European Commission

# CONCORDi 2021

## Industrial innovation for competitive sustainability

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**The effect of Board Gender Diversity and Environmental Responsibility on Innovation: Evidence from the Top-Patenting Firms**.

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# Motivations

- Firms and stakeholders alike have been placing increasing importance on having more women in leadership positions such as the board of directors.
- Firms also face increasing pressure to address climate change and care of the environment by being more environmentally responsible.

# Theoretical framework

H1: Board Gender Diversity has a positive effect on Innovative Output.

H2: Environmental Responsibility has a positive effect on Innovative Output.

H3: Board Gender Diversity moderates the relationship between a firm's Environmental Responsibility and its Innovative Output, such that the positive effect of Environmental Responsibility on Innovative Output will be stronger for firms with higher Board Gender Diversity.

# Data and Method

- CSR, financial, and demographic data were from the Thomson-Reuters Eikon Database.
- Innovative output was collected from the United States Patent and Trademark Office (USPTO), which produced a list of the top-patenting organizations (2007-2015).
- Data on the board of directors was collected from the BoardEx database.

→ ***After counting for missing information and other problematic entries, the final merged data consisted of 895 firm-year observations on 160 unique firms, which reported patents in the US between 2007 and 2015.***

# Data and Method

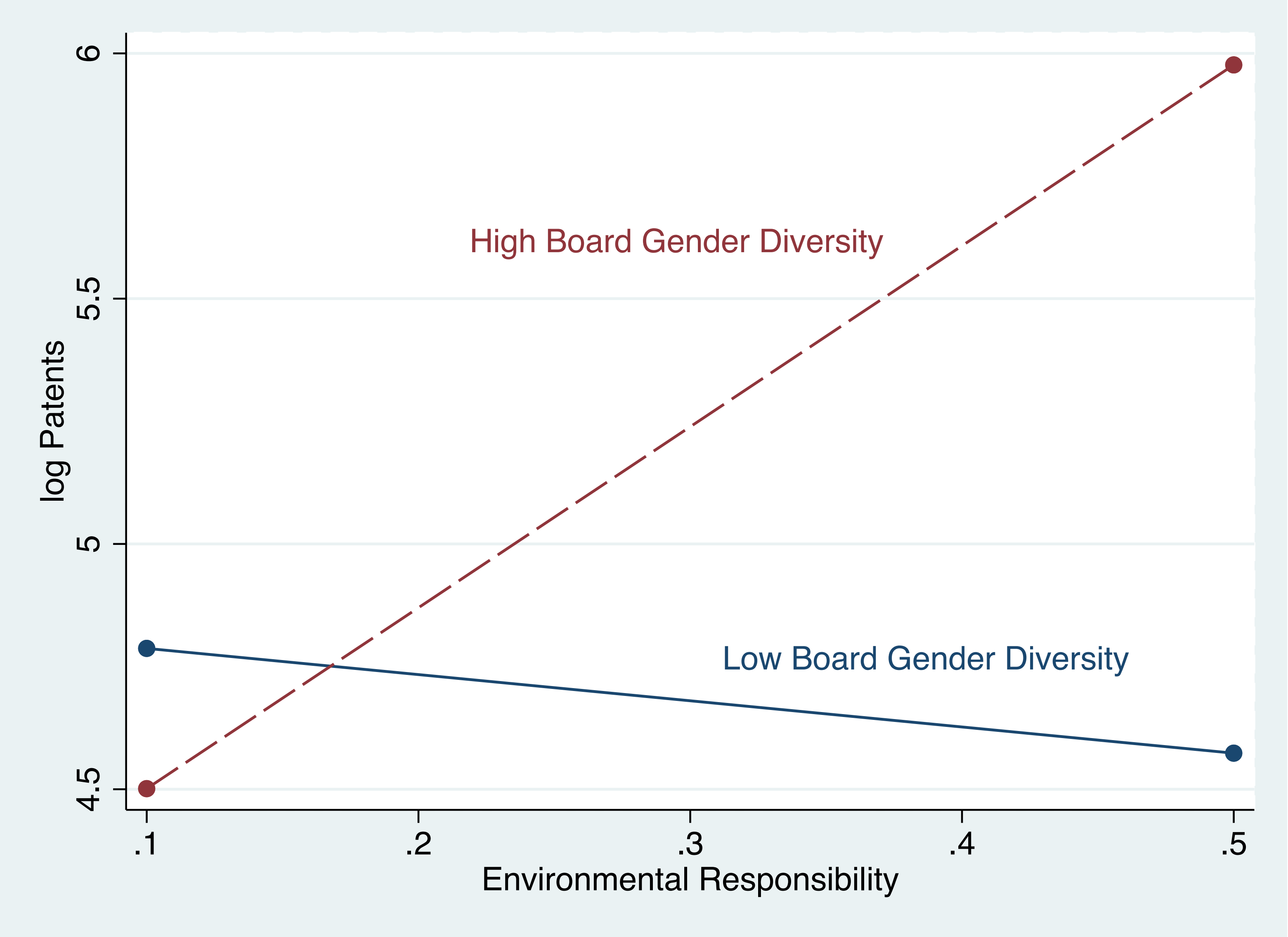
**Main Variables:**

- **Innovative Output:** log(Patents).
- **Board Gender Diversity (BGD):** the proportion of each company's board of directors that are women,
- **Environmental Responsibility:** measured by the Environmental Pillar Score from the Thomson-Reuters' Environmental, Social, and Governance (ESG) Scores.

# Table 1 Truncated regression of Innovative Output. Independent variables are lagged by one year.

| | (1) | (2) | (3) |
|---|---|---|---|
