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The input-output table for the Alentejo Region in Portugal([1])

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Abstract

With this paper we present a preliminary version of the input-output table for Alentejo, a Portuguese region through the regionalization of the input-output national table, for the year 2008.

As it is well known the input-output (IO) model is particularly appropriate for the analysis of the effects of demand on supply (possibly in territorial/regional terms). As such, from the descriptive point of view, the IO model is useful for the analysis of explanatory factors of (regional) growth. Moreover, from a decision-making point of view it allows to support (regional) decision making in order to change (in the most favorable possible way) the (regional) production structure. This is particularly important for the fragile region of Alentejo where such instruments are scarce. Furthermore, the second quadrant, from which demand

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effects can be considered and extended to third quadrant, where a proper quantification of inter-regional imports is to be considered, complete the table.

From the production perspective, our preliminary results suggest weak inter-sectors relations in the Alentejo region. In particular, more than 75% of the indirect effects are below 0,05.

Furthermore, tobacco, food, beverages, crude refineries, fishing & aquaculture, clothing and agriculture sectors have the most relevant type II multipliers. However, only clothing and beverages have higher aggregate indirect effects over all other industries as a result of an increase of one euro on their final demands.

Regarding type I multipliers, our results suggests a different picture. Forestry, tobacco, leather, beverages, among other have important direct and indirect effect.

These results have important policy implications in this fragile region.

Keywords: Regional Input-Output Table, Alentejo.

JEL Codes: C67, R12, R15, R58.

1. Introduction

Portugal is made up of very different regional realities, so considering Portugal as a single region may be important when the objective is to make comparisons with other regions, but not the most appropriate when the goal is to solve internal problems, such as regional disparities. Thus, more information is necessary, if possible in spatial terms (Saúde, 1997).

Furthermore, our accession to the European Economic Community (EEC), now the European Union (EU), stressed the need for statistical production at regional level. In the organic structure of the EU Directorate General, having a purpose to reduce regional disparities within the EU, one can consider the current Director General for Regional Policy (DGREGIO), as associated with the privileged use of statistical information (Saúde, 1997).

For all these reasons, and because the Statistical Office of the European Communities (EUROSTAT) main function is to harmonize criteria and establish uniform rules for the production of national statistics, the National Statistics Institute (INE) accommodated these requirements and evolved to the production of regional information. Regional Accounts arise in this context and are a requirement of EUROSTAT. The European System of Integrated Economic Accounts 1995 (ESA - 1995) devotes an entire chapter to the National Accounts and, simultaneously, Eurostat has developed manuals of the Regional Accounts for each specific area, such as those relating to Gross Value Added (GVA) and Gross Fixed Capital Formation (GFCF) by industry, and household accounts (Saúde, 1997).

The goal would be to construct regional accounts, in all similar to the National Accounts, except for the reference space. But this would only be possible if all statistical surveys had representation at the regional level, allowing reliable results. So the ideal would be to calculate the Regional Accounts, and from these, by aggregation, reaching the National Accounts (Saúde, 1997).

At the present moment it is not possible to follow this methodology, so the INE builds Regional Accounts from the National Accounts, by ventilation, and not vice versa, i.e., in practice, apply mixed pseudo-ascending methods. As approximation methods, these are pseudo-ascending consisting on collecting data for the base units (local activity economic units or households, for example), obtaining, by addition, regional values for the variables. When there is no data for base units and we have to provide estimates to the values of regional variables, it is said that we are applying methods pseudo-ancestors (Saúde, 1997).

The paucity of information with regional representation, in fact, inhibits deeper economic analysis and may represent an obstacle to the establishment and / or evaluation of regional and / or sectorial policies, therefore affecting regions of different forms of the Portuguese territory.

A special instrument in the definition and evaluation of economic policy is the input-output analysis (Leontief model), or in the language of National Accounts, Input-Output tables.

It is in this context that the present project arises, our goal being the construction of an Input-Output Table for the Alentejo region, with reference to the year 2008.

The literature on the construction of regional input-output matrices is relatively vast, being influential the works of Moses (1955), Hewings (1969), Schaffer & Chu (1969), Morrison & Smith (1974) and Round (1978). More recently, some work on non-survey methods (Chelli & Bonfiglio, 2008), hybrid methods (Lahr, 1993; West, 1990) and methods based on location quotients (Flegg et al., 1995; Flegg & Webber, 1997) are of relevance (see also Ralston et al., 1986, and Oosterhaven, 2005).

