Supplementary Material

**Paper Title:** Research on the Carbon Emissions Reduction Effects of China's Digital Economy: Moderating Role of the National Big Data Comprehensive Pilot Zone Policy

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**Abstract:**

The rapid growth of the digital economy brings significant potential to accomplish the “dual carbon” objectives in both China and the global economy. Fully considering how digital economy lowers emissions of carbon dioxide is critical for promoting high-quality economic growth. The research, from multiple dimensions of “production-side”, uses 30 provincial-level samples from 2012 to 2022 in China to systematically analyze the influence of the digital economy on carbon emissions, comprising the scale, structural, and technological effects. Additionally, it examines how the National Big Data Comprehensive Pilot Zone (NBDCPZ) policy influences the digital economy's role in carbon emissions. According to the findings of this paper: 1) Digital economy has a key role in lowering carbon emissions. The heterogeneity analysis shows that it is more effective in translating the digital economy's influence for lowering carbon emissions in eastern regions, and the reduction effort is more obvious in regions with abundant energy resources and higher digital economic development. 2) On the production-side, the mediating effects caused by technological progress and structural upgrading decrease emissions of carbon, while the mediating effects of scale expansion promote carbon emissions. The sum of former two effects outweighs the latter. 3) The moderation effect test reveals that the NBDCPZ policy further enhances the prohibitive influence of the digital economy on emissions. As nations all around the world placing a greater emphasis on sustainable development, this research provides understanding about how the digital economy achieves emission reduction targets.

**Keywords:**

Digital economy, Carbon emissions, Production-side, National Big Data Comprehensive Pilot Zone policy, Mediating effect, Moderating effect

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