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The Industrial Reorganization of US Agriculture as Reflected in Input-Output Accounts

Yicheol Han

Post-Doctoral fellow

Northeast Regional Center for Rural Development; National Agricultural and Rural Development Policy Center, Pennsylvania State University

7G Armsby, The Pennsylvania State University, University Park, PA 16802-5602, USA

yuh14@psu.edu

Stephan J. Goetz

Professor

Northeast Regional Center for Rural Development; National Agricultural and Rural Development Policy Center, Pennsylvania State University

Department of Agricultural Economics and Rural Sociology, Pennsylvania State University

207-C Armsby, The Pennsylvania State University, University Park, PA 16802-5602, USA

sgoetz@psu.edu

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The Industrial Reorganization of US Agriculture as Reflected in Input-Output Accounts

Introduction

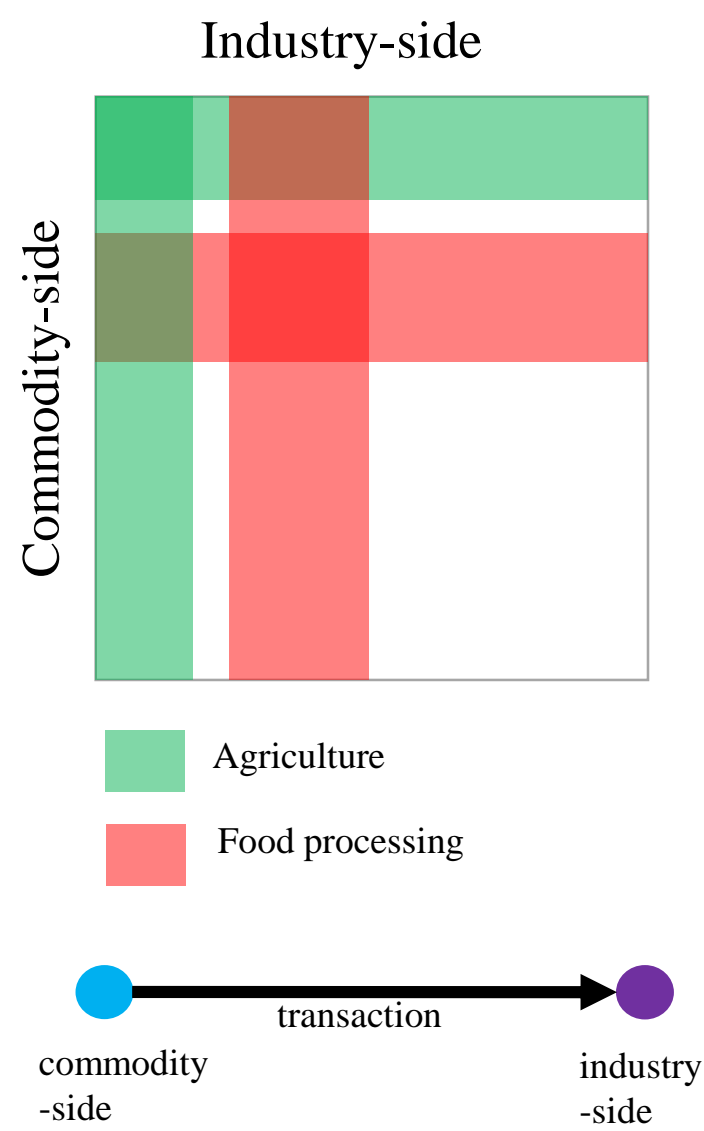
- Industries develop in rapid bursts that follow from economic innovations.
- Economic activities of industries reorganize over time to assimilate economic innovations and environmental changes optimally, so that the industries continue to secure maximum profits.
- Economic activities of a sector (industry) are reflected in the economic input-output accounts (IO account), which for each sector show purchases from and sales to other sectors.
- The IO table can be regarded as a network in which economic sectors are nodes and the flows of commodities or transactions between sectors are edges.
- Social network analysis can be applied to the IO table.
- The purpose of this study is to examine when and how agriculture has undergone changes within the US, through a social network analysis of agricultural activities in the IO table over time.

