

# A New Skyline Chat Model for Global Value Chain Analyses

Topic: Structural Change and Dynamics

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Over half a century ago, Leontief (1963) introduced the Skyline Chat, an innovative input-output based structural analysis tool designed to analyze and visualize a country's industrial structure, trade dependency, and economic self-sufficiency over time, with explicit consideration of production propagation effects along domestic inter-industrial networks. Since its inception, numerous applications and extensions of Skyline Chat have been utilized for economic structure analyses. However, the rise of global value chains (GVCs) presents significant challenges for traditional Skyline Chat analyses in accurately capturing the complexities of economic globalization.

This paper addresses these challenges by identifying three primary limitations of the conventional Skyline Chat model:

- 1) The reliance on gross term measures, which leads to double counting issues due to the treatment of intermediate inputs. For example, conventional Skyline Chat uses output share rather than value-added share by sector to measure industrial structure, and gross term exports and imports rather than trade in value-added to measure trade dependency.
- 2) The use of a single national input-output model, which treats exports and imports of intermediates exogenously, thereby failing to capture the full extent of foreign interdependencies through complex GVCs.
- 3) The focus on country-sector level analyses, which overlooks the role of multinational enterprises (MNEs) as key organizers and players in GVCs.

To overcome these limitations, this paper proposes a new Skyline Chat model based on the OECD AMNE inter-country input-output tables. This model incorporates trade in value-added measures within the GVCs accounting framework, effectively addressing the double counting problem in assessing industrial structure, trade dependency, and self-sufficiency. Empirical results indicate that the conventional Skyline Chat model over- or under-estimates trade dependency and self-sufficiency for more than half of the 70 economies covered in the OECD data by approximately 10-30%. This discrepancy is particularly pronounced in sectors dominated by MNEs compared to domestically owned firms.

Furthermore, leveraging the dual relationship between value-added and final demands (where a country's total value-added equals its total final demands), this paper extends the trade in value-added based Skyline Chat model to measure final demand structures. Additionally, the dual Skyline Chat models are applied to carbon emissions footprint analysis, offering a novel tool to visualize production versus consumption-based emissions accounting, while considering a country's energy supply and demand structure, foreign dependency, and self-sufficiency in a consistent manner.