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NATIONAL INPUT-OUTPUT TABLE OF BRAZIL¹

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Abstract: This paper reports on the basic information about the Brazilian input-output tables. First part presents the history of constructing I-O tables in Brazil, starting from the non-official table of 1959. The second part illustrates some basic features of the last table with the reference year of 2005. It also articulates the issues concerning the integration of the table into 2005 BRICS International Input-Output Table.

1. Introduction

In the view of constructing I-O tables, Brazil is relatively young in its experience compared to other countries of the similar development stage. Only after the 1970s when the Brazilian Institute of Geography and Statistics (IBGE) took its leading role to construct input-output accounts did the history of official I-O tables begin. However, the Brazilian I-O table developed very rapidly from its outset, and it is now considered to be one of the most advanced statistical series in terms of the data availability, speed of release, and conformity with the international standards.

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2. History

The official (symmetrical) I-O tables of Brazil, together with supply and use tables, are available for the years 1970, 1975, 1980, 1985, 1990, 1991, 1992, 1993, 1994, 1995 and 1996. For the years from 1997 to 2005, only the information about supply and use tables at purchaser prices can be found in the national accounts.

<The 1959 Input-Output Table: The Kick-off>

The first Brazilian I-O table is a non-official data, and it was constructed for the year of 1959. The table was elaborated by the Brazilian Institute of Research in Applied Economics (IPEA), with the coordination of Willy van Rijckeghem (Rijckeghem, 1969) from the University of Gand in Belgium. Intending to deal with the problem of consistency planning of Brazilian economy, the study utilized the data from the 1960 census, covering 32 sectors. This is a symmetrical matrix and appears to be valued at producer's prices.

<The 1970s: The Initial Phase>

In the 1970s IBGE initiated the task of constructing I-O tables for every five years. The construction of I-O tables with the same periodicity as that of census allowed the assembly of a methodological and conceptual foundation, which, in the posterior period in the 1980s, made it possible to integrate the data into the system of national accounts.

The first official I-O table had a reference year of 1970, when economic and demographic censuses were taken in Brazil. Although this work allowed the development of I-O models, it was not completely integrated in the system recommended by the UN System of National Accounts, 1968. The 1970 Brazilian I-O table was first constructed in the form of supply and use tables at basic prices with 87 sectors. The construction of the tables in the framework of supply and use tables at basic prices

became a standard practice for all the I-O tables released by IBGE. The hypothesis to obtain a symmetrical table (industry by industry) and the Leontief Inverse is based on the industry technology assumption.

Besides the I-O data, IBGE also released tables for imports, trade margins, transportation costs and sales taxes on products.

Concerning the concept and the organization structure, the I-O table of 1975 (year of economic censuses) did not undergo substantial modifications in relation to the methodology employed for the 1970 I-O table. Therefore, it was also calculated independently of the national accounts. However, a part of the industrial sectors, final demand and value added categories are more detailed than those in the 1975 table. It covered 123 sectors.

<The 1980s: A Challenge for the International Standards>

Published in 1989, the 1980 I-O table made an important landmark, since it was the first table to be integrated into the UN System of National Accounts 1968. The nine years gap between the reference year and the year of publication suggests that IBGE spent a considerable time and effort to prepare for harmonizing the concepts and definitions with those in national accounts. The 1980 table specified 90 sectors.

It is worthwhile to point out that since 1986 IBGE came to assume the responsibility of calculating the national accounts of Brazil, a task that had been hitherto delegated to the Getúlio Vargas Foundation (FGV). A consequence of this is that the agenda of preparing I-O tables was thereafter aligned with the working schedule of compiling national accounts. Here, the possibility of constructing annual I-O tables emerged, which led to the period of propagation in the 1990s.

The calculation model for the 1985 I-O table accorded to the same methodology for the 1980 table, and also closely integrated into the national accounts. The industrial sectors were more aggregated than those in the 1980 table, covering 42 sectors.

<The 1990s: The Age of Propagation>

Since 1990, tables were produced annually. The last set of I-O tables released by IBGE refers to the year of 1996. The tables for these years are presented as commodity by industry with 42 industries producing 80 commodities. These tables adopted the same treatment of by-products as the 1985 table did, and developed from the national accounts.

This is a complete set of I-O accounts, with separate tables for production, value-added, sales taxes, intermediate and final demands, import tariffs (separate from import values) and margins for both domestic products and imports. The values are given at basic prices for the reference years.

<The early 2000s: A Moratorium>

In preparation for the drastic revision of Brazilian statistical system in coming years, IBGE decided to suspend the publication of symmetrical I-O tables after the 1996 table. However, Guilhoto and Sesso Filho (2005) presented a method of estimating I-O tables by using preliminary data from the national accounts.