Although this is an innovative project in this region,[2] similar projects for other regions of Portugal were developed. As such, in the following section a brief reference to the methodology followed in these previous projects is presented.

[2] To the best of our knowledge, there is no other of this kind.

After that the statistical sources, the methodologies used in this project and some results are presented.

2. Theoretical background

The input-output model assumes a multi-sector perspective of the economy. Given the characteristics of the input-output methodology, it is one of the most appropriate to determine the economic impacts of demand changes, through a multiplier mechanism that results from three kinds of effects: direct, indirect and induced ones.

To put it clearer, let us consider X to be the vector of output, **A** the matrix of (constant) technical coefficients a_{ij}, which represent the consumption by sector *j* of intermediate goods produced by sector *i* in order to obtain one unity of production X_j, i.e. $\mathbf{A} = \left[a_{ij} \equiv \frac{x_{ij}}{X_j} \right]$, and Y the vector of final demand (constituted by private/public consumption, investment and exports).

If so, it is possible to estimate the direct and indirect effects on output resulting from a change in final demand ΔY as: [3]

$$\Delta X = (\mathbf{I} - \mathbf{A})^{-1} \Delta Y \qquad (3.1)$$

Those effects, in turn, -- the so-called induced effect -- propagate to the use of primary factors such as wages, taxes and imports and, when appropriate, the creation of new jobs. Being V the vector of primary factors, and **v** the diagonal matrix of primary factors coefficients, it is possible to extend the changes in production, given by (1), to ΔV as shown below:

$$\Delta V = \mathbf{v}\, \Delta X = \mathbf{v}\, (\mathbf{I} - \mathbf{A})^{-1} \Delta Y \qquad (3.2)$$

In particular, a regional version of the input-output model has the virtue of making it possible to take into account the way those three kinds of effects are

[3] **I** represent the identity matrix.

propagated through the territory, which is a crucial aspect for social/territorial cohesion policies. Plainly, for that being possible it is required the existence of regional input-output tables.

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3. Comparative Analysis of Methodologies used

The preparation of regional matrices described in the previous section highlights some points in common, but we note that differences will be important to explore, which can possibly be justified by their own economic and social characteristics of each territory (regions) in the analysis. Therefore, it will be useful to conduct a comparative analysis of methodologies adopted in each of these projects.

Base year and date of publication

Speaking globally it is found that, in most of the projects under review, the reference year of input-output matrix is located in the 90's, but has only been published in the year 2000 and beyond.

Sources of Information

Regarding the data used for the construction of regional input-output matrices it is clear that the official source of privileged information is the National Statistics Institute (INE), where we can find most of the information necessary for the construction of such instruments. Note also the importance of additional

information made available by some regional entities, allowing a better description of economic activities in each territory.

Targets

In general, with regional matrices building is intended to seek a planning tool that is critical for the analysis, studies and ex-ante assessment of investment projects in any sector of economic activity in the region. In addition, the regional input-output matrices must be assumed as an important source of information for economic agents to the extent that highlight the economic potential of the territories, describing the inter relationships. Therefore represent an instrument of territorial information of high importance and is likely to update.

Type of table used

In the works under review, it was decided to construct a matrix of total flows. In the case of input-output table of the Beira Interior region, it is broken down into three sub-arrays: table of flows of origin (within and outside of Beira Interior) at purchaser base prices (including trade margins and transport); table flows of origin in Beira Interior at market prices; flow table at producer prices (goods and services produced in the region, excluding the value of trade margins and transport).

Valuations of Table

All matrices analysed are valued at purchase prices. In all matrices, adopt the criteria CIF (Cost, Insurance and Freight) on the value of imports and FOB (Free on Board) on the value of exports.

Level of Nomenclature of National Accounts

All regional headquarters in the analysis present the results of the first level, according to the classification of national accounts (NCN) to 49 branches (NCN49), and in some cases present more detailed data on 2nd level. The table of the Central

Region presents the results of second-level breakdown of the 49 branches into sub-branches, creating a 291x276 table. In the case of the Algarve region, in addition to presenting results for intermediate consumption and GVA according to NCN315 also break up the branch 34 of NCN49 into three sub-sectors - restaurants, hotels and other traditional means of accommodation - given the expertise production in the region in tourism.

