FEDERAL HOUSING FINANCE AGENCY

Remarks on: "Long-Run Sectoral Transition Risk using a Hybrid MRIO/IAM Approach" by George Krivorotov (2022)

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Research Questions

What can an environmentally-extended MRIO production network model tell us about the “green premium” and the effectiveness of carbon taxes versus green subsidies?

To what extent do emissions-based metrics (scope 1/2/3 emissions) linearly approximate transition risk?

Key Findings

- The estimation of transition risk highly depends on the elasticities of substitution.
- While transition risk is concentrated in carbon-intense sectors, absolute economic impact can be greater in larger sectors that are indirectly affected (rely on carbon-intense sectors for their own production).
- Green subsidies are less effective at reducing carbon-intense sector activity.

Contributions to Literature

- Improves upon existing “carbon taxes in production network models” research by:
  - *Adding more granularity to the elasticities of substitution (EOS) parameters*
  - *Utilizing an EE MRIO database that allows for better sectoral disaggregation (esp. within electricity sources)*
- Connects this research (and methodology) to the more policy-familiar metrics (scope 1/2/3 emissions) and climate scenario analysis.

Model, Data, Methodology

- General equilibrium production network model
  - *Supply-side (producers), demand-side (consumers), market clearing*
  - *Pricing shock: Carbon tax or green subsidy*
- EE MRIO: EXIOBASE3
  - *2018*
  - *44 countries (author aggregates to 2: USA + ROW)*
  - *163 industries (author aggregates to 31)*
    - Including “renewable electricity”, “fossil fuel electricity”
  - *Intermediate inputs & final goods*