Method and Data

- Analyze the reorganization of agriculture through social network analysis

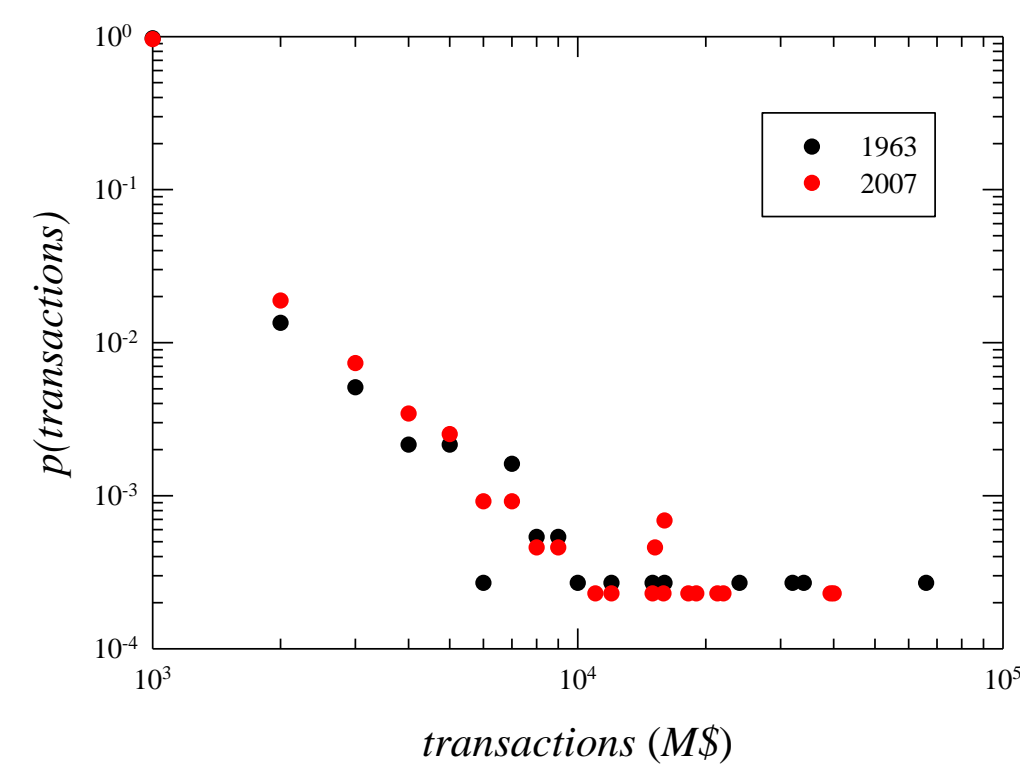
centrality	description	equation
strength	The amount of transactions	$\sum_i \sum_j w_{ij}$
entropy	The diversity of transactions	$\sum_i \sum_j p_{ij} \log p_{ij} / \log N, \quad p_{ij} = \frac{w_{ij}}{\sum_s \sum_t w_{st}}$

- Historical Input-Output Accounts are used
 - 1963-2007 Benchmark IO Accounts from BEA
 - 1993-2012 Annual IO Accounts from BLS
 - Prices adjusted by the Consumer Price Index



