



THE DISTRIBUTIVE ISSUES ASSOCIATED WITH GREENING THE ECONOMY:

GREEN HUMAN CAPITAL, INNOVATION AND GROWTH

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Distributive issues and climate risk: already in the Paris agreement ?

- Paris Agreement Preamble
- “Taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities”



Distributive issues and climate risk : already in the Paris agreement ?

It is difficult to reconcile energy transition (E) and social impact (S+G) in a context where

- ❑ **environmental and climate risks are not distributed equitably**, which raises a "distributive justice" issue (socially just repartition of resources)
- ❑ the **different stakeholders do not have the same opportunities to influence decisions concerning their immediate environment**, which raises the issue of "procedural justice" (fairness in the processes that resolve disputes and allocate resources (ex ante))
- ❑ Technology affects social and environmental inequality, which raises the issue of " technological bias/justice"

Recovery plans

- After formally adopting a carbon neutrality objective by 2050 in March 2020, European states have adopted recovery plans in which the fight against climate change is a clearly stated objective. The European Union announced in September 2020 an issuance of 225 billion euros in green bonds to finance its recovery, or 30% of the total budget deployed to deal with the aftermath of the coronavirus crisis.
- France expects to become the first major low-carbon economy in Europe with 30 billion euros, devoted to four priority sectors: energy renovation of buildings, transport, agricultural transition and energy.
- China, for its part, has just declared at the end of September 2020 a goal of carbon neutrality by 2060 at the latest.

Recovery plans

- Those recovery plans are based on the premise that "cleaner air quality, healthier water, effective waste management, and enhanced biodiversity protection not only reduce the vulnerability of communities to pandemics and improve resilience, but have the potential to boost economic activity, generate income, create jobs, and reduce inequalities"

Green growth

Growth and inequality

- the impacts of environmental degradation tends to be concentrated among vulnerable groups and households, and global warming exacerbates economic inequality (Diffenbaugh and Burke, 2019)
- but the benefits and costs of environmental policies are also likely to be unevenly distributed across households (OECD, 2021)

Climate transition risk and inequality

Glen 2022:

“Transition risk is when society, technology, or policy, move faster than anticipated...”

❑ 3 dimensions of climate transition risk ...

- Public policy
- Technology
- Preferences

❑ ... affects wage inequality

My approach

Research question

Is growth based on green investments and innovation a source of higher income and lower inequality?