| BGD | | **1.428*****  | **-3.203*** |
| Environmental Responsibility | | **1.752**** | **-1.219** |
| BGD × Environmental Responsibility | | | **19.586***** |
| Social Responsibility | 0.930 | -0.102 | 0.0572 |
| Governance Responsibility | 1.838* | 1.282 | 1.020 |
| ESG Controversies | -0.196 | -0.179 | -0.261 |
| Number of Directors | -0.150*** | -0.153*** | -0.144*** |
| Return on Assets | 0.0184*** | 0.0172*** | 0.0157*** |
| Log of Total Assets | 0.790*** | 0.743*** | 0.725*** |
| R&D Intensity | 6.461*** | 6.331*** | 5.996*** |
| Manufacture | -0.246** | -0.202* | -0.211** |
| Non-US Headquarters | 0.860*** | 0.932*** | 0.940*** |
| IMR | 0.128 | 0.139 | 0.137 |
| Constant | -12.88*** | -12.04*** | -10.94*** |
| sigma | 1.012*** | 1.007*** | 0.996*** |
| Log likelihood | -998.735 | -988.413 | -984.244 |
| Wald chi2 | 394.49 | 412.82 | 432.58 |

# Figure 1 Interaction plots for BGD and Environmental Responsibility.



- We expand the scope of performance implications beyond financial measures in general and specifically to innovation.
- We argue that both BGD and Environmental Responsibility should be considered when assessing the impact of corporate social responsibility on firm performance.
- While most literature considers corporate social responsibility in aggregate, our results indicate that a more accurate and nuanced understanding requires disaggregating Environmental, Social, and Governance Responsibility.

- Much of the research on the impact of firm characteristics on Innovative Output has focused on firm-level financial measures. A major contribution of this paper is to encourage researchers to look at non-financial firm performance metrics. Here, we used innovation as a metric of firm effectiveness, but our results raise the possibility that other measures be considered as well.

- While higher BGD may have internal benefits on the workforce, we show here a direct link between BGD and firm performance in terms of innovative output.

- Being more environmentally responsible is often seen as a something that is admirable and necessary, but also potentially detrimental to firm performance.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