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Against the backdrop of the accelerated spread of the global green economy, environmental issues have become an important focus of international cooperation platforms, providing a favourable opportunity for China to explore effective and sustainable development paths in the green transformation stage. Existing research has limitations in the empirical study of the operating mechanisms of financial agglomeration, trade openness and green total factor productivity (GTFP), which are manifested in the incomplete theoretical framework and the supplementation of empirical methods. Based on China's provincial panel data from 2008 to 2021, this paper adopts a two-way fixed effect model and a two-stage system generalized method of moments (GMM) model to empirically test the impact mechanism of financial agglomeration and trade openness on GTFP from a static and dynamic perspective. The results show that financial agglomeration and trade openness have a positive impact on GTFP, which is manifested in a significant improvement in green efficiency progress (GEC) and an insignificant improvement in green technology progress (GTC); financial agglomeration promotes trade openness, and trade openness promotes financial agglomeration. Trade openness plays a partial mediating role in the impact of financial agglomeration on GTFP. The empirical research of this paper has passed the robustness test and endogeneity test. The results of heterogeneity analysis show that the agglomeration of the securities industry has a positive impact on GTFP, while the agglomeration of the banking and insurance industries has a negative impact; through a comparative analysis of the traditional industrialization stage and the new industrialization stage, it can be seen that the role of trade openness in promoting GTFP in the new industrialization stage is significantly stronger than that in the traditional industrialization stage. This study deeply explores the internal mechanism of financial agglomeration and trade openness driving the green and sustainable development of the economy, further improves the theoretical system in related fields, and provides a solid theoretical foundation and practical strategy for the government to build a green and sustainable development strategy.

**Key words:** financial agglomeration, green total factor productivity, heterogeneity, trade openness, two-step system GMM

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