Methodology

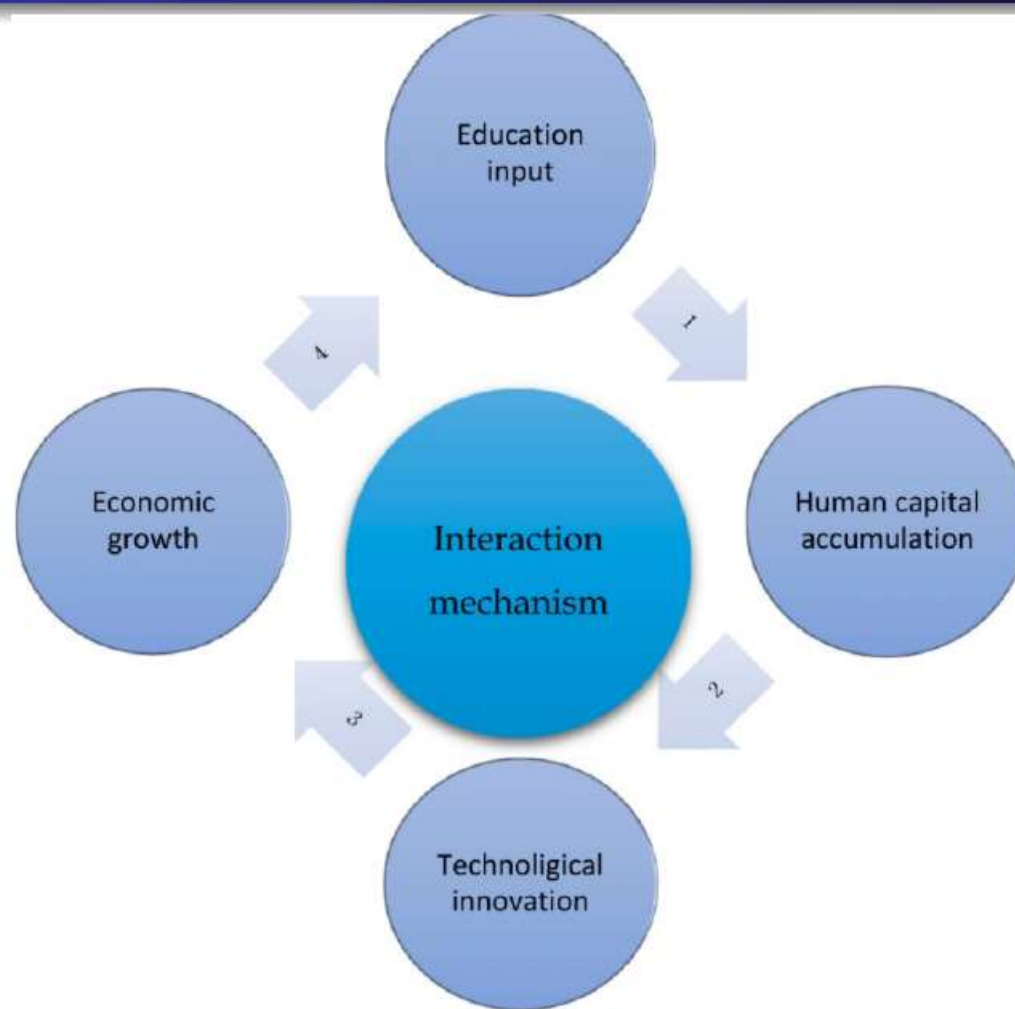
- Propose a model of growth based on green innovation and green human capital.
- Document the predictions of the model using firm-level data from OECD countries, and France over the 2004-2022 period.

Crifo (2024)

Preview of results

- Policy measures aimed at raising the proportion of green workers in the economy (intrinsic preferences or cost of education) increase wage inequality between groups and decrease wage inequality within skilled workers
- Policy measures rewarding green motivation increase wage inequality both between and within skilled groups.
- Green bonuses are associated with higher skilled wage premium and lower between group inequality.