Methodology Used

The matrices of the Norte, Centro and Algarve regions were prepared using a partially indirect method (mixed method), i.e., it uses information from national accounts and, through information available to the productive activity of each region (via the statistical operations INE), are estimated, indirectly, the values of flows for each region.

In general, this method corresponds to calculating a given flow x in the region R (X_{ij}^{R}) as follows: [4]

$$X_{ij}^{R} = \frac{X_{ij}^{P}}{\sum_{i\ (or\ j)} X_{ij}^{P}} \sum_{i\ (or\ j)} \hat{X}_{ij}^{r} \qquad (4.1)$$

Where the superscript r indicates that it is the estimated value for the region through methods upward (bottom-up), or from direct collection of information in the territory, and the exponent P refers the value for the same variable in the accounts national. Thereby are combined the two types of information, information on a territorial basis and reference information for the construction of regional matrices (i.e., the information in Tables of Resources-Employment or frames of inputs and outputs of national accounts), which corresponds the application of methods pseudo-up or mixed. The indices i and j refer, respectively, the row and column of the table.

However, in the methodological description for each of the matrices under consideration, we find some specific aspects that differentiate these instruments, which we describe.

[4] In this example, the sum is used online, but we can use the sum column depending on the variable in the estimation.

As for inputs, the table of the Norte region are estimated from national values with the use of expressions like (4.1), although with exceptions for some branches as mentioned below, while at the table of the Centro, in a general way it was decided by RAS method due to lack of data on the second level, and in the table of Algarve region was used a more specific methodology, branch to branch, as also described below.

RAS is a well-known method of updating the (input-output) matrix of technical coefficients. In its simplest form, it consists on an iterative adjustment of the rows and columns of the first quadrant of an input-output table given the knowledge of the column and row vectors of total intermediate consumption. This adjustment is made by multiplying each row by a positive constant, so that the total (in row) equals the true total. In general, this operation does not lead to a total (in column) equal to the true total. Hence, in a second iteration, the columns are then be multiplied by a constants in order to make the total equal the true total. This sequence of row and column multiplication continues until the totals of rows and columns converge to the true vectors.

We can then analyse the specific treatment of each branch in each of the cases under review, with regard to the first quadrant (inputs) and the third quadrant (clearance of total resources).

Branches of Agriculture, Livestock and Hunting

In the table of the Centro for the estimation of agricultural inputs, it was used the work of the CCRN (Coordination Committee of the North) by applying the direct method.

In developing the table of Algarve region, the value of inputs in the branch Agriculture and Hunting, relating to classes of goods of Agriculture and Hunting, Oil, Electricity, Gas and Water, Chemicals and Repair and Recovery, were estimated based on data from actual production of the industry. The intermediate consumption of other products (smaller values) was estimated by applying the structure of domestic production by industry, the actual production of the branch, minus the uses of the product classes mentioned above. The feed consumption

(products in the sector 22) was regionalized by the values appearing on the Agricultural Statistics (INE), and corresponds to the distribution of national consumption, proportionately, based on the number of livestock

Regarding remuneration, in table of the Norte regional the ventilation is obtained based on employment for others in full time, having calculated the number of annual work units (AWU's). In the table of the Algarve region, wages were obtained by applying the unit cost of manpower enrolled in the Culture accounts of Ministry of Agriculture, the quantities produced in the region.

Obtaining the regional value for the subsidies in the North table is based on the regionalization of two types of subsidies, compensatory payments and subsidies on diesel, while in the Algarve table data were used in the production of culture, and the corresponding unit amounts for each crop, listed in the special program of the Ministry of Agriculture for Grain Producers.

In the table of the Algarve, direct production taxes are estimated based on the national rate for the branch of Agriculture and Hunting.

In the table of Norte indirect taxes are calculated according to the average national impact on demand distributed to the ex-works price.

In the table of the Algarve the GVA of this branch is obtained by difference, after the ventilation of values of actual production and intermediate consumption.

Methodological notes in the table of the Norte region is said that for the by-products, the values was obtained at national level (INE) and the residual sales were regionalized through the weight distributed to each region in the national value.

Fishery Branch

In the table of the Norte, initially were used the values of fish landings in the region's ports and aquaculture, as criteria for the regionalization of production. Relative to earnings and inputs, the regional breakdown was calculated based on the national technical coefficients.

