

## Heterogeneous Impacts of Population Age Structure on Carbon Emissions

**Authors :** Jun-Jun Jia, Li Luo, Jinlan Ni, Chu Wei

**Abstract :** This paper investigates the impact of population age structure on carbon emissions in China. Using panel data from 30 provinces in China spanning from 1997 to 2020, the study estimates the heterogeneous effects of the working-age population (aged 15-64) on carbon emissions. The IV-MuGS-OR model is proposed to address the endogeneity and accommodate latent group structures in cross-sectional effects and slope coefficients. On average, across the 30 provinces, a one percentage point change in the working-age population share can lead to a 3.22% change in carbon emissions. However, the overall average impact varies significantly across the three identified heterogeneous groups of provinces, which differ from traditional classifications. A shrinking working-age share tends to reduce carbon emissions in provinces with high average carbon emissions while it increases emissions in provinces with median-level emissions. No significant impact is observed in provinces with low levels of carbon emissions. These findings suggest that varying policy intensities are crucial, given the heterogeneous impact of the working-age population share on carbon emissions across different emission levels.

**Keywords :** working share, carbon emissions, IV-MuGS-OR, heterogenous impacts, population aging, China

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