Model

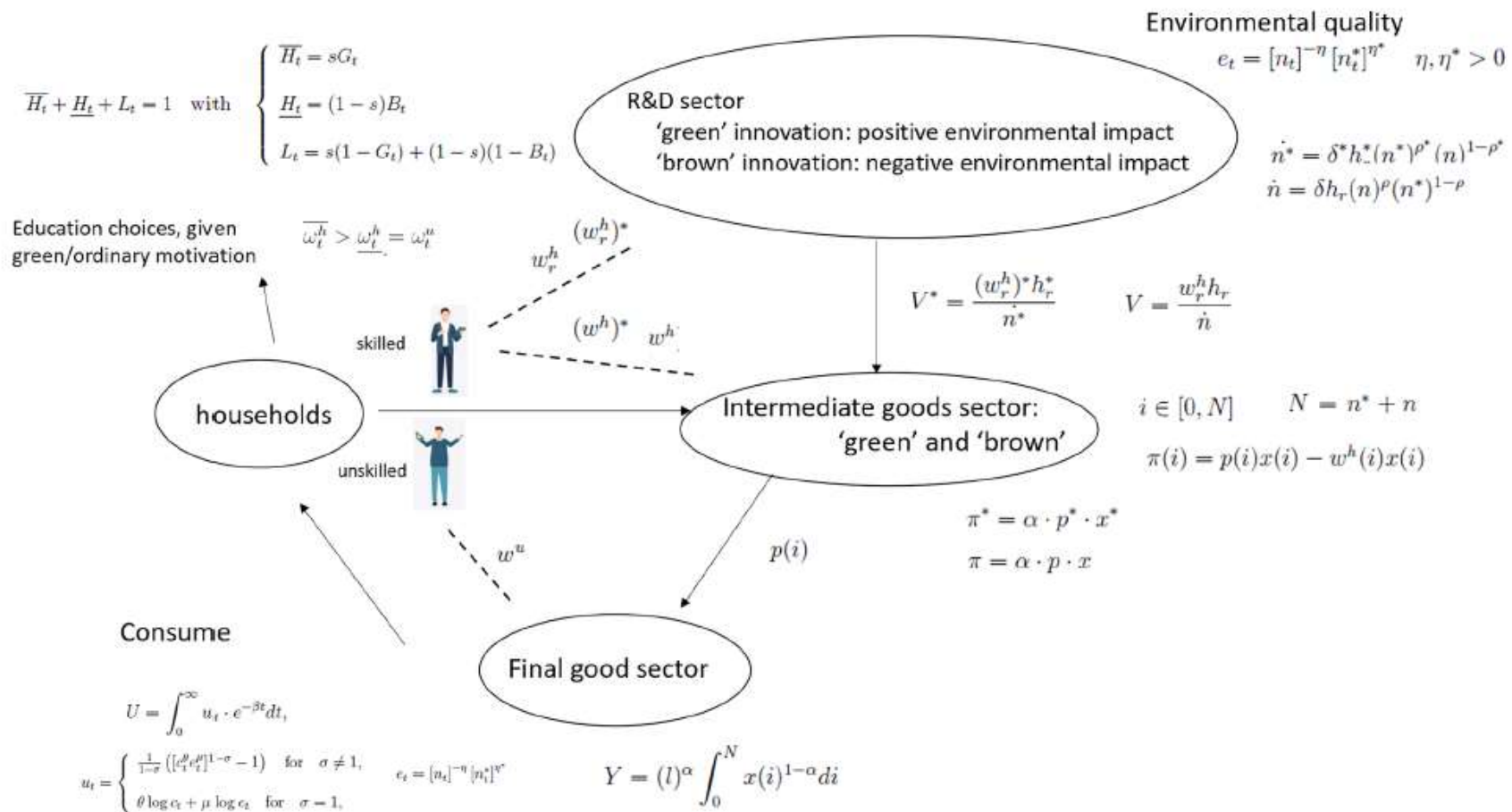


Model

Romer (1990) model, with

- ① 1 final good sector
- ② 1 intermediate goods sector
- ③ 1 RD sector and two sources of innovation:
 - 'green' innovation: positive ESG impact
 - 'brown' innovation: negative ESG impact
 - society 'green/performance':

$$e_t = [n_t]^{-\eta} [n_t^*]^{\eta^*} \quad \eta, \eta^* > 0 \quad (1)$$



Green human capital

① Individuals differ in their **job motivation**:

- 'green/SR' motivation, in proportion s ,: supply more efficiency units of labor (personal value or productivity effect)
- basic motivation, in prop. $1 - s$,: indifference across tasks, less efficient at work workers.

② Individuals can **acquire education**

- SR motivated workers supply $\overline{\varphi}_t$ efficiency units of labour , nonSR motivated supply $\underline{\varphi}_t$ efficiency units of labour, unskilled supply φ_t efficiency units of labour.
- time cost of education $0 < \xi < 1$ dedicated to the formation of human capital.

green human capital

- returns to SR human capital

$$\overline{\varphi_t} > \underline{\varphi_t} \geq \varphi_t$$

$$\overline{\omega_t^h} = (1 - \xi) \cdot \overline{\varphi_t} \cdot w_t^h, \quad \underline{\omega_t^h} = (1 - \xi) \cdot \underline{\varphi_t} \cdot w_t^h, \quad \omega_t^u = \varphi_t \cdot w_t^u$$

- Resources constraints on the labor market

$$\overline{H_t} + \underline{H_t} + L_t = 1 \quad \text{with} \quad \begin{cases} \overline{H_t} = sG_t \\ \underline{H_t} = (1 - s)B_t \\ L_t = s(1 - G_t) + (1 - s)(1 - B_t) \end{cases}$$

Consumption

- Preferences are represented by the following instantaneous utility function:

$$u_t = \begin{cases} \frac{1}{1-\sigma} ([c_t^\theta e_t^\mu]^{1-\sigma} - 1) & \text{for } \sigma \neq 1 \\ \theta \log c_t + \mu \log e_t & \text{for } \sigma = 1 \end{cases}$$

where c_t denotes per capita consumption and e_t is the society's green quality/performance.