In the table of the Algarve region, the branch of Fisheries was broken down into two sub-sectors - fisheries and aquaculture. To obtain an approximation to the distribution of inputs and the operating account of each sub-branch of aquaculture related entities were surveyed and exploitation of fish ponds and then match the values obtained with aquaculture statistics. In the sub-branch of fishing it was used the value of fish landings as a criterion for regionalization of the actual production the branch.

Branch of Forestry

In the table of the Norte region, the regionalization of intermediate consumption and production of this branch was based on the study of Roll (1995), which can lead to an overestimation of the values.

In the table of the Algarve region, were used data from the actual production of the branch and the intermediate consumption were estimated using national technical coefficients, as well as remuneration of the different productive factors.

Industry Branches

In the table of the Algarve region, the values of GVA, actual production of the branch and intermediate consumption of each branch, were obtained directly from data provided by INE. The intermediate consumption of the branches was distributed by various sources through the application of the national pattern to regional values. Indirect taxes on production were estimated based on national rates of each branch

Energy Branches

In the table of the Norte region, regionalization took place in four stages: after the identification of sub-branches, proceeded to the regionalization of production of these, followed by the regionalization of the main intermediate consumptions and finally the remaining inputs.

Tradable Services Branch

In the table of the Algarve region, the estimation of intermediate consumption is performed by dividing them into two groups, tangible products (goods and other materials) and intangible products (services provided by third parties). Given the characteristics of this region is also given special treatment to the branch 34, on production of accommodation services, restaurant and cafeteria. This branch was further divided into sub-branches: 34.01 - catering, cafeteria and similar 34.02 - traditional hospitality (hotels, inns, guesthouses, hostels, campsites and holiday camps) 34.03 - other means of accommodation (apart-hotels, tourist apartments and resorts).

In the table of the Norte region the authors used a generic methodology and made the estimation of intermediate consumption by branch to the 2nd level of the nomenclature of National Accounts.

Branches of non-tradable services

In the table of the Norte region the authors used data from exploration and production accounts for institutional sectors (Economic Table Articulated - QEC - of National Accounts) involved in the production of such services. For the central government they used the employment variable as key regional ventilation (source: INE, Census of Population, 1991). For the Local Government sector, the regional ventilation was based on the costs of salaries and current goods and services of local authorities (source: INE, Government Finance Statistics). As regards social security, employment for others in the set of all sectors of activity was used. The regionalization of intermediate consumption by industry of origin was estimated based on extrapolation for each region of the respective national coefficients.

In the table of the Algarve region, the technical coefficients matrix of intermediate consumption (1st quadrant) was estimated as follows:

$$\hat{a}_{ij}^{r} = a_{ij}^{n}\left(\frac{a_{.j}^{r}}{a_{.j}^{n}}\right) \tag{4.2}$$

where the indices *i* and *j* refer to rows and columns, respectively, the "dot" indicates the sum of all rows for a particular column, and the exponents *r* and *n* indicates that it is regional or national coefficient, respectively.

Transfers of by-products and residual sales

It is important to remember that production distributed by product is obtained by adding the actual production of the branch (PER), residual sales (VR) and by-products (PF).

In the table of the Norte region, the regionalization of these values was based on the information source / destination of national values. Each national flow of positive value in the transfer of by-products, was regionalized in proportion to actual production of the respective branch of origin, and was distributed by the branch of destination by extrapolation of the national incidence rates in their actual production. The negative flows from residual sales were estimated based on the regionalization of the non-tradable services and positive flows follow the same methodology adopted for the transfer of by-products. The branches of the primary sector and electricity and gas had a proper treatment.

In the table of the Centro region was used a disaggregation of these operations to the second level of classification and the regionalization of the values passed through three phases:

1. Processing of negative values:

$$-VR_j^R = \frac{-VR_j^P}{PER_j^P} PER_j^R \tag{4.3}$$

2. Obtaining the sum of the values calculated for the VR and PF, the second formula in step 1;
3. Processing of positive values:

$$+VR_j^R = V_j^P \sum_{j=1}^{n} -VR_j^R \tag{4.4}$$

where

$$V_j^P = \frac{+VR_j^P}{\sum_{j=1}^{n} +VR_j^P} \tag{4.5}$$

In the table of Algarve region, the regionalization of transfers of by-products, the variable for allocating used is the actual production of the different branches (2nd level of the nomenclature), as follows:

$$PF_i^R = PF_i^N(\frac{PER_i^R}{PER_i^N}) \tag{4.6}$$

In this table, the procedure for residual sales is similar. The values of all branches have all been regionalized in proportion to actual production by sector, taking into account the value of the emitting branches (branches 46 to 49) and by imposing the rule of balance between the accounting values of the global flows of inputs and outputs.

