

A new interrelatedness indicator to measure economic complexity, with an application to the Portuguese Case

João Carlos Lopes; J. F. Amaral; J. Dias

ISEG – UTL

Draft: do not quote without permission

Paper to be presented at:

Fifteenth International Input-Output Conference
Renmin University of China, Beijing, China
27 June– 1 July 2005

Abstract:

This paper is about economic complexity, treated as interrelatedness between the parts or sectors of an economy, particularly one represented by an input-output system. The complexity indicator proposed capture two relevant features of interrelatedness that can be separately measured: a dependency effect and a network effect. This indicator can be used in two contexts: the direct connections given by the technical coefficient matrix, A and the total (direct plus indirect and induced) effects given by the Leontief inverse, $(I-A)^{-1}$. The first results of an empirical application to the Portuguese Case are presented, covering the period 1980-1999.

JEL Classification Codes: C67, D57

Keywords: economic complexity, input-output analysis

1. Introduction

This paper is about economic complexity, treated as interrelatedness between the component parts or sectors of an economy, particularly one represented by an input-output system.

In a previous paper - see Amaral et al(2005) - we develop a new measure of connectedness of an input-output system that can be particularly useful to quantify complexity as interdependence, and we apply it to some countries belonging to the Input-Output OECD database.

In this paper we present the first results of an application of this indicator to the Portuguese input-output (domestic transactions) tables for the years 1980 and 1999.

2. Complexity indicator

For a detailed exposition of the complexity indicator used in this paper, see Amaral et al(2005).

3. Application to the Portuguese Case

In table 1 we present the results of the application of our method of measuring complexity to the Portuguese economy in the years 1980 and 1999, with two levels of aggregation: 5 sectors and 17 sectors.

We quantify complexity as interdependence in two related but diverse contexts: the direct connections given by the technical coefficient matrix, A ; the total (direct plus indirect and induced) effects given by the Leontief inverse, $(I-A)^{-1}$.

Table 1: Complexity as interdependence of the Portuguese Economy

	A		$(I-A)^{-1}$	
	1980	1999	1980	1999
5 Sectors	0.7612	0.6491	0.3884	0.3454
17 Sectors	0.7744	0.7090	0.3638	0.3558

The main conclusions are:

i) the diminishing complexity in a period of strong growth and development of the Portuguese Economy, at both the direct and total effects levels, which is a somewhat surprising result

ii) the general increase in complexity when the number of sectors grow, which is an expectable result, but has an exception in the case of total effects connections, year 1980

iii) the strong decrease in complexity when we move from direct connections to total connection, which is also expectable and has no exceptions.

Conclusion

Although pointing to a decreasing complexity as interdependence in the period 1980-1999, one of rapid growth and structural change in Portugal, the first results of this empirical research need to be carefully examined and we plan to do so in the immediate future.

Reference

Amaral J., Dias J., Lopes J., 2005, “Complexity as Interrelatedness: An intersectoral approach”, Paper presented at the 15th International Conference on Input-Output Techniques, Renmin University of China, Beijing, China, June 27 to July 1, 2005

Annex

Table A1: 17 sectors

- 1 Agriculture, mining & quarrying
 - 2 Food, beverages & tobacco
 - 3 Textiles, apparel & leather
 - 4 Wood and paper
 - 5 Chemicals, drugs, oil and plastics
 - 6 Minerals and metals
 - 7 Electrical and non-elect. equipment
 - 8 Transport equipment
 - 9 Other manufacturing
 - 10 Electricity, gas & water
 - 11 Construction
 - 12 Wholesale & retail trade
 - 13 Restaurants & hotels
 - 14 Transport & storage
 - 15 Communication
 - 16 Finance & insurance
 - 17 Other sectors
-

Table A2: 5 sectors

- 1 Agriculture, mining & quarrying
 - 2 Traditional manufacturing (Food, ...; Textiles, ...; Wood...)
 - 3 Other manufacturing
 - 4 Utilities and construction
 - 5 Services
-