- green quality depends on the number of green and brown goods as follows:

$$e_t = [n_t]^{-\eta} [n_t^*]^{\eta^*} \quad \eta, \eta^* > 0$$

Equilibrium

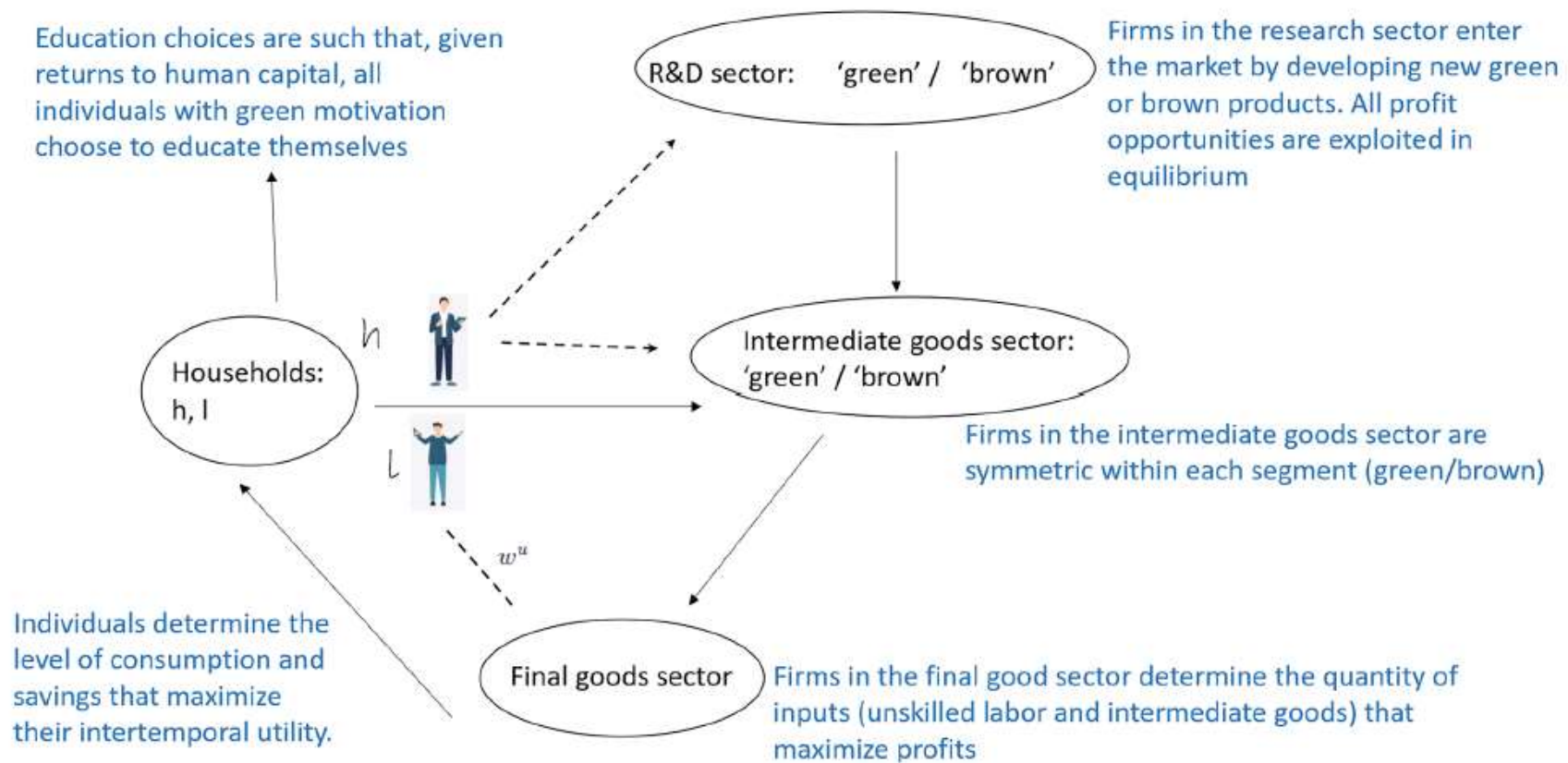


Fig. 2 General equilibrium of the model

Balanced growth path

Along the balanced growth path, the economy grows at a unique constant rate g^*

green workers and growth

The steady-state growth rate g is increasing in the proportion of green workers in the economy, s .

Green innovation and growth

The steady-state growth rate g is increasing in the efficiency rates of innovation δ and δ^*

Green quality and growth

The steady-state growth rate g is increasing and the relative share of green product in ESG quality, $\eta^* - \eta$.

3 dimensions of climate transition risk :

- Public policy
- Technology
- Preferences

Education costs and inequality

A shock increasing the cost of education (ξ) induces an increase in the number of workers without green motivation who choose to become educated B_t , a decrease in wage inequality between groups $\Sigma_t^{h/u}$ and an increase in within skilled workers Σ_t^h

Green human capital and inequality

A shock increasing the proportion of green workers in the economy s induces a decrease in the number of workers without green motivation who choose to become educated B_t ; an increase in wage inequality between groups $\Sigma_t^{h/u}$ and a decrease in wage inequality within skilled workers Σ_t^h

Green motivation and inequality

A shock increasing the returns to motivation $\overline{\varphi_t}/\underline{\varphi_t}$ induces a decline in the number of workers without green motivation who choose to become educated B_t and an increase in wage inequality both between groups $\Sigma_t^{h/u}$ and within skilled workers Σ_t^h

Two main results

- Policy measures aimed at raising the proportion of green workers in the economy (intrinsic preferences or cost of education) increase wage inequality between groups and decrease wage inequality within skilled workers
- Policy measures rewarding green or SR motivation increase wage inequality both between and within skilled groups.

