

GREEN FINANCE AND INEQUALITY

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MOTIVATION

We study the financial system's role in addressing climate change and its impact on inequality. Our focus is on climate and green finance, which has grown at a rapid pace over the last decade. We ask whether this emerging paradigm that relies on environmental financial products can be an effective complementary tool to existing policy, such as carbon pricing, in terms of inequality reduction. Given the exponential rise in financial investments labeled as green or sustainable, it is important to understand their impact on social issues.

We consider four potential mechanisms from the literature through which green finance can affect inequality:

- (1) *Innovation and technological change* \implies increases the rents of firm owners and the returns to certain skill types in the labour market.
- (2) *Financial development* \implies affects economic growth and prospect.
- (3) *Carbon Pricing* \implies increases price levels of goods
- (4) *Climate Change* \implies changes endowments such as arable land and housing areas.

WHAT IS OUR UNDERSTANDING OF GREEN FINANCE?

We understand green finance (*GF*) as the collection of financial acts directed towards the mitigation of climate change. It is a very broad term that encompasses the actions of every agent in an economy towards this goal. We measure the degree of *GF* in an economy by using the following variables:

- *CLMT* - Climate finance index is the average of z-standardized *BOND*, *GHG*, and *PAT* indicators.
- *BOND* - Climate bonds amount issued (\$bn) from 2006-2022 in logs, (source: Climate Bonds Initiative)
- *GHG* - Green house gas emissions from operations that are owned or controlled by the company (1mil kg CO₂) from 2005-2019 in logs, (source: Trucost).
- *PAT* - Number of patents in environmental related technologies from 2000-2018 in logs, (source: OECD.Stat)
- *E* - Cap-weighted average of environmental ratings from MSCI (2007-2019), Refinitiv (2002-2019), and S&P Global (2002-2019), $\in [0, 10]$. A country is considered only in a given year if it has more than 10 rated firms in that year.

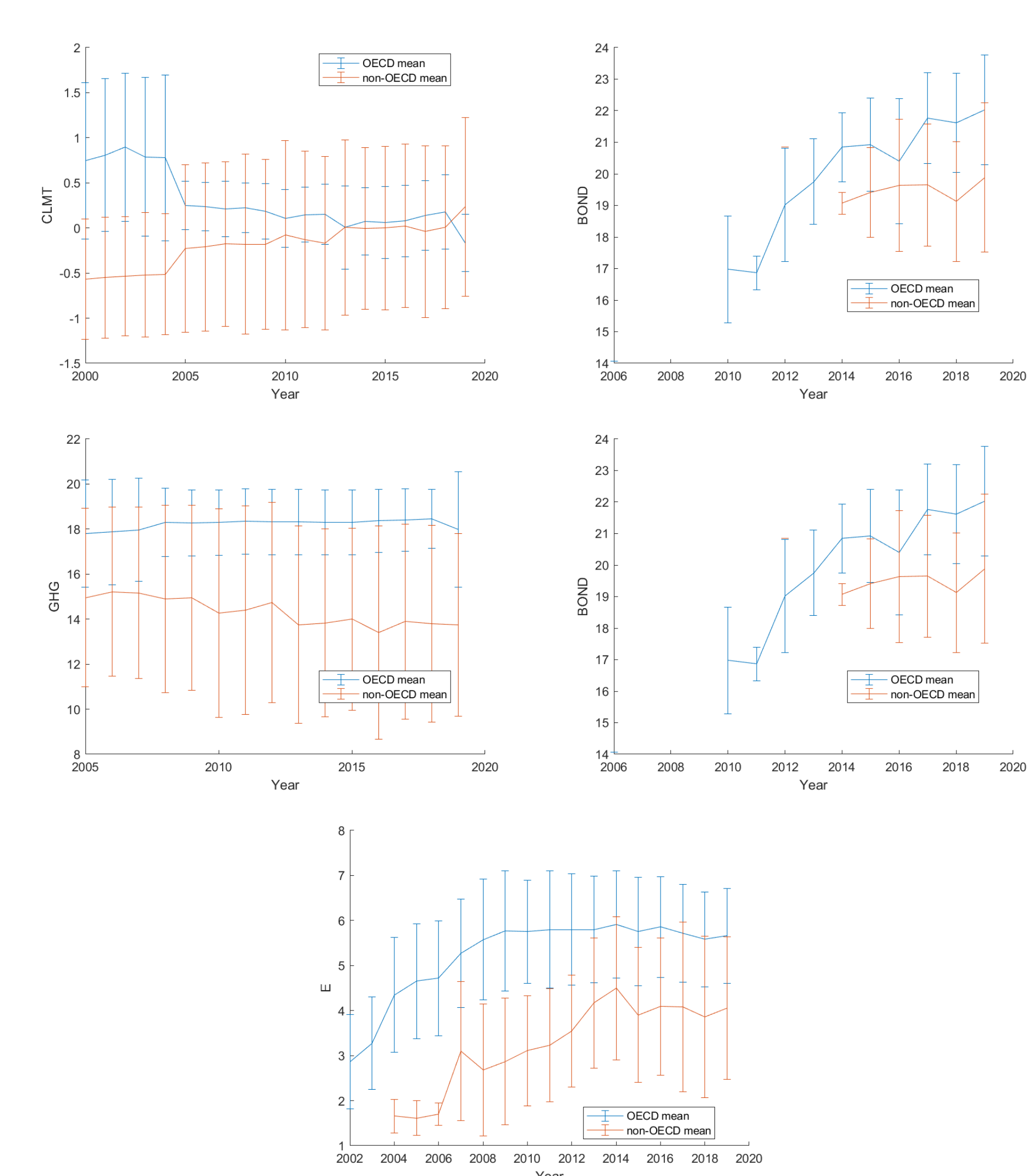
We relate this variables with inequality measures such as the GINI coefficient, bottom 5%, 10%, and 50% income share, top 20%, 10%, and 5% income share, as well as the ratio of the top 10% to the bottom 50% earners.



