Assessing the impacts of fertility and retirement policies on China's carbon emissions

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Mitigating climate change and coping with population aging are both critical goals for China in achieving sustainable development. As the world's largest carbon emitter, China aims to have a carbon emissions peak before 2030 and achieve carbon neutrality by 2060. Currently, China is turning toward more sustainable development, as evidenced by the deceleration in annual carbon emissions growth from 10% (2000-2010) to 2% (2010-2020). However, China remains an important driver of global carbon emissions due to its large population and growing household consumption over the past two decades. Moreover, China is one of the most populous countries in the world, with a population that is nearing its peak and aging rapidly. In 2020, China's total fertility rate was only 1.3 births per woman, which is far below the replacement level (2.1) needed for a stable population. At the same time, China is aging rapidly, with the proportion aged 65 years and above doubling from 7% in 2000 to 14% in 2020. To address these challenges, China has implemented national strategies such as relaxing fertility policies and delaying retirement age.

The gradual adjustment of fertility and retirement policies in China has social benefits in terms of coping with population aging. However, the environmental consequences of these policies remain ambiguous. While numerous studies have estimated the impact of population aging on carbon emissions in China, few have assessed the impacts of policies that address population agingâ€”including fertility (particularly the three-child policy) and retirement policiesâ€”on carbon emissions or household carbon footprints. Thus, we aim to address this gap in the literature. In this study, we investigate age-based household carbon footprints in China and its provinces by using a global multiregional input-output (MRIO) table and employing a large-scale household survey (China Family Panel Studies, CFPS). We then estimate the population of China and its 31 provinces up to 2060 by age (0-100+) and sex (male and female) under different fertility policies: previous two-child policy, the latest three-child policy, and the assumed "replacement-level" policy (with fertility rate reaching the replacement level of 2.1). Finally, we explore the potential effect of these fertility policies and their combination with retirement delay policies on the household carbon footprints.

We find that Chinese young people have relatively higher household carbon footprints than their older counterparts due to differences in income by age group. Relaxing fertility policies and delaying retirement age are associated with an increase in population (and labour supply) and thus increases in household carbon footprints, with a majority of these increases from the fertility side. Our result provides evidence of interactions between the policies targeting population aging and climate change, highlighting the importance of synergising these two types of policies. In addition, although fertility and retirement policies may pose a challenge to China's carbon emission mitigation, these policies (particularly those for retirement delay) can considerably lower the dependency ratio and thus improve the demographic dividend. In sum, our results add to the literature on climate change and population, which has typically evaluated the effect of demographic structure on emissions without considering the independent effect of population policy (especially in China) that contributes to bringing about the change in demographic structure in the first place. Our results also offer insights for developing countries undergoing economic and demographic transformation for more sustainable development.