



## Distinguishing Capital Investment and Consumption of Material Footprint: A Comparative Analysis between Subnational China and Other Nations

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Economic prosperity is vital to human development, but heavy reliance on material extraction leads to environmental degradation. To successfully decouple growth from degradation, the main drivers of material footprint (MF) must be identified. Here, we focus on MFs in Chinese provinces as well as emerging economies in a global context. We employ a local-global input-output model that considers trade and classified investment/consumption to evaluate the relationship between MF and the Human Development Index (HDI). The results show that China's growing MFs exhibit different development trajectories. While GDP and Human Development Index (HDI) are generally correlated with MFs, some low-income provinces in China have higher MFs per capita than some affluent provinces and advanced economies. We find that capital investments related to buildings, infrastructure, and equipment in China explain the complexity. To explain this further, we distinguish between consumption-driven and investment-driven MFs. We demonstrate the different roles of consumption and investment in the physical economy. An interesting finding is that consumption-driven MFs are generally associated with HDI across Chinese provinces and countries, but investment-driven MFs are not. Such trends are also observed in some developing economies. Capital investment shapes the different trajectories of MFs in rapidly industrializing economies. Given the large infrastructure gaps in emerging economies and post-pandemic investment plans, these underline the need to consider the broader sustainability implications of future investment plans. The concept that investigating different roles of investment- and

consumption-associated footprint in input-output framework suggests that modeling future MFs, especially in rapidly industrializing countries, requires a more sophisticated framework. Taking capital investment and stocks formation into the general modeling is important. We conclude by asking two open questions: (1) Does the development of consumption-driven and investment-driven MFs across countries follow a paradigm where the early process of development is high-infrastructure MFs, and then shifts to higher consumption MFs as capital stocks build up? (2) How much investment does an economy need to maintain healthy and green growth?