 1+2+3 Emissions - Oil & Gas Sector



Measurement of Scope 3 Emissions

- **"During our sample period, Scope 3 emissions are limited to the upstream emissions, which are estimated from the expenditures that a firm uses to purchase its inputs from all sectors."**

- **"We exclude firms that are not listed in the required stock exchanges, are in financial industries (NAICS2=52) or public administrations (NAICS2=92, 99), and have missing control variables."**

Suggestion

- "Affected UK firms exhibit an increase in Scope 3 emissions following the disclosure mandate"
  - Add a modifier "upstream" to the phrase "Scope 3 emissions" throughout the paper
  - Consider restricting the sample to sectors where "purchased goods and services" are a major contributor to upstream Scope 3 emissions

Questions

- "Affected UK firms exhibit an increase in Scope 3 emissions following the disclosure mandate"
  - Is it the case that there is an increase in total Scope 3 emissions?
  - Is there any empirical evidence to support the mechanism?
    - "For example, firms may cut direct emissions by discontinuing the production of certain goods … they can outsource the production to low-cost suppliers that are subject to less stringent environmental regulation and scrutiny."
    - Less measurement error
- "Carbon outsourcing, an alternative strategy for reducing direct emissions, increases unreported Scope 3 emissions following the disclosure mandate"
  - Has the 2013 UK carbon disclosure mandate caused carbon outsourcing?

Are Developed Countries Outsourcing Pollution?
Arik Levinson (Journal of Economic Perspectives 2023)

- Have rich countries improved their environments by importing polluting goods?
  - No, the mix of goods imported has shifted towards those from cleaner industries, not dirtier.

- Have environmental regulations enacted by rich countries caused pollution outsourcing?
  - No, the evidence does not show that regulations cause outsourcing.

Levinson's Accounting Exercise

- Calculate how much total pollution is used to manufacture each product in developed countries.
- Divide that total pollution produced by the total dollar value of each product manufactured to get each product's pollution intensity.
- Multiply those pollution intensity values by the total value of imports for each good to get the pollution displaced by those imports.
- Sum those multiples across all imported goods to get the total amount of pollution embodied in imports.
- That is the amount of pollution "outsourced."
- We want to compare the amount of pollution outsourced by high-income countries to those with lower incomes with the amount of pollution outsourced (by this same definition) from lower-income to high-income countries.

Levinson's Accounting Exercise

- We want to compare the amount of pollution outsourced by high-income countries to those with lower incomes with the amount of pollution outsourced (by this same definition) from lower-income to high-income countries.
- What does he find?
  - For Carbon dioxide (CO_2), the mix of manufactured goods imported by the 24 high-income countries is less polluting than the mix exported by those countries to the rest of the world.
- What is the explanation?
  - High-income countries have a comparative advantage in capital-intensive, high-skill industries that also happen to be relatively polluting.
  - Thus, if polluting goods are traded, they are more likely to be exported by high-income countries, not imported.

Suggestion

- “Carbon outsourcing, an alternative strategy for reducing direct emissions, increases unreported Scope 3 emissions following the disclosure mandate”
  - Reconcile with the evidence from the economics literature

Questions

- "Our findings highlight the importance of considering corporate supply chains when implementing mandatory carbon disclosures."

- Spillover effect
  - What happens to the industry peers (private firms) of affected UK firms?
  - Data on private firms can be obtained from Bureau van Dijk

- Aggregate effect
  - What happens to the industry or country as a whole?

Summary

- “Affected UK firms exhibit an increase in Scope 3 emissions following the disclosure mandate”
  - Add a qualifier “upstream” and consider sample restriction
  - Provide evidence on the mechanism
- “Carbon outsourcing, an alternative strategy for reducing direct emissions, increases unreported Scope 3 emissions following the disclosure mandate”
  - Reconcile with evidence from the economics literature
  - Consider spillover and aggregate effects
- Deng, Hung, and Wang (2024)
  - A very interesting and important study
  - Stimulate more work in this interesting and important field