



AN INVESTIGATION INTO THE CAUSAL IMPACT OF
CARBON TAXATION ON CARBON EMISSIONS

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```
knitr::opts_chunk$set(echo = FALSE, message=FALSE, warning=FALSE)
pacman::p_load(tidyverse, riskParityPortfolio, xts, quadprog, tbl2xts, PerformanceAnalytics,
               RColorBrewer, knitr, kableExtra)

setwd("~/Masters_2024_stuff/Financial_Econometrics/Fin_Metrics_Project/Written_Report")
list.files('code/', full.names = T, recursive = T) %>% .[grepl('.R', .)] %>% as.list() %>% walk(~s

## Warning: package 'portfolioBacktest' was built under R version 4.3.3

## Registered S3 method overwritten by 'quantmod':
##   method      from
##   as.zoo.data.frame zoo
```

1 Introduction

2 Data

Data for this project was collected largely from ourworldindata.org, original sources are cited in the bibliography. The following data is pooled.

- Annual level of carbon emissions by country.
- When or if each country implemented a carbon tax.
- The annual GDP per capita for each country.
- The land area for each country in kilometers.
- The population of each country in millions.
- The Human Development Index (HDI) rating of each country.
- The continent of each country.

3 Methodology

3.1 LASSO-OLS Model

$$\begin{aligned}\ln(\text{Emissions}_i) = & \beta_0 + \beta_1 \ln(\text{GDP per capita}_i) + \beta_2 \ln(\text{Population}_i) \\ & + \beta_3 \ln(\text{Land Area}_i) + \beta_4 \text{HDI Tier}_i \\ & + \beta_5 \text{Continent}_i + \beta_6 \text{Carbon Tax}_i \\ & + \epsilon_i\end{aligned}$$

3.2 Difference-in-Difference Models

3.3 Causal Forest Model

4 Results

Figure 1: Distribution of Treatment Probabilities

4.1 LASSO-OLS Model

5 Conclusion

6 References