# **Appendix A. Measurement of control variables**

Drawing on prior literature (Liu et al., 2023; Chang et al., 2024), this paper accounts for additional variables that might affect a company's carbon emission intensity. These variables include firm size (*SIZE*), financial leverage (*LEV*), return on assets (*ROA*), sales growth rate (*SGR*), cash ratio (*CASH*), firm age (*AGE*), CEO duality (*DUAL*), institutional ownership (*INST*), the proportion of independent directors (*IDR*), and board size (*BSIZE*). The specific definitions are provided in Table A1. The reasons for selecting this series of control variables are as follows:

First, firm size (*SIZE*) may affect both the total volume and intensity of emissions. On the one hand, larger firms tend to have more resources available for environmental investment; on the other hand, their production scale may generate higher emissions. Therefore, it is necessary to control for size effects. Financial leverage (*LEV*) reflects a firm's debt pressure and financial risk. Highly leveraged firms may be more inclined to cut non-core expenditures, including environmental spending. Return on assets (*ROA*) captures profitability, which may enhance a firm's capacity to afford environmental costs and respond positively to policy incentives. Sales growth rate (*SGR*) reflects the firm's development stage and expansion speed; fast-growing firms may face resource constraints or engage in more emission-intensive operations.

Second, the cash ratio (*CASH*) measures short-term liquidity, which can affect a firm's ability to invest in green technologies. Firm age (*AGE*) captures organizational maturity and long-term presence in the market. More mature firms are likely to have more developed management systems and higher institutional adaptability, which may facilitate compliance with environmental regulations.

Finally, in terms of corporate governance, we include CEO duality (*DUAL*), institutional ownership (*INST*), the proportion of independent directors (*IDR*), and board size (*BSIZE*). A well-structured governance system may encourage a long-term perspective and stronger engagement in environmental responsibility. For example, CEO duality may lead to more centralized decision-making, potentially reducing oversight over environmental investments. In contrast, institutional investors and independent directors are often seen as external governance forces that can strengthen firm accountability in environmental and social practices.

In sum, including these variables helps reduce potential omitted variable bias and improves the robustness of our DID estimates of the policy effects.

 **Table A1. Variable definitions**

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| **Variable** | **Variable definition** |
| *SIZE* | The natural logarithm of total corporate assets |
| *LEV* | The ratio of total liabilities to total assets |
| *ROA* | The ratio of EBIT to total assets |
| *SGR* | The growth rate of corporate revenue |
| *CASH* | The ratio of cash and cash equivalents to total assets |
| *AGE* | The natural logarithm of the firm's age |
| *DUAL* | A dummy variable for CEO-Chairman duality. Which is set to 1 when the positions of chairman and general manager are held by the same person, and 0 otherwise. |
| *INST* | The ratio of institutional shareholding to total shares outstanding |
| *IDR* | The proportion of independent directors on the board |
| *BSIZE* | The natural logarithm of the number of the company's board of directors |