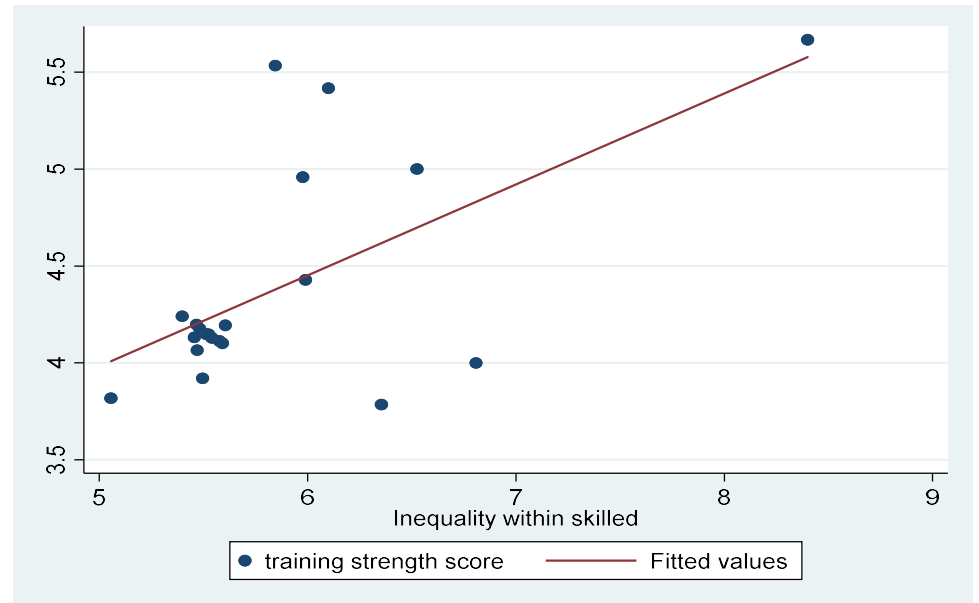
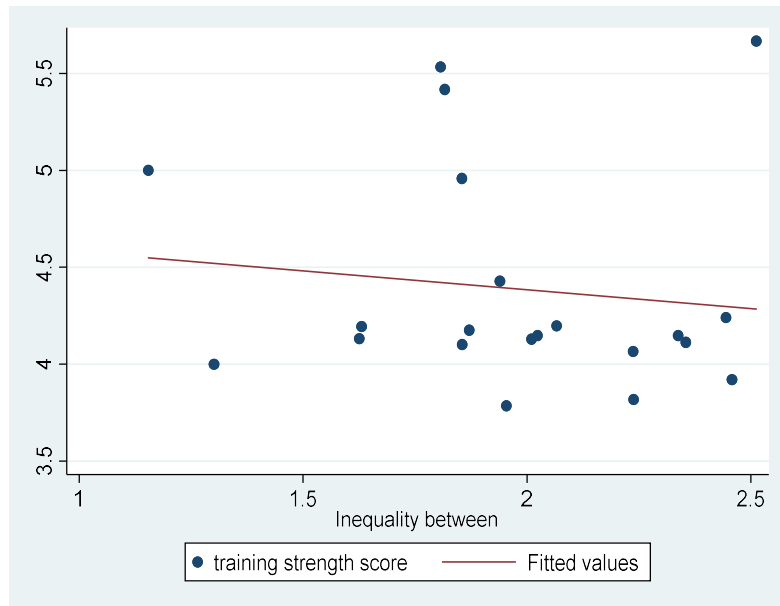
Empirical observations : OECD countries 2022

Data

- MSCI ESG Ratings

Measure a company's management of financially relevant ESG risks and opportunities. Identify industry leaders and laggards according to their exposure to ESG risks and how well they manage those risks relative to peers
- ACWI index: Covers 2,933 constituents across 11 sectors and approximately 85% of the free float-adjusted market capitalization in each market
- Date: April 2023
- AUSTRALIA, CANADA, SWITZERLAND, CHINA, GERMANY, France, UNITED KINGDOM, JAPAN, NETHERLANDS, SWEDEN, USA, AUSTRIA, BELGIUM, DENMARK, SPAIN, FINLAND, IRELAND, ISRAEL, ITALY, NORWAY, Portugal
- Variables
 - ✓ Inequality:
 - Ratio of CEO pay to average employee pay (Inequality index between)
 - Human Capital Development Score (Inequality index within) : companies' ability to attract, retain and develop human capital based on their provision of benefits, training and development programs, and employee engagement. The companies that rely heavily on highly-skilled employees but show no evidence of such employee engagement score poorly on this key issue. (Score: 0-10)
 - ✓ Training:
 - Professional Development Score= strength of the company's training and professional development programs
 - Company spending on employee professional development in the indicated year
 - ✓ Green Jobs = Employees * Portion of the company's revenues derived from lines of business that typically have a low level of carbon intensity
 - ✓ Green motivation= Environmental Pillar Score: constituents' management of and exposure to key environmental risks and opportunities. Scores range from 10 (best) to 0 (worst)

