KDI-Brookings Joint Seminar: Productivity in a Time of Change

ESG Performance and Firm Productivity: Evidence from South Korea

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Part 1. Motivation

Part 2. Data and Methodology

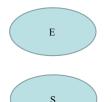
Part 3. Findings and Discussions

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Part 1 How does ESG ratings affect Productivity

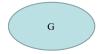


Non-fundamental ESG



Environmental strategy, structure, management, performance, and response to stakeholders

Employee protection, competition and acquaintances, consumer protection, and regional community facilitation



Shareholder rights, board of directors quality, audit, and transparency



Motivation Behind ESG Efforts

- Consumers
 - Recent abnormalities in weather conditions around the world
 - How corporations treat their employees (wrongful termination, coercion, etc.)
- Investors
 - UN's Principles for Responsible Investment
 - Preference for ESG-friendly assets
 - Risk management (sustainability)
 - Less financial friction

High ESG Performance



- Represents better work
 environments
- Socially and environmentally responsible
- Firm is operated with competent management



Labor Productivity

Higher quality workers want to work for this firm

> More able to headhunt

Total Factor Productivity



With more access to finance, firms will invest in innovation and technology

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- Labor productivity
 - Barrymore and Sampson (2021)
 - Fonseca and Van (2022)
- Total factor productivity
 - Deng, Li, and Ren (2023)
 - Luo, Wei, and He (2023)



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Part 2 Data and Methodology



ESG Scores

- ESG ratings and scores are obtained from Korea Corporate Governance Service (KCGS)
- E : environmental strategy, structure, management, performance, and response to stakeholders
- S : employee protection, competition and acquaintances, consumer protection, and regional community facilitation
- · G: shareholder rights, board of directors quality, audit, and transparency
- In 2021, 1,009 firms were rated by KCGS, but only 940 were public
- Data ranges from 2011 to 2021 for ESG
- ESG score ranges from 0 to 7
- G score ranges from 0 to 100



Productivity Measures

Total Factor Productivity

- Ackerberg, Caves, and Frazer (2015) control for the unobserved productivity shock and endogeneity issues by using an intermediate input
 - · Generally, energy or materials
- Levinsohn and Petrin (2003) use a similar method
- Labor Productivity
 - Total Sales / Labor Cost
 - Total Sales / # of Employees
- Control Variables
 - Herfindahl index, capital intensity, size, book to market ratio, leverage, and profitability



Empirical Specification

 $Productivity_{i,t} = \alpha + \beta_1 ESG_{i,t} + \gamma Controls_{i,t} + \delta_i + \theta_t + \varepsilon_{i,t}$

- Productivity is TFP and Labor Productivity
- ESG is the quantified ESG rating that ranges fr om 0 to 7
- Fixed-effect and year-effect are included
- Endogeneity issue: IV method
 - The average of industry ESG score (Benlemlih, 20 19)



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Part 3 Findings and Discussions



Total Factor Productivity

| | ESG | G Only | |
|-------------------|----------|----------|--|
| VARIABLES | TFP | TFP | |
| | | | |
| ESG Score | -0.039 | | |
| | (-1.51) | | |
| G Score | | 0.007* | |
| | | (1.92) | |
| Constant | 3.534*** | 3.044*** | |
| | (54.75) | (21.30) | |
| | | | |
| Observations | 8,074 | 16,100 | |
| R-squared | 0.17 | 0.16 | |
| Firm Fixed Effect | Yes | Yes | |
| Time Effect | Yes | Yes | |
| Controls | Yes | Yes | |
| Number of Firms | 1,054 | 1,608 | |



- By size
 - No significance
- By ESG performance improvements
 No significance
- By industry
 - Only few industries showed significance but the sign was not consistent



Labor Productivity

| | ESG | G Only | |
|-------------------|--------------------|--------------------|--|
| VARIABLES | Labor Productivity | Labor Productivity | |
| | | | |
| ESG Score | 3.478** | | |
| | (2.38) | | |
| G Score | | 0.811*** | |
| | | (4.20) | |
| Constant | -101.153*** | -123.740*** | |
| | (-4.93) | (-9.37) | |
| | | | |
| Observations | 8,065 | 16,023 | |
| R-squared | 0.08 | 0.1 | |
| Firm Fixed Effect | Yes | Yes | |
| Time Effect | Yes | Yes | |
| Controls | Yes | Yes | |
| Number of Firms | 1,049 | 1,593 | |



Potential Determinant

- Financial constraint
- Whited and Wu's (2006) financial constraint measure is constructed (WW)
- WW is divided into quartile
 - Firms in the lowest quarter are financially unconstrained
 - Firms in the highest quarter are financially constrained



| | Unconstrained | Unconstrained | Constrained | Constrained |
|-------------------|--------------------|--------------------|--------------------|--------------------|
| VARIABLES | Labor Productivity | Labor Productivity | Labor Productivity | Labor Productivity |
| ESG Score | 5.203** | | -2.469 | |
| | (2.55) | | (-0.58) | |
| G Score | | 0.646** | | -0.362 |
| | | (2.29) | | (-1.01) |
| Constant | -169.295*** | -211.733*** | 206.383 | -29.583 |
| | (-4.70) | (-7.44) | (1.01) | (-0.97) |
| | | | | |
| Observations | 4,776 | 6,523 | 1,421 | 5,141 |
| R-squared | 0.03 | 0.05 | 0.07 | 0.13 |
| Firm Fixed Effect | Yes | Yes | Yes | Yes |
| Time Effect | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Number of Firms | 737 | 845 | 365 | 979 |



Conclusion

1. ESG affects firm productivity through the labor market (Short-run)

2. Financial constraint affects the relationship between ESG and labor productivity

- Already financially constrained firms do not benefit from higher ESG performance while unconstrained firms do