The Brazilian national accounts are first presented as a preliminary version in the next year of the reference. IBGE then announces the revision of the Auditors in the second period, and at the end of the third year (reference year + 3) the accounts are released in their final version, from which the I-O table is available. I-O tables, however, add some additional information to the data from the Tables of Resources and Uses of Goods and Services included in the national accounts (on this subject, see Feijó et al., 2001). So, in order to draft I-O tables it is necessary to employ a special estimation method by using the data from the national accounts in their preliminary and first revised versions.

The methodology developed by Guilhoto and Sesso Filho was tested for the reference years of 1994 and 1996. The IBGE official I-O tables (final version) are compared with the estimated matrices using the proposed methodology. The results analyzed refer to: (a) type I production multipliers; (b) Rasmussen-Hirschman backward and forward linkages; and (c) pure backward and

forward linkages. Based on statistical methods (correlation indexes), the results demonstrate that the estimated matrices are similar to the ones released by IBGE. Accordingly, this methodology can be used to estimate Brazilian national I-O tables for the time periods in which only preliminary data are available. The economic structural analysis made with the estimated matrices remains valid for the years analyzed.

Another contributions offered by Guilhoto and his colleagues at the University of São Paulo and FIPE is the estimation of interregional tables at the state and micro-regional levels, and the construction of I-O tables with more sectors than the ones presented by IBGE official tables. For example, if it is important to analyze the sugarcane industry in Brazilian economy, the agricultural sector was disaggregated to enable such an analysis. Or, if we need to study the transportation sector in Brazil, the sector can be stratified in terms of road, rail, water, air, and passenger transportation.

So, through the efforts of Guilhoto and his colleagues, most of his papers, theses and other studies can be used to estimate the I-O tables for the most recent years.

<From 2007 onwards: The New Age of Brazilian Statistics>

In March 2007, there was a dramatic change in the statistical system of Brazil. The IBGE published the results of the new series for the system of national accounts, which changed the year of reference from 1985 to 2000. With the publication of this new series, the IBGE not only improved the national accounts, but also incorporated into its routine a systematic and periodic review of the series of the accounts, thus aligning itself with recommendations provided by the United Nations, as expressed in the manual for the System of National Accounts 1993.¹⁾ The method of constructing the tables was thus entirely revised so as to conform to the 1993 System. The industrial classification is also integrated into ISIC revision 3. In this line, IBGE announced that by July 2008 the symmetrical I-O tables will be newly constructed from the national accounts for the reference years of 2000 and 2005.

1) Concerning the methodology adopted by IBGE for the development of the new system, on the definition of work tools and the presentation of results, the 1993 System rested more intensely on the experience of the French System of National Accounts (Système Elargi de Compatibilité Nationale – Base 1980 – Méthodes), in consequence of a cooperation accord established with the Institut National de la Statistique et des Etudes Economiques (INSEE).

3. Basic information about the latest table

<Main features>

Year of reference: 2005

Organisation in charge: Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística)

Date of release: July 2008

Tables to be released: Use table, Supply table, Symmetrical I-O table (activity by activity)

Sector classification: ISIC rev.3 update (2002 version)

(1) 100 commodities x 55 industries

(2) 12 commodities x 12 industries

Price scheme: Basic price, Actual price, Domestic basis

Import: CIF Export: FOB

Final demand items:

- Private Consumption Expenditure
- Government Consumption Expenditure
- Gross Fixed Capital Formation
- Changes in Stock

Value added items:

- Wages and Salaries
- Gross Operating Surplus
- Indirect Taxes

Special treatment

- Standalone Repair sector
- Re-export sector

Auxiliary tables (available in most detailed classification 100 x 55 sector)

- Import matrix
- Trade margin matrix
- Domestic transport cost matrix (incl. port logistics and warehouse services)
- In-house transport matrix
- Sales taxes matrix

- Employment matrix (55 industries x employment by types)

<Integration into the BRICs International Input-Output Table>

One of the most complicated, nerve-racking tasks of compiling international input-output table is the adjustment of national tables towards the common format. Considering the Brazilian national table, however, the survey on the presentation format proved that the table was quite conformable to the common scheme, hence requiring only minor adjustments for its integration into the BRICs international I-O table.

Adjustment 1: Basic price to producer's price

Because the BRICs table will be evaluated at producer's prices, it is necessary to convert the Brazilian table from basic prices by adding sales taxes to the transaction values. This is not a difficult task as the sales taxes matrix is readily available from IBGE at the most detailed level of classification.