Foreign Imports

In the table of the Norte region, imports were regionalized by the indirect method: extrapolation for each region, of the national import coefficients by branch.

The methodology in the table of Algarve region is the same for the estimation of imports and exports. For imports (M) of services, was broken the national vector of imports of services and applied an import coefficient, as follows:

$$M_i^R = \frac{M_i^N}{VAB_i^N} VAB_i^R \tag{4.7}$$

In the hotel and restaurant services, the key of the assignment of foreign imports was also the GVA. With regard to imports of goods, it was considered the casuistic analysis of the records compiled by the INE statistics of international trade, according to the compatibility of their respective nomenclatures.

Trade margins

Estimation of trade margins in the table of the Norte region was calculated based on extrapolation, for each region, of national rates of commercial margins on distributed production, using the RAS method to correct the table of trade margins.

In the table of Centro region the estimation trade margins follows a two-step process. Initially, it is estimated that the trade margins of branches to the Centro region, based on the regional structure of the sum of distributed production and imports by product. In a second stage, in branches of goods, adds to the margins obtained earlier, the share (based on the structure of margins, by branch, obtained in the first phase) distributed production of product 33 (trade).

In the table of Algarve region, the estimation procedure was identical to that followed in the table of the North.

Taxes on imports from abroad

In the table of the Norte region, the estimation of this operation was based on the regional application, the national tax rates on imports.

In the table of Algarve region it was used the following formula:

$$TM_i^R = M_i^R \left(\frac{TM_i^N}{M_i^N} \right) \tag{4.8}$$

where TM means taxes on imports.

Value Added Tax (VAT)

In the table of the Norte region, the authors use the methodology of valuation of the liquid system, i.e. the VAT charged each product is calculated by subtracting to the VAT invoice, the VAT deducted, which is the VAT calculated on the operations of Private Consumption.

In the table of Algarve region was followed the extrapolation of national rates by branch of the classification of National Accounts (NCN49) for the region. The

private consumption is the basis of the tax, crucial for the calculation of regional production tax by branch.

Also in the second quadrant of the table (components of final demand) are major differences.

Private Consumption

In the table of the Norte region resorted to two sources of statistics, the Survey on Household Income and Expenditure (INE, 1990) and the General Population Census (INE, 1991). The authors estimated the capitation of Private Consumption (CP) for the Norte region and for the whole country, for different products and followed up with to reconciling with the NCN49. In a second step, were applied the capitation of the CP to the values of resident population.

In the table of Centro region, after having been entertained several hypotheses, it was concluded that the best would be to regionalize the consumption based on a structure calculated from three different sources (INE): The Income and Expenditure Survey, the Index of Local Purchasing Power and indicators of savings.

In the table of Algarve region, given the importance of the tourism sector, the estimated vector of private consumption was calculated by differentiating the consumer acts performed by residents and by non-residents on the economic territory, resulting in two vectors of private consumption: final consumption of the residents on the economic territory and the final consumption of non-residents on the economic territory.

Collective consumption

In the table of the Norte region, the regionalization of collective consumption (G) is derived directly from the regionalization of distributed production of non-tradable services, with only a small part of this production (about 5%) is not considered collective consumption.

In the table of Centre region, the collective consumption to the branches 46 to 49 is estimated as follows:

$$G_i^R = PDP_i^R - CP_i^R \qquad (4.9)$$

where PDP corresponds to distributed production by product. In other branches, the collective consumption takes the value zero.

Also in the table of Algarve region, the collective consumption was obtained based on the distributed production of non-tradable service sectors.

