Make and Keep the World in the Loop: Analyzing Factors Driving Circular Economy

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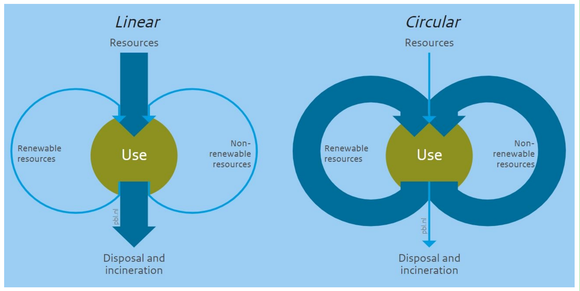
Introduction

- **Circular economy**, unlike linear economy, reduces material use, redesigns materials to be less resource intensive, and recaptures "waste" as a resource to manufacture new materials and products.
- Specific business models and standards for circularity are still officially **undefined**.
- I study **factors** driving circularity both at the company and country levels.
- I analyze data from 160 countries focusing on **3 main factors**–demographic and national features, governance, and green behavior.
- For companies, **S&P 500 companies** are selected.



Data Description

- Mention CE: number of times the company mention the word "circular" or its derivation
- Report: dummy variable, Report =1 if the company publish sustainability report
- ESG score: environmental performance score by S&P Global
- GGEI(Global Green Economy Index): environmental performance score, ranging from 0 to 1
- Incentives: dummy variable, incentives=1 if the country rewards sustainable activities like recycling
- Party Pattern: dummy variable, Party Pattern=1if the country has one political party; Party Pattern=3 if the country has multiple political parties

Method

- Run linear regression and analyze the correlation between environmental performances and independent variables
- Visualize 2 variables, GGEI and Regulatory quality, to see the connections between them and the cross-sectional effect
- To see if greenwashing (declaring practicing circular economy but actually not) could be a problem, I graph a time series of circular economy mentions and companies' ESG scores

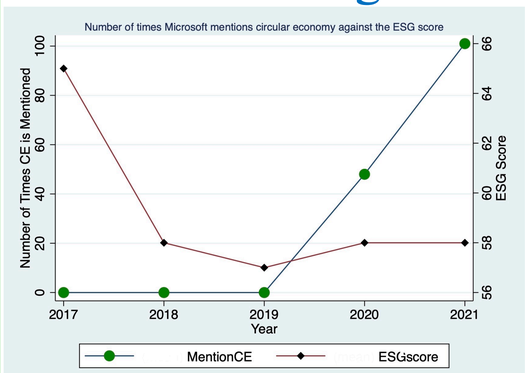
RQ1: Does circular economy efforts improve or hinder companies' revenue?

Linear Regression: Company Revenue

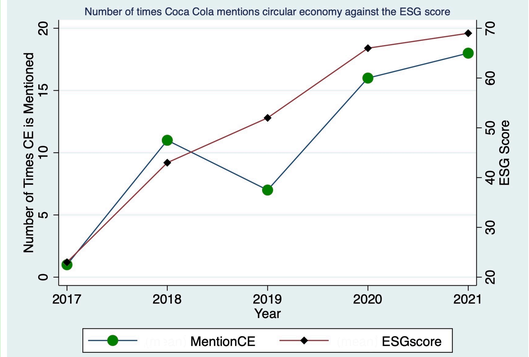
	Dependent Variable: Companies' revenue in billion USD(2021)			
	β	p-value	df	R^2
Mention CE	0.913	0.107	490	0.44
Report	2.871	0.869	490	0.44
Number of Employees	0.0003	0.000	490	0.44
ESG score	0.175	0.055	490	0.44

Key Results:
- **Mention CE is mostly statistically significant at α=0.1 level.**
- **mentioning CE would bring some economic profits to the company.**

Greenwashing?



Microsoft vs Coca-Cola



Results

Through comparing two companies, we can confirm that the company with simultaneous changes of two variables authentically practices circular economy.