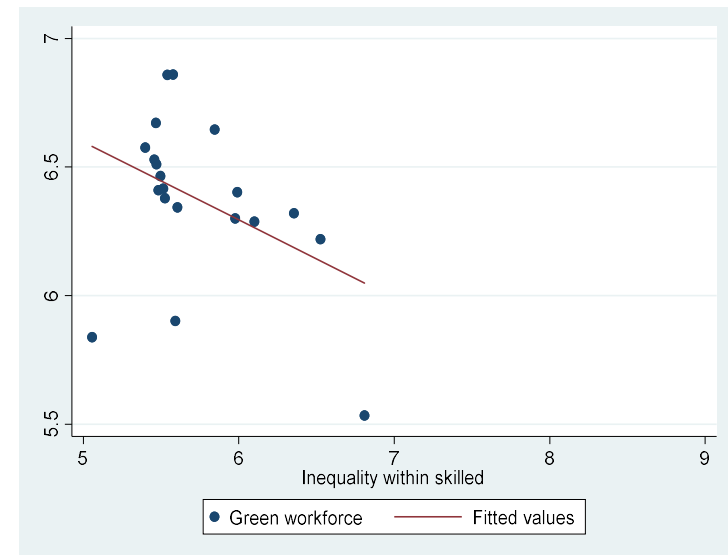
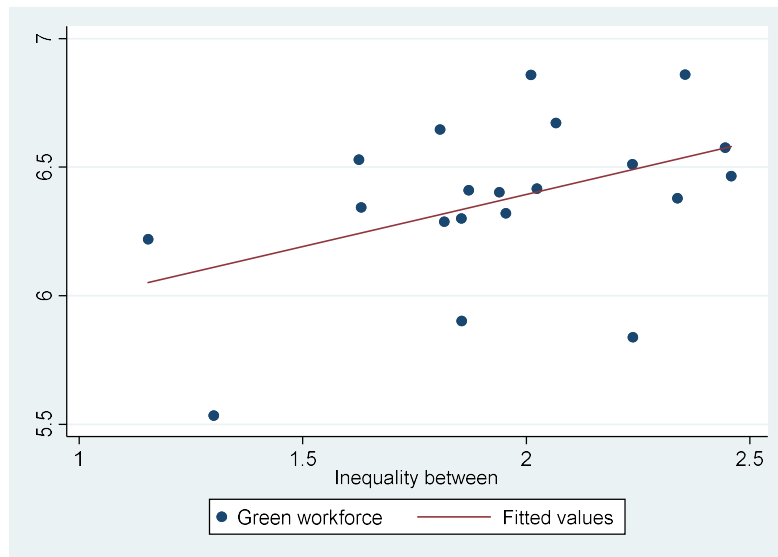
Empirical observations



An increase in the cost of education

- decreases wage inequality between groups
- and increases wage inequality within skilled workers

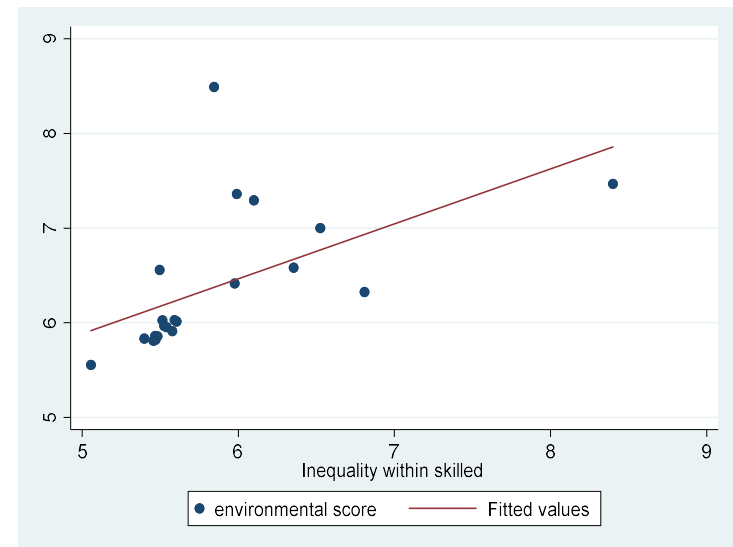
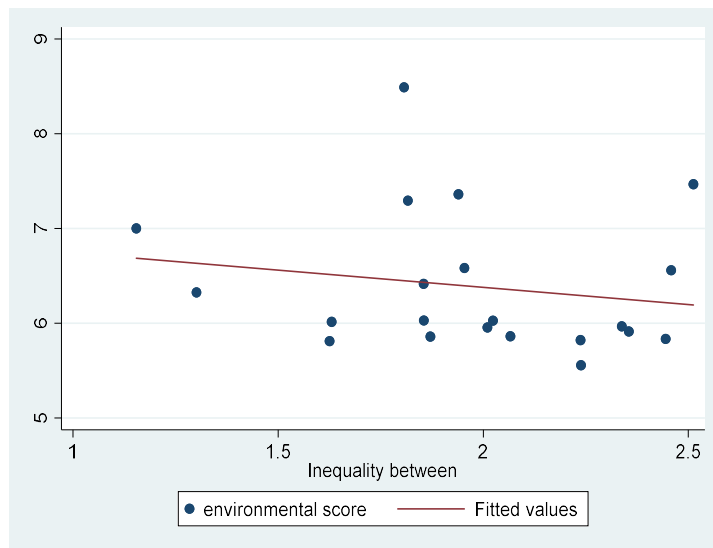
Empirical observations