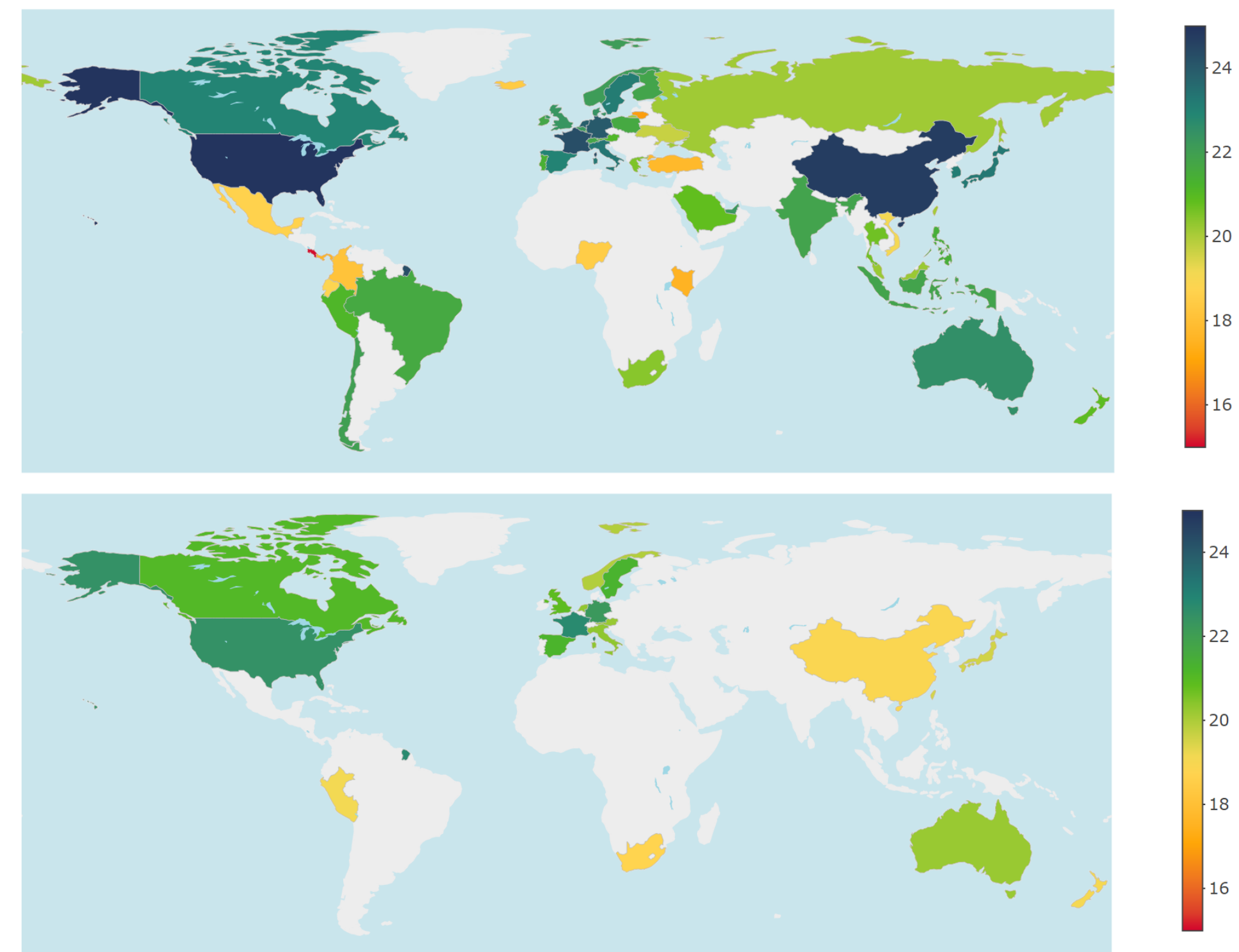
PRELIMINARY RESULTS

1. On average, an increase in green finance is associated with a decrease in the Gini coefficient.
2. However, we find substantial differences in effect direction and size once we group data based on the tertiles of initial inequality levels. Countries from low and high initial inequality levels show a negative effect on Gini while countries with a moderate initial inequality level show a positive effect.
3. The effects change when considering a country's initial GDP level. In that case, countries from a low initial level show a negative effect twice as big as for a moderate level. Countries with high initial GDP show no significant effect on the Gini coefficient.
4. For almost all specifications we find a negative interaction between green finance and initial Gini. This means that the effect gets more and more negative with increasing Gini and increasing green finance.

VARIABLES OVERVIEW - VARIATION OVER TIME



How does *GF* change over time?
Example: *BOND* in 2019 (below figure at the top) and 5 years earlier (below figure at the bottom).

