DISSERTATION PROPOSAL

Nilsu Uzunlar

"Essays on Environmentally Responsible Operations: Operational Challenges and Opportunities in Transitioning to Low-Carbon Economy"

Friday, December 6, 2024 10:30am Tepper 4219

https://cmu.zoom.us/j/99671814530?pwd=ukkckNKxjhXRkGGA3kwfOUceF8cvI1.1

Chapter 1:

In today's world, there has been an emerging, significant disposal problem due to the high volume of clean-energy product waste (e.g. retired PV technologies, wind turbine blades). In addition to the hurdle of this increasing waste stream, more recently, overproduction of materials used in clean-energy product manufacturing has been raising concerns that it hinders global competition. Accordingly, in the first chapter, we explore how policy initiatives and investments may be able to ameliorate both problems: Considering the emerging necessity of a recovery approach for clean-energy product waste, we explore how this may also promote domestic production, and hence, global competition. Specifically, we study the impact of a regulator (i) imposing recycling legislation by setting a minimum recycling requirement; (ii) supporting competition by subsidizing the introduction of a domestic recycler who recoups the raw material from the end-of-life products and sells this in the commodity market. The recycler competes with an existing, foreign supplier with extensive infrastructure (e.g. mines) who decides how much to produce and sell in the commodity market. We use a game-theoretic framework with queuing components to understand the impact of the supplier's capacity decision on operational performance, specifically demand allocation. This then informs our ultimate question: Under what market conditions can the regulator design and implement an effective circular policy?

Chapter 2:

Publicly traded firms are exerting efforts to reduce their carbon emissions, partially in response to environmental pressure from investors. This pressure can come in the form of influencing the equity and debt markets, as well as advocating for environmental transparency. The positive impact of investor pressure manifests in its ability to foster sustainable business practices. However, investor pressure can also backfire: Firms can respond by selling their carbon-intensive assets to private companies, which reduces transparency and eliminates investor oversight, potentially leading to *worse* overall societal outcomes: increased pollution, increased unit selling price, and lower employment. In the second chapter, we study the impact of two prominent environmental assessment metrics on a manager's operational strategy (exiting, investment in emission reduction and capacity decisions) by comparing two different mandatory disclosure regimes - where the firm discloses the unit impact under an intensity metric (regime) and the total impact under an absolute metric (regime). We then extend our base model to analyze the manager's choices under a voluntary disclosure regime in the presence of investor pressure, in which the operational decisions are made jointly with *disclosure* determinations.

Chapter 3:

Mergers - the combination of two or more firms into a single entity - often involve the aim of enhancing operational efficiency through cost savings. Prior research shows that cost reductions from a merger can enable the merged firm to reduce its price. However, the recent promotion of ESG (environmental, social, governance) factors by growing segments of consumers and shareholders creates new questions for merging firms: In response to the environmental considerations by consumers, firms may manufacture or, at least, make public environmental commitments to design, more sustainable products (on which they may or may not follow through). Accordingly, the goal of the third chapter is to understand the impact of environmental considerations on a merger by answering the following questions: How does environmental consideration by consumers affect a firm's product design choice (e.g., lower Scope 4 emissions) and environmental manipulation effort before and after a merger? To what extent does the merged firm's cost synergy (through economies of scale) affect its ESG synergy? By analyzing the premerger and post-merger equilibria, we also aim to provide managerial insights on the merged firm's failure to act on ex-ante environmental commitments.

Proposed Committee: Alan Scheller-Wolf (chair), Sridhar Tayur, Gaoqing Zhang, and Nick Muller

Proposal Documents: <u>https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4729492</u> [Chapter 2]