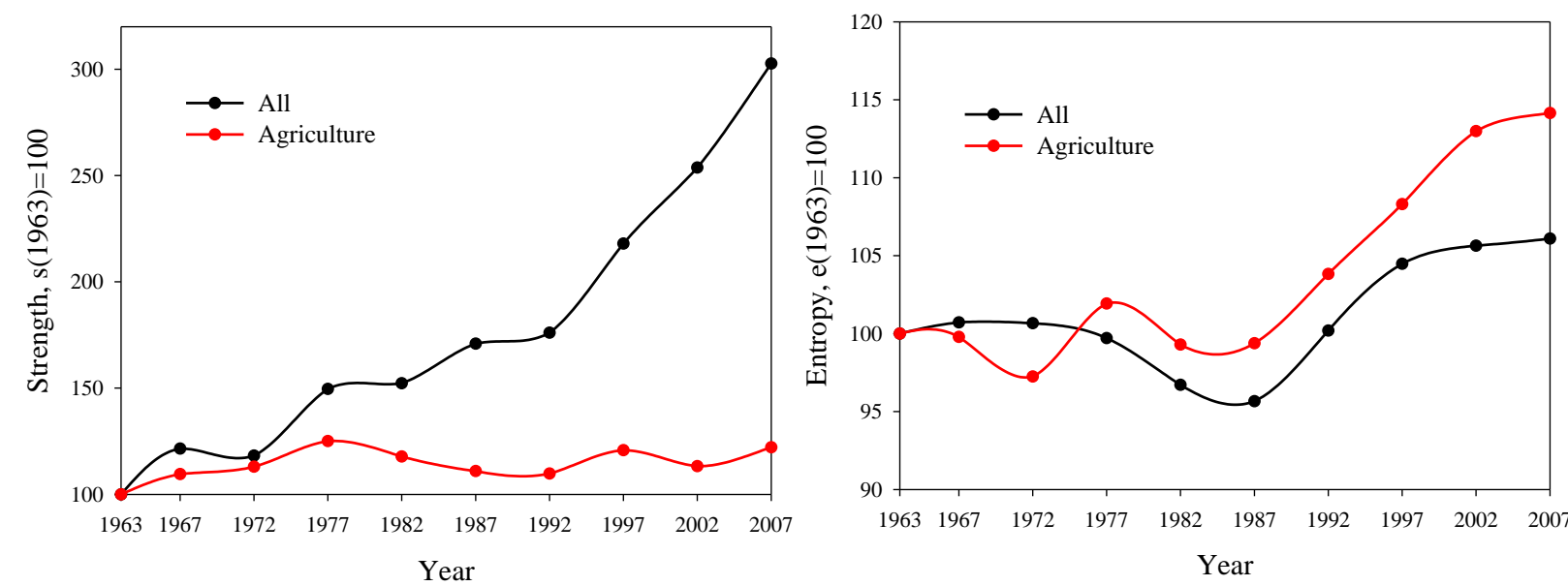
Results

Weight distribution



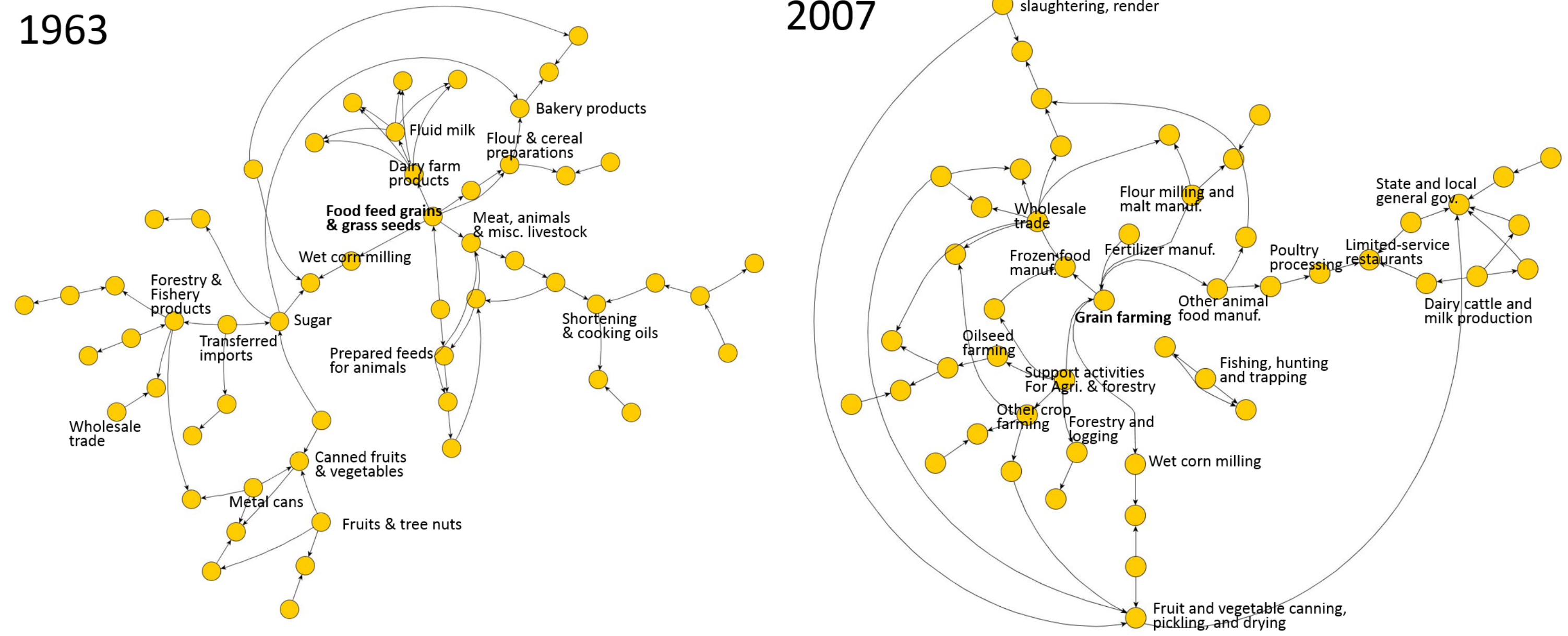
- Agriculture is a scale-free network
 - Most small transactions and a few large transactions between industries
- Agriculture has become resilient
 - Total transactions are increased 21% while the largest transaction is decreased 40 %
 - Transactions of agriculture in 2007 are more diverse than those in 1963.

