

Incremental Input-Output Analysis and Empirical Study of Structural Change in China

Topic: Input-output Modelling and Supply Chain Resilience (I)

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Abstract: The input-output methodology pioneered by Leontief has achieved remarkable results in national economic accounting, analyzing industrial structures, industrial chains, value chains and policy simulation. However, its static nature limits its applicability to analyzing structural change and identifying its underlying determinants.

The incremental input-output table is obtained by subtracting the base-period input-output table at constant prices from that of the reporting period, serving as a compact representation of economic dynamics. The concept of marginal (incremental) input coefficients was first introduced by Tilanus in 1967, while the compilation methodology for incremental input-output tables was subsequently proposed by the Chinese scholar Li Guozhang in 1995. However, theoretical progress has been slow due to several challenges: the incremental model is not a non-negative matrix; the computation of incremental coefficients yields multiple results with difficult economic interpretations; and questions regarding whether the incremental inverse matrix exists remain unresolved. In 2025, Song Hui and colleagues preliminarily established an analytical framework for incremental input-output analysis, demonstrating the de facto existence of the incremental inverse matrix, though methodological refinement remains necessary.

Building upon existing research, this paper theoretically refines the incremental input-output analysis framework and proposed fundamental judgment methods and pathways for its application. This includes: four types of incremental input and allocation coefficients along with six patterns of input-output efficiency changes; four types of incremental net income contribution coefficients along with six patterns of cost-benefit variations; and calculation methods for incremental influence and sensitivity coefficients. Empirically, using China as a case study, through the unified classification of input-output tables of different years in 2010, 2012, 2015, 2017, 2018, 2020 and 2023, the matrix conversion (MTT) method is used to compile an interpolation table, and the actual published index and the theoretical price model are combined to compile the price index to form a comparable price input and output table. From this, China's incremental input-output sequence table from 2010 to 2023 is constructed, enabling systematic analysis of input combination quality and output efficiency during this period. The results reveal that the quality of input combinations across China's economic sectors has improved, the pattern of economic growth has shifted from extensive to intensive, economic expansion has demonstrated considerable resilience, and both economic structure and development quality have been significantly enhanced.

The empirical findings demonstrate that the incremental input-output analytical framework possesses substantial explanatory power regarding structural economic transformation, is capable of illuminating the complex and multifaceted drivers of sectoral incremental variations and technological progress, and constitutes a significant theoretical advancement in input-output analysis.