Adjustment 2: Standalone Repair sector

The BRICs table will not accommodate a standalone Repair sector. The entries in the row and column of the sector are thus distributed among machine manufacturing industries. Ideally, the distribution should be done in reference to the ratios taken from the Fixed Capital Formation Matrix. Yet since Brazil does not have this data, the ratios derived from fixed capital formation vector in final demand items will be used.

(3) Re-export

The BRICs table will not allow the presentation of re-export, hence the corresponding entries in the Brazilian table should be deleted.

<Industrial sector classification>

Table 1 shows the change in number of industrial sectors grouped by five large industrial categories. The total number of sectors has decreased over time since 1975. Especially, the decrease of the sectors categorised under "Light Manufacturing" is remarkable. Looking at the

shares (Table 2 and Figure 1), it is observed that the share of sectors under “Service” category has almost doubled, reflecting the increasing importance of the industries. Also, it is noted that dummy sectors, which were presented in the earlier tables, disappeared from the 1985 table.

5. Concluding Remarks

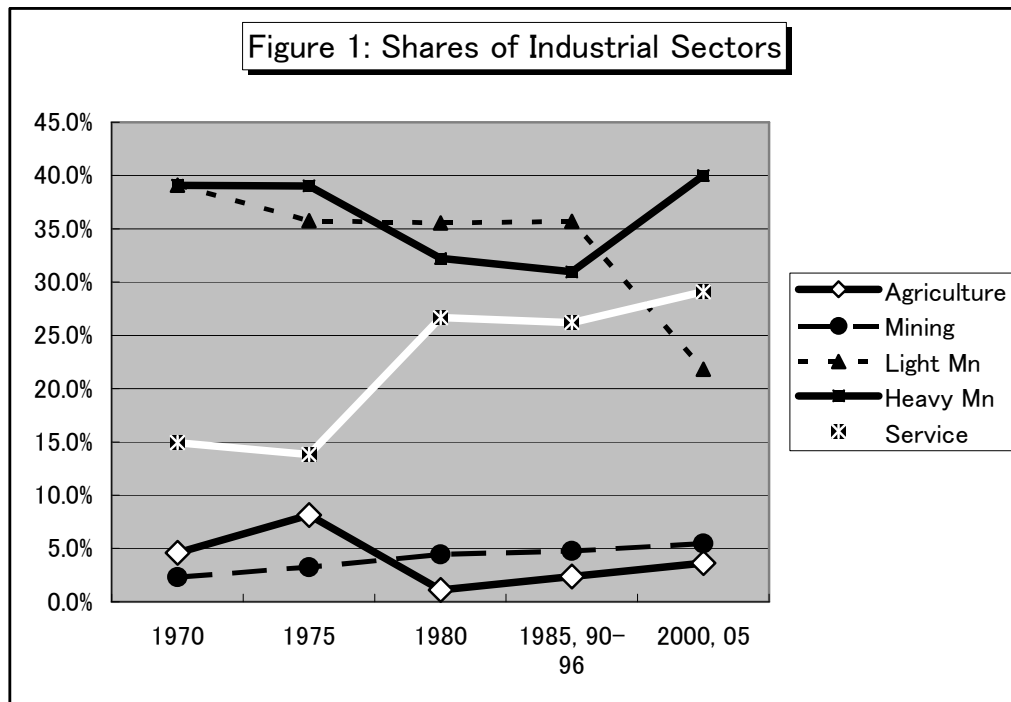
From the viewpoint of the BRICs international I-O project, it was far fortunate that IBGE recently revised the statistical system such that the national table of 2005, which the BRICs table will utilise, shall be constructed upon the new concept and methodology, conforming more to the common scheme. As stated in the beginning, the Brazilian I-O tables today have much to be proud of in terms of consistency and conformity to the international standards, and are hence expected to be closely integrated into the 2005 BRICs International Input-Output Table.

Table 1: Change in the number of industrial sectors (1970–2005)

	1970	1975	1980	1985, 90–96	2000, 05
Agriculture	4	10	1	1	2
Mining	2	4	4	2	3
Light Mn	34	44	32	15	12
Heavy Mn	34	48	29	13	22
Service	13	17	24	11	16
TOTAL	87	123	90	42	55

Table 2: Change in the share of industrial sectors (1970–2005)

	1970	1975	1980	1985, 90–96	2000, 05
Agriculture	4.6%	8.1%	1.1%	2.4%	3.6%
Mining	2.3%	3.3%	4.4%	4.8%	5.5%
Light Mn	39.1%	35.8%	35.6%	35.7%	21.8%
Heavy Mn	39.1%	39.0%	32.2%	31.0%	40.0%
Service	14.9%	13.8%	26.7%	26.2%	29.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%



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