Centrality changes



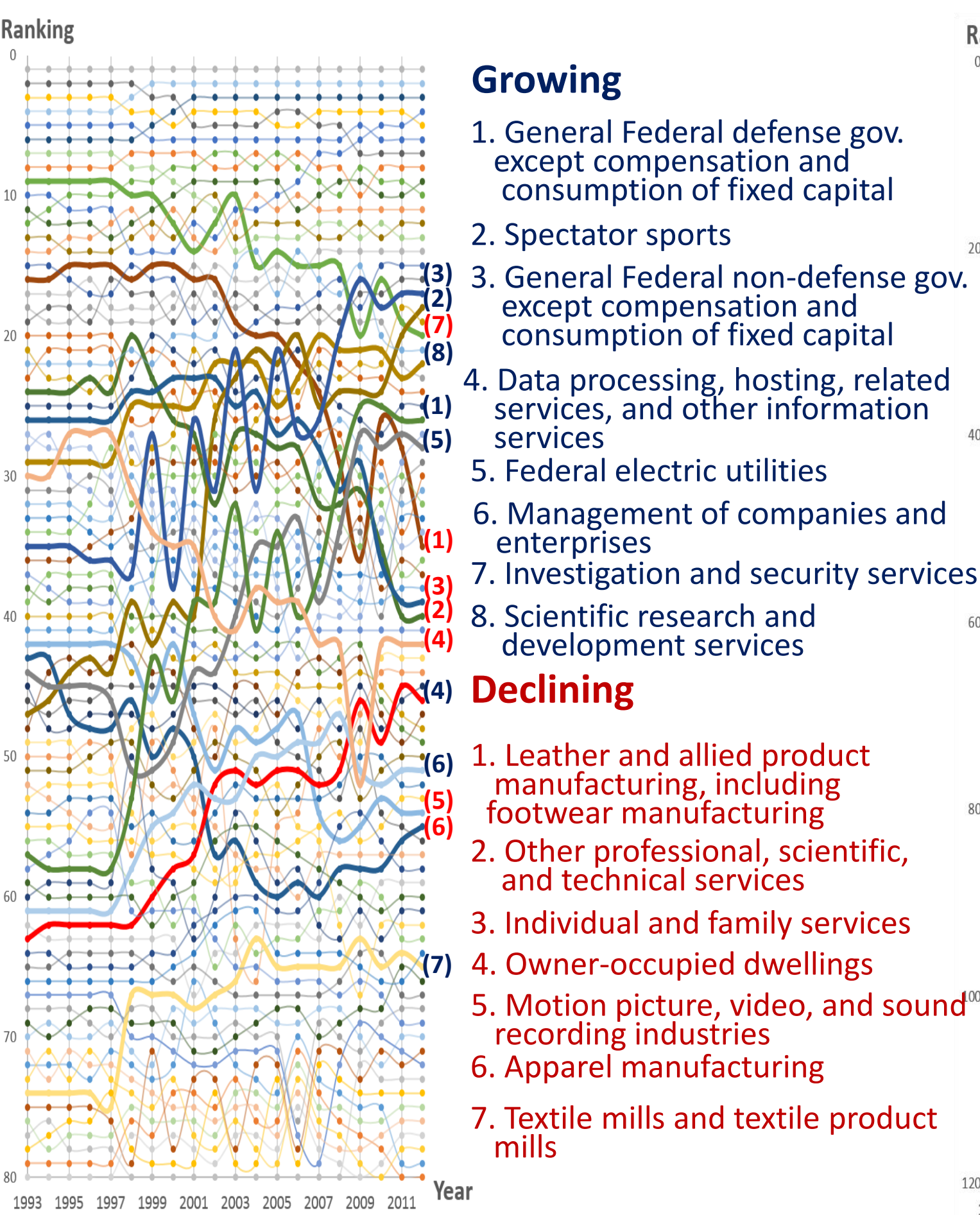
- Economic size of agriculture has not increased compare to that of all economy.
- But, agriculture experience rapid changes in 1972, 1977, 1987 (the first and second oil crisis, computer industry)