An increase in green workers

- increases wage inequality between groups
- and decreases wage inequality within skilled workers

Empirical observations



An increase in green motivation

- increases wage inequality both between groups
- and within skilled workers

Implications

- Growth based on green innovation may create more inequality.
- The social dimension of environmental policy is essential at the macro (country / city) level and at the micro (firm) level

The social & environmental performance at the firm level

Defining ESG performance



Measuring ESG performance

- Three types of **firm level data** available:
 - ✓ ESG ratings
 - extra-financial rating agencies (VE-Moodys)
 - ✓ ESG practices:
 - official statistics surveys
 - experimental data

Results on ESG practices: France 2003-2006

Crifo, Diaye, Pekovic 2016 & 2023; Benhamou, Diaye, Crifo 2016



- *Official survey of public statistics (COI) and fiscal data (EAE)*
- *Representative sample of more than 8,500 companies with more than 10 employees - private sector in 2003 or 2006*
- *Sample of 15,365 workers (Annual Survey of the Cost of Labor and the Wage Structure (ECMOSS))*
- *19 organizational and managerial practices observed covering several CSR areas*
 - ☐ *Environment and business ethics*
 - ☐ *Human resources*
 - ☐ *Customers relationship*
 - ☐ *Suppliers relationship*

Results on ESG practices: the wage premium puzzle

Crifo Diaye Pekovic (2023)

	The base wage	The total wage	Wage premium
Whole sample (N = 13,186)	ns	ns	-1.42***
Manager sample (N = 6,496)	ns	ns	2.63***
Nonmanager sample (N = 6,633)	ns	ns	-1.79***

Note(s): ns: indicates “non-significant”
 ***: indicates parameter significance at the 1 % level

Table 2.
 The summary of SEM
 results – the relation
 between CSR and
 wage policies

- Firms adopting CSR practices tend to pay lower wage premium (employee participation and pensions, bonuses and overtime compensation)
 - But when we distinguish between managers and nonmanagers, the results reverse: coeff negative for nonmanagers, while it is significant and positive for managers.
- CSR practices lead to **segmentation and sorting between skills**: managers (the high skilled segment) would benefit from both responsible practices (nonmonetary incentives) and bonuses (E+S+W), while nonmanagers (the low skilled segment) would not benefit from such a complementarity but would rather be subject to substitutability between bonuses and nonmonetary incentives (E+S-W).



Impact + executive wages, - non-executive wages

CONCLUSION

- Environmental and social issues are complementary inputs of firm performance
- The evolution of inequalities represents a real challenge for the greening of growth and the green recovery plans
- To avoid green innovation policies being "absorbed" by an increase in wage inequality (increased demand without increased supply), it is necessary to accompany them by training and education policies supported at the firm level.
- As green human capital incorporates an essential firm-specific, that is non-transferable component, corporate expenses are crucial to avoid increases in inequality

References

Papers quoted can be downloaded :

<https://sites.google.com/site/patriciacrifo/>