

The Effect of Human Capital on CO₂ Emissions: Macro Evidence from China

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Rapid accumulation of carbon dioxide (CO₂) has alarmed the catastrophic consequences of global warming. Despite the collective efforts by international communities, the potential of growing CO₂ emissions remains strong. As the top CO₂ emitter in the world, China and its strategy and path toward CO₂ abatement have attracted considerable attention in both policy and academic circles. While promising, the abatement target pledged by the Chinese government is also ambitious. To cut carbon intensity by 60 to 65 per cent from the 2005 level before 2030, China needs to reduce it annually at 4.2 per cent which is above the pre-2014 rate (1.49 per cent) by almost three percentage points.

Until now, a conventional solution like command-and-control remains the fundamental tool for the Chinese government to reduce various emissions. Their limited effect, however, is generated at the expense of substantial economic losses along with the unwanted market distortion at the regional level. Given China is an authoritarian state still riddled with red tape, the efficiency and effectiveness of those regulation-based tools are further constrained. Their market-based counterparts are expected to fill the void. However, available instruments like carbon tax and emission trading scheme (ETS) are still at the early stage and yet to be fully implemented, making their efforts on abating CO₂ emissions marginally at best.

With this backdrop, we examine whether investing in human capital could be used to facilitate carbon reduction without distorting economic growth much. We do recognize that human capital is not necessarily the only or the most important way for abating carbon emission. Nevertheless, we believe this study improves our understanding of social benefits associated with human capital accumulation, extending them to the perspective of environmental protection.

We take the advantage of recently-released CO₂ emissions data and construct a provincial panel spanning the period 1997–2016 to study the association between human capital and CO₂ emissions. We perform regression analysis and find a negative and significant association between human capital and CO₂ emissions. Importantly, since we have employed a set of human capital proxies differed by age and qualification, we are able to reveal heterogeneous human capital–CO₂ emissions nexus. We show their negative association is due to human capital embodied in workers aged between 25 to 44 and workers with tertiary education. Finally, we analyse mechanisms underlying our established results using disaggregated CO₂ emissions by energy sources and end emitters. We find the negative association is manifested through technology effect and the improvement in energy efficiency. These mechanisms are limited to the production sector and are absent in the household sector.

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Our finding suggests a promising avenue for abating carbon emissions without impeding economic growth. Specifically, schools may consider teaching long-term impacts associated with pollution to improve students' environmental awareness from the very beginning. On the production side, financial incentives should be offered to enterprises which provide energy/environment related training to their employees. For those firms in high energy/pollution intensity industries, they should recruit more professionals to innovate their production practices toward an environmentally-friendly way. Although this study finds that human capital fails to reduce pollution in the household sector, it points out an avenue for the Chinese government to exert more efforts. For instance, the public campaign should be promoted to strengthen households' environmental awareness which cautions them from damaging the environment. Meanwhile, the financial incentive should be placed on encouraging renewable energies or energies with less environmental impacts.