Backbone of Agriculture in the IO network

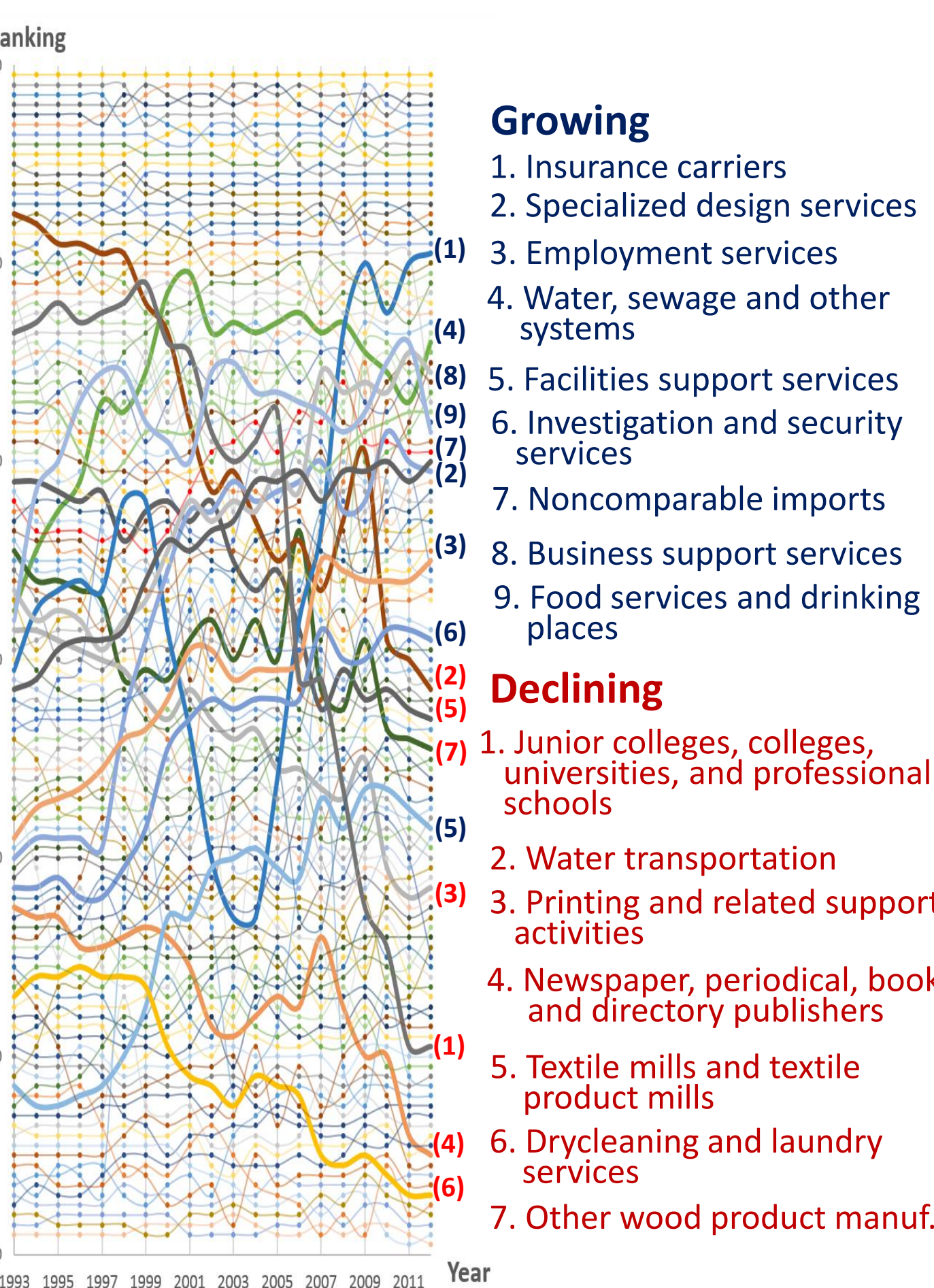


Selling and purchasing changes

Selling-side



Purchasing-side



Conclusion

- Agriculture has become resilient with diverse transactions between industries.
- The major changes were initiated in 1997-1998.
- Agriculture sells more products to government, sport, IT and R&D industries, while purchasing more commodities from service industries.