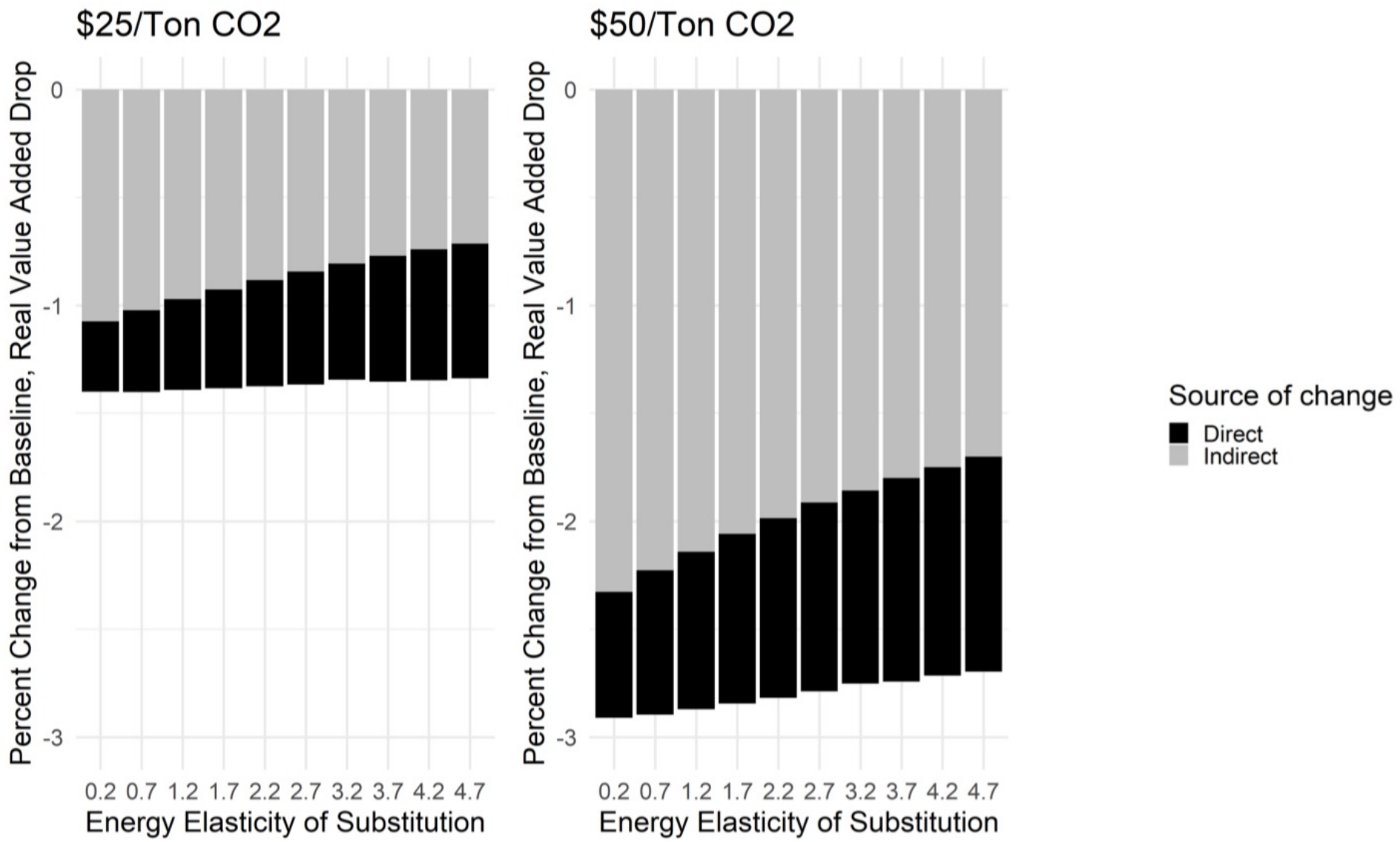
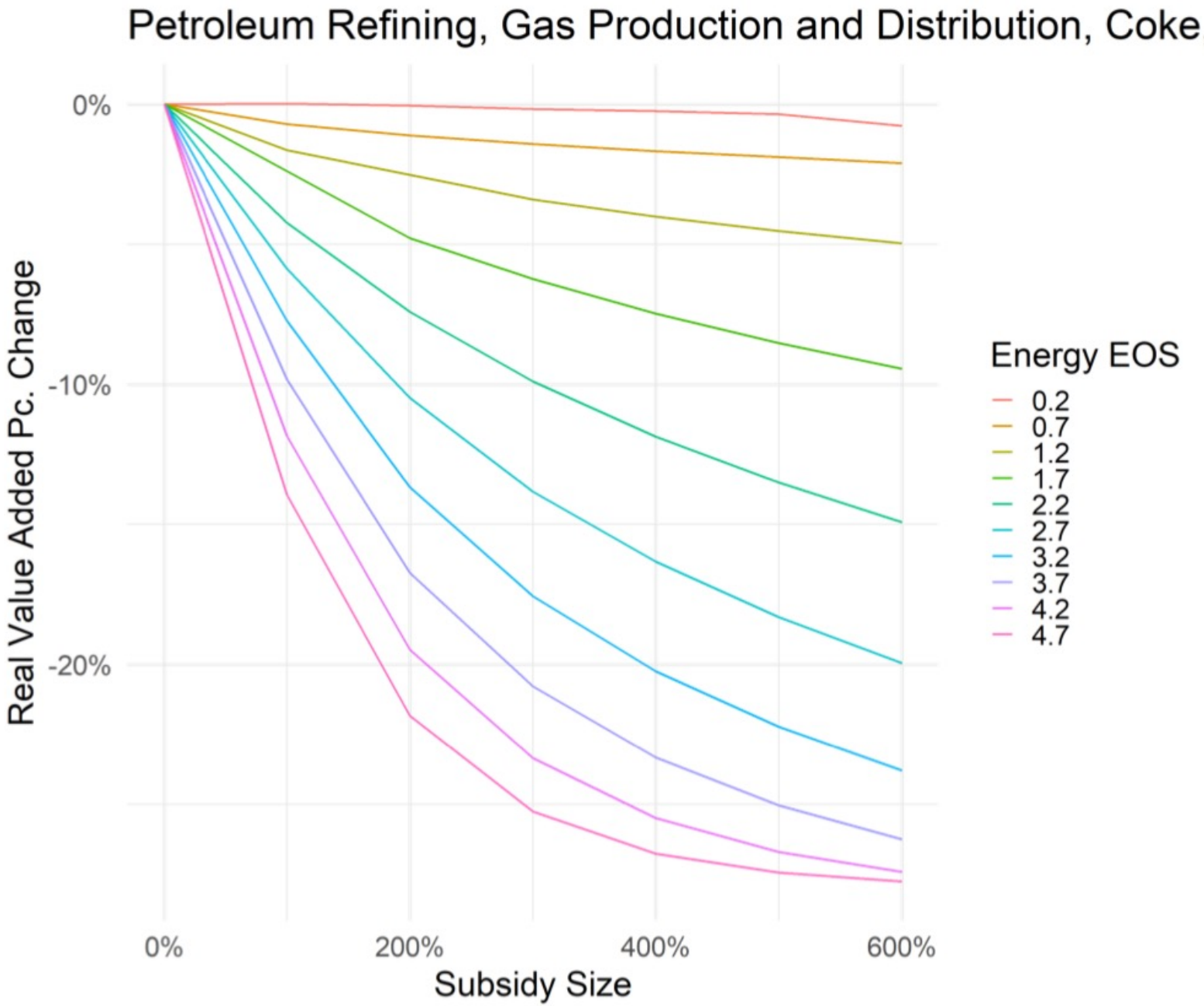


Figure 9: Decomposing aggregate changes.


Petroleum Refining, Gas Production and Distribution, Coke,
Real Value Added Pc. Change
0%
-10%
-20%
0%
200%
400%
600%
Subsidy Size
Energy EOS
0.2
0.7
1.2
1.7
2.2
2.7
3.2
3.7
4.2
4.7

Discussion Notes

- Motivation for use of production network models more in transition risk & climate policy research.
- Key finding about the importance of EOS:
  - *Policy consideration: If costs are dependent on this substitution value (that is unknowable), how can we make FF-to-clean sector switching more elastic and/or reduce other costs of the transition?*
- Clarification point on the carbon tax / green subsidy price shock:
  - *Globally applied to USA & ROW? Or only USA?*
- How might unilateral carbon policies complicate this story?
  - *EOS of cross-country trade?*