Gross Fixed Capital Formation

In the table of the Norte region, the authors rely on the array of investment in national accounts. Regionalization of Gross Fixed Capital Formation (FBCF) of public administration was calculated based on the information on the public investment for 1990 (INE, Statistical Yearbook of the North, 1994). FBCF of industrial enterprises was regionalized based on business statistics, except in the branch 5 (Oil), for which it was used information offered by Petrogal. To the branches of non-tradable services it was used the inter-regional structure of employment by industry, except for housing (branch 41), where the authors used a resident population

In the table of Algarve region also resorted to the table of investment of national accounts of 1994, which provides the national framework FBCF in each branch. Although the procedure may differ in some branches, in general was followed the following method:

1. Obtaining FBCF by user branch;
2. Determining the regional structure of FBCF of each branch (following different allocation keys based on additional information);
3. Comparison of values and structures of regional investment obtained in the previous paragraphs, with the views of technical responsible and business associations.

Variation in stocks

In the table of the Norte region was chosen an indirect regionalization, using the extrapolation to regions of the rates of domestic variation of stocks, defined in terms of the weight of change in stocks (Ve) in the total resources of each branch.

In the table of Algarve region was followed a similar method:

$$Ve_i^R = \frac{Ve_i^N}{PE_i^N} PE_i^R \tag{4.10}$$

where PE refers to the actual production.

Exports abroad

In the table of the Norte region, was followed a similar methodology to that adopted for imports and already described.

In the table of Centro region, exports to other countries, like the imports are calculated from national accounts and taking into account the weight of the region in the country.

In the table of Algarve region, the authors used data from business surveys for exports of goods and on export of services applied indirect methods (export coefficients by branch in relation to GVA, at national level).

Inter-regional trade and balance of the table

In the table of the Norte region was followed the method of balances is used calculating, for each branch, the difference between total resources and uses in the region and the difference corresponds to the flow of inter-regional imports and exports. As an alternative method can be used the method of location quotients (QL), calibrating the global balance of extra-regional (interregional and international) with the level of specialization assessed by QL's in each branch

In the table of Algarve region was followed a similar method to that adopted in the construction of the table of the Norte.

4. Methodology applied to the input-output matrix of the Alentejo region

With regard to the first quadrant of the input-output table for the Alentejo region, its determination was done following the footsteps immediately described below:

a) Aggregation of the 2008 Input-Output Table for Portugal, published by the Departamento de Prospectiva e Planeamento (DPP), in order to obtain the A38xA38 sectorial compatible with the classification of the Gross Value Added (GVA) for the Alentejo region;

b) Extrapolation of the relationship, at the national level, between the Intermediate Consumption (IC) and the GVA in order to obtain the ICs for the Alentejo region;

c) Considering the national I-O table, as a basis for regionalization, application of the RAS method allowing the determination of the values for the intermediate supplies (IS);

d) The use of other RAS stages makes it possible to update the values of ICs (calculated in step 2) and IS2 (calculated in step 3) for the Alentejo region, being fulfilled the condition that the total of flows in the second quadrant equals the one for the third quadrant.

The application of four steps described above, considering as a basis for regionalization the input-output table (published by DPP), makes it possible to estimate the first quadrant of MIO Alentejo (see, however, Sargento et al. (2011) for a discussion of the need / utility of using the IO table rather than the Supply and Use tables).

Obviously, in view of the assumptions made in determining the first quadrant of the MIO Alentejo it essentially matters to point out the results for the output multipliers from a relative point of view. Having this in mind, the inverse of the Leontief matrix is shown in Figure 1.