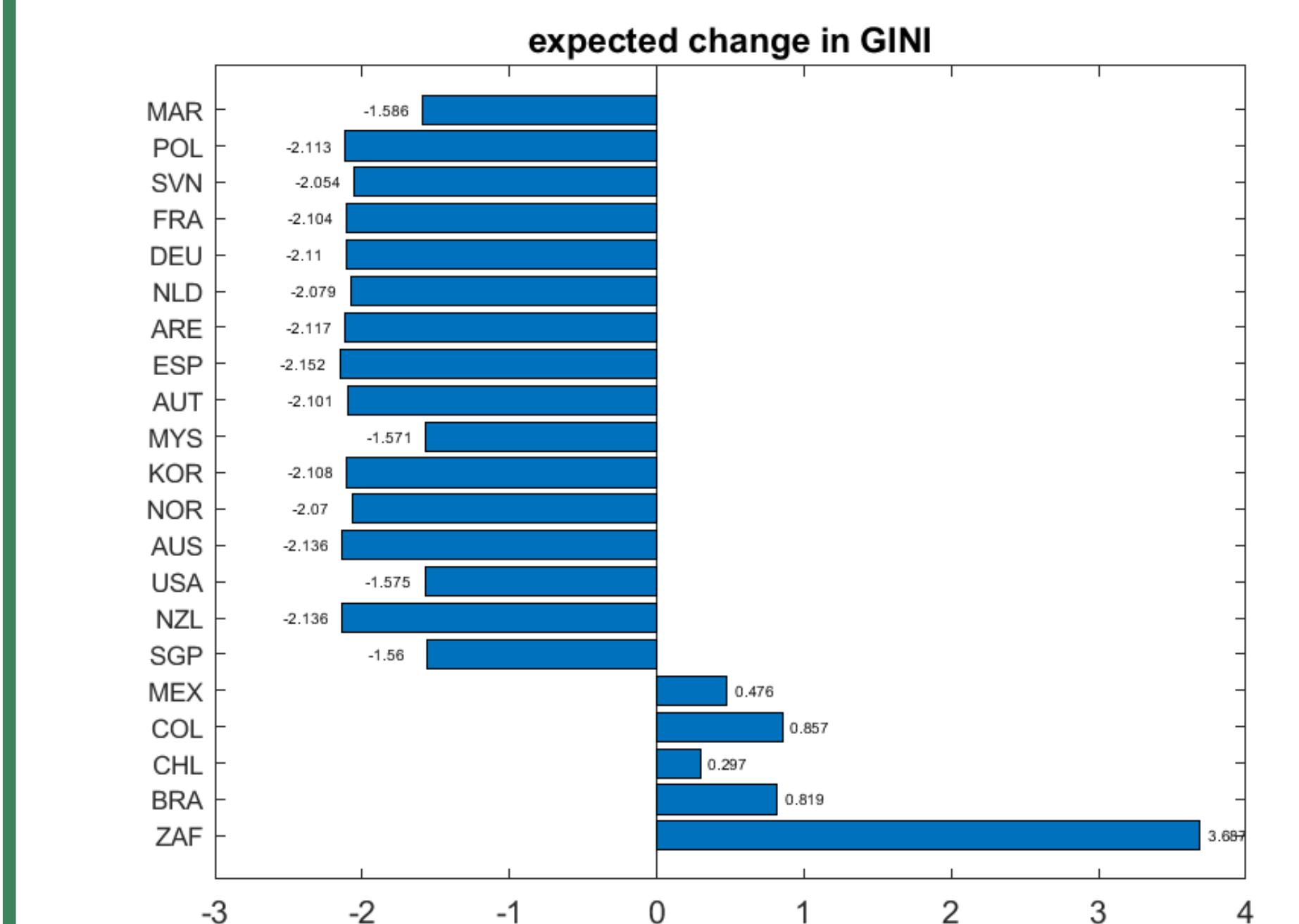


Number of countries with at least one *GF* variable: 131
Time frame: yearly data from 2000 to 2019

NUMERICAL EXAMPLE

What would happen to the Gini coefficient in 2017 if *BOND* were increased by 1 (approx. \$2.7bn)?

Below figure illustrates the difference in Gini resulting from a prediction based on the actual total issued volume in 2017 compared to a prediction based on a sum that is \$2.7bn higher.



The model includes covariates and initial inequality levels, run on yearly data in levels

MODEL & METHODOLOGY

We use regression (1) as the baseline model which is enriched with various control variables. The dependent variable *INEQ* is one of the $l = 1, \dots, 8$ inequality measures, the explanatory variable of interest is one of the $m = 1, \dots, 5$ green finance indicators. c_i is the unobservable country-specific effect, and δ_t is the time-specific effect. We always control for the initial inequality level *INEQI*.

$$INEQ_{l,i,t} = \alpha_m GF_{m,i,t} + \beta_1 INEQI_{l,i,t} + c_i + \delta_t + \epsilon_{l,i,t}. \quad (1)$$

We expand this setup to designs in which interest is on effect size and direction for different levels of GDP, financial development and inequality.

We use a two-step system GMM estimator applied to a dynamic panel data model. The system GMM estimator solves the problem of a) simultaneity by using internal instruments and b) omitted variable bias by estimating the regression in differences. Throughout the analysis it is assumed that green finance, the initial inequality level, and some of the controls are predetermined (weakly exogenous).