Timeline for conducting the proposed project (July 2023 – June 2025)

July-Sept 2023	Obtain the updated AIS data. Clean the data and provide descriptive analysis and visulalization for the relationship between fuel efficiency and ship characteristics. Preliminary regression analysis.
Oct-Dec 2023	Estimate how fuel efficiency is related to ship characteristics (size, ship types, ages) and operation conditions (draft, speed) using semi-parametric methods and machine learning tools.
Jan-Mar 2024	We conduct validation test for the predictive powers across different specifications and models to choose a specification and an estimation method that have good out-of-sample prediction performance.
Apr-June 2024	The estimated model is used to compute the worldwide CO2 emissions from international shipping. We provide decomposition analysis to understand a source of changes in the aggregate CO2 emissions from shipping in terms of bilateral trade relationships.
July-Sept 2024	The first draft of the first paper on the worldwide CO2 emissions from international shipping during the COVID pandemic is written. Present it at international workshop. Estimate the heterogenous elasticities of CO2 emissions from international shipping with respect to trade volume is estimated at each of bilateral trade relationship. Submission to conferences.
Oct-Dec 2024	The second draft of the first paper is written. We conduct counterfactual experiments of regulating ship speeds and regulation that prevent the travels with empty cargo and quantify the impact of such regulations on the worldwide CO2 emissions. The first draft of the second paper on the impact of policy regulations on CO2 emission is written.
Jan-Mar 2025	We will submit the first paper to a journal (e.g., AEJ: economic policy, Journal of International Economics). The second draft of a paper on the impact of policy regulations on CO2 emission. Submission to conferences.
Apr-June 2025	The third draft of a paper on the impact of policy regulations on CO2 emission. We will present the paper at internal workshops as well as external seminars.
July 2025-	The final draft of a paper on the impact of policy regulations on CO2 emission . Submission to a journal.