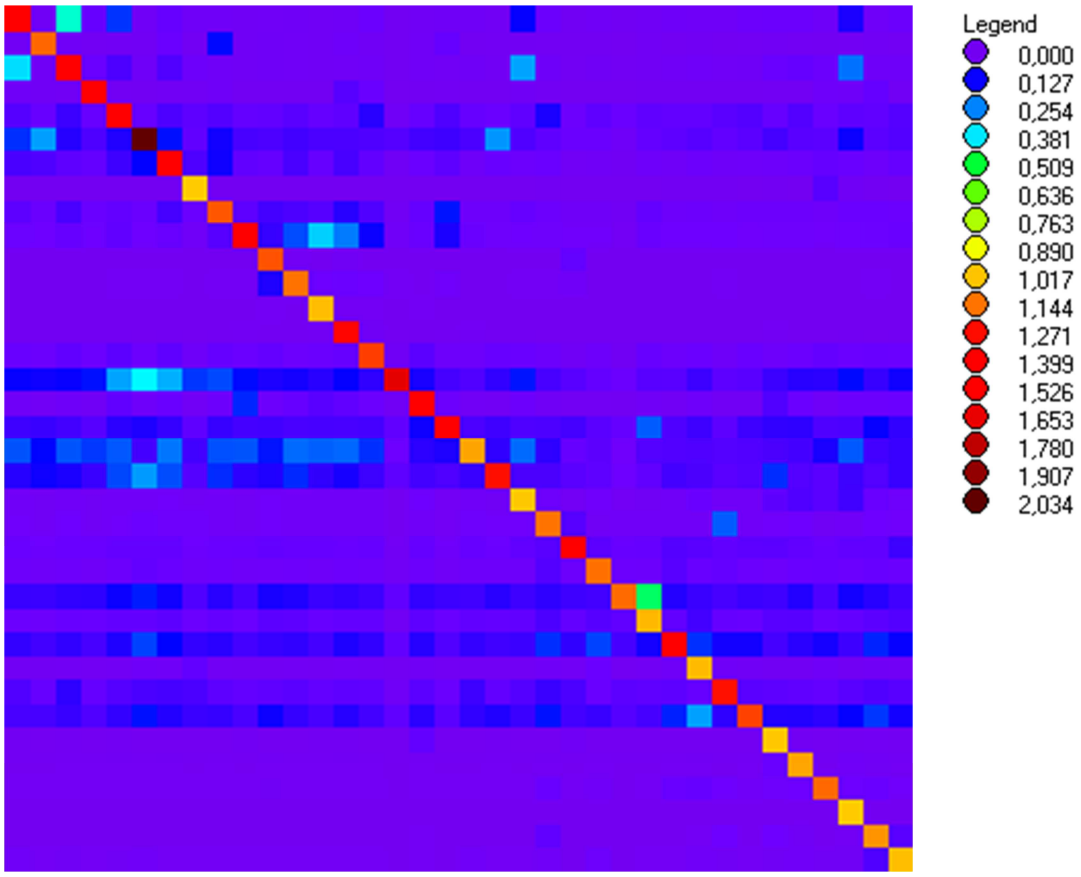

Figure 1: The inverse of the Leontief matrix

In terms of what corresponds to the traditional use of input-output model, the visualization of output multipliers (as presented in Figure 1) allows to determine - based on the verification of the assumptions underlying the model - those sectors of activity engaged a greater multiplier effect (of demand on supply). From this point of view is apparent to highlight the relationships established at the level of the primary sector and some types of industries.

Another possibility, not to be overlooked is the use of the model in order to determine how to alter the structure of production, in order to potentiate the multiplier effects. This, in our opinion, more interesting possibility of use of the input-output model, will be developed in future work.

Regarding the second quadrant of the MIO Alentejo the information sources to focus will be:

a) Supply and Use tables for 2008 at current prices

b) Income and Expenditure Survey of Families, INE (previous Household Budget Survey - HBS)
c) Input-Output Tables for 2008 (64x64), INE
d) Regional Accounts, INE

For the third quadrant of input-output table of Alentejo region, the methodology follows two major steps:

a) The using of values published in INE's Regional Accounts, to ensure perfect compatibility between input-output table of Alentejo and Regional Accounts, which means filling the lines related to the wages and GVA by industry (A38);
b) The valuation of other transactions in this quadrant applying the calculation algorithm followed in the National Accounts, to ensure maximum methodological consistency. The main source of information is the Integrated System of Business Accounts (INE, File SCIE).

Table 1 describes the sources of information used in the estimation of the third quadrant of the input-output table of Alentejo region.

Table 1 – Information sources used in the estimation of the 3rd quadrant

Transaction	Information Source
Total intermediate consumption at basic prices by sector	1st quadrant
Compensation of employees	INE, Regional Accounts
Consumption of fixed capital (depreciation)	Calculation algorithm followed in the National Accounts (File SCIE)
Net Operating Surplus	Estimating endogenously
Value added by sector at the cost factors	Estimating endogenously
Production at basic prices by product	Informação ficheiro UAL (INE, informação relativa às unidades de atividade locais)
Total Imports of Goods	Estatísticas do Comércio Internacional e estimação do comércio inter-regional
Imports of total services	Estatísticas do Comércio Internacional e estimação do comércio inter-regional
Imports of Goods and Services Totals	Estimating endogenously

Customs Duties	Calculation algorithm followed in the National Accounts (File SCIE)
Total Commercial Margins	Calculation algorithm followed in the National Accounts (File SCIE)
Total Margins of Transportation	Calculation algorithm followed in the National Accounts (File SCIE)
Non-deductible VAT on products	Calculation algorithm followed in the National Accounts (File SCIE)
Other taxes on products	Calculation algorithm followed in the National Accounts (File SCIE)
Subsidies on products	Calculation algorithm followed in the National Accounts (File SCIE)
Total Supply	Estimating endogenously

The GVA was estimated for comparison with published data on regional accounts to evaluate the consistency of our results with the regional accounts published for all other transactions, by sector.