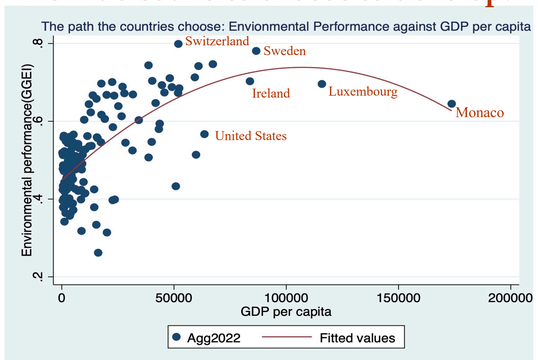
RQ2: What determines the circularity of a country?

Linear Regression: Countries' circularity

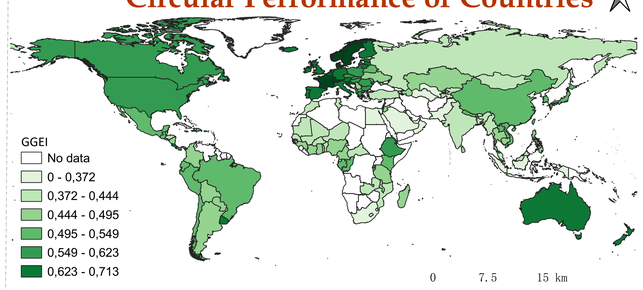
		Dependent Variable: Global Green Economy Index (GGEI)			
		β	p-value	df	R^2
Governance	Regulatory Quality	0.070	0.000	144	0.52
	Incentives	0.048	0.014	144	0.52
	Party Pattern	0.021	0.006	144	0.52
Green behavior	Median Age	0.010	0.000	148	0.55
	Recycling Rate	0.002	0.000	148	0.55
	Number of Sustainable Companies	0.007	0.052	148	0.55
	CO2 Emissions (metric tons/capita)	-0.003	0.062	148	0.55
Demographic and national features	Median Age	0.005	0.000	147	0.69
	Forest Cover	0.0002	0.265	147	0.69
	GDP per capita in 2021	3.95E-06	0.000	147	0.69
	Population Density	-0.00002	0.000	147	0.69
	CO2 Emissions (metric tons/capita)	-0.011	0.000	147	0.69

Key Determinants:
- **Strict governance, incentives, and cooperation of multiple parties**
- **Higher median age and low population**
- **GDP**

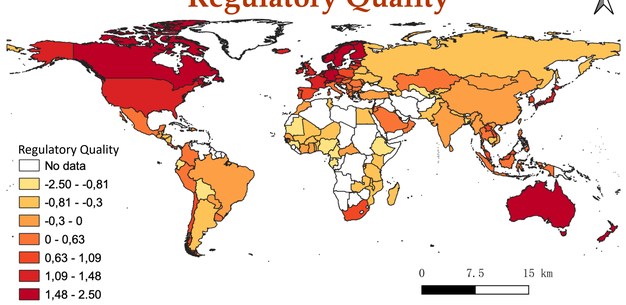
How do counties choose to develop?



Circular Performance of Countries



Regulatory Quality



Discussion

- **This paper provides some causal evidence to discuss factors driving circular economy**
- Though most companies mention circular economy in their sustainability reports for several times, the case studies reveal that some companies are **practicing circularity**, while some treat circular economy just as an **advertising approach**, attracting investments and economic profits.
- Many countries still focus on **traditional economic development**.
- Circular economy is more chosen by developed countries **with high regulatory quality** and **less population density**.
- Countries with higher median age gain higher GGEI, indicating **older people** care about green economy more than the young people do.
- Positive cross-sectional effect exists. Adjacent countries have similar GGEI and regulatory qualities.

Acknowledgement

Undergraduate Research Fund for Corporate Responsibility

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