The inter-regional trade, share of significant importance in the flow of any region in Portugal, can not be determined using the statistics of international trade, since this source, as its name indicates, only gives us information on the flows with outside the country (and not all the territory outside the Alentejo region, national and international). As such, to try to quantify the approximate size of the variable is important to assess the relevance and validity of transport statistics at regional level.

In previous studies, the value of interregional trade was obtained by the method of balances, by which one obtains the regional balance of trade (entry-exit or vice versa) by imposing the assumption of equality between the total resources and the total employment for each branch of economic activity in regional input-output table, not being possible to quantify individually the amount actually exported and imported to and from other regions of Portugal.

With regard to international trade were used International Trade Statistics of the INE, for the year 2008, to obtain the flow of imports and exports carried out by agents who operated in the Alentejo region.

Due to lack of precise information about the statistics used in the total imports, this variable was recorded at *cif* prices and exports were recorded at *fob* prices (in both cases we used the variable "statistical value"). Later it was not possible to perform any procedure *cif/fob*. Because of this the values of imports include a set of services that should not be included in this item (transport and freight to the international border of the region).

The criteria for confidentiality does not allow the consideration of flows of a group of companies, which will lead to more biases results that increase the need for the use of correction methods, also used in other regional input-output tables, and involving the use of correction weights hereinafter explained (see Alves, M. *et al*. (2004)).

The need to reduce the biases generated by the regional statistics of international trade and the need for compatibility with the available data on National Accounts in 2008 (reflected in the Input-Output Table of Portugal in 2008, built and made available by the Departmento de Planeamento e Prospetiva - DPP) leads us to correct regional values found for each branch as a function of distance between the values of the Portuguese trade (imports and exports) in each branch in International Trade Statistics and in National Accounts for the year 2008.

Thus being $X_{i,ECI}^{A}$ the value of exports from the Alentejo region of each branch *i*, in International Trade Statistics, $X_{i,ECI}^{P}$ the value of total exports of Portugal, for each product *i* in International Trade Statistics, and $X_{i,CN}^{P}$ the value of total Portuguese exports, for each branch *i*, in the National Accounts, we can calculate the value of exports of Alentejo Region X_{i}^{A} as follows:

$$X_{i}^{A} = X_{i,ECI}^{A} * \frac{X_{i,CN}^{P}}{X_{i,ECI}^{P}} \tag{4.1}$$

For the calculation of imports, the methodology will be similar:

$$M_{i}^{A} = M_{i,ECI}^{A} * \frac{M_{i,CN}^{P}}{M_{i,ECI}^{P}} \tag{4.2}$$

Conclusion

Throughout this paper the main features of the latest regional input-output for Portugal were analysed. This gave us an overview of the main sources of information, methodology and structure of existing input-output tables.

Although the structure of the territory is very irregular among different regions of the country, it is important to emphasize several points in common, including the main sources of information, which are based on the INE, the structure of tables based on a nomenclature to 49 branches (NCN49) and the fact that, for almost all cases, the data collection process is based on a top-down method, i.e. use national accounts as the primary basis of information, which may lead to a less precise analysis of the territories.

In the matrices analysed a similar structure for the North, Centre and the Algarve regions can be noted, while the Azores region, possibly due to their much more specific territorial characteristics, has shown some differences in the structure of its information. It is also of relevance the fact that the input-output table for Beira Interior region has a differentiated structure, which may be explained by the fact that it is a table published in the early 90s and based on the year 1986.

As it concerns the IO table for the Alentejo region, the results for its first quadrant show a fragile productive structure, i.e. the inexistence of a dense network between the several sectors of production. Plainly, this is reflected on generally low multipliers. From a policy viewpoint this should call the attention that the stimulus via the demand may easily spillover to other regions unless a change in the territorial structure is to be made.

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