SECTORAL BLOCKS IN ARGENTINA

a methodological approach applied to secto-regional input-output analysis

EDGARDO M. LIFSCHITZ [*]

March 2004

[*] Director de Análisis e Información Sectorial, Dirección Nacional de Programación Económica Regional, Ministerio de Economía y Producción (Argentina) <elifsc@mecon.gov.ar>

This paper presents a methodology to identify sectoral blocks within an input-output matrix and the results of its application to input-output matrices of Argentina. In section 1 we introduce some concepts related to the definition of sectoral blocks and their constituents. In section 2 we present an algorithm for the identification of sectoral blocks. In section 3 we apply the block matrices to a regional level. In section 4 we display detailed results of the application of this algorithm to Argentina's input-output matrices.

1) Sectoral Blocks: concepts and constituents

1.1) Concepts

The concept of sectoral block, which is applied here, has been initially proposed by Leontieff (1986) p.167. A sectoral block is understood as a space for economic analysis that links activities strongly related to each other, thus constituting relatively autonomous groups within economic structures. These groups have activities at international level; although in a few cases, these relations are not relevant, such as some regional products.
On the other hand, these blocks can be seen as an intermediate stage between aggregate analysis (i.e. macroeconomic studies) and highly disaggregated ones (firm or sectors analysis).

Sectoral blocks can be defined by the following statement: *economic activities tend to have specific relations with other economic activities, maintaining non-specific connections with the rest of activities, thus creating a map of linked quasi islands, or blocks.*

From a dynamic perspective, as an economy develops, economic activities (production of goods and services and their commercialisation) become more complex and specialized. Some activities disappear while others emerge. At first, these ones are related to previous activities. But they later become independent, joining existent blocks or forming new ones.

Usually, the number of sectoral blocks and their composition changes slowly over a period of time. Although in times of strong technological innovations these changes may accelerate.

This dynamic process has been analysed by many sectoral approaches: "Firms analysis", "Studies of Sectors", "Value Chains" and "Clusters", among others. But these analysis take into account activities and chains in parallel, without integrating them in blocks. [1]

The block perspective, on the contrary, seeks to analyse firms, sectors and chains inside blocks where they have their specific relations. At the same time, as it will be seen, the block perspective focuses in the relationships among blocks, other activities and public sector.

---

[1] The salient feature of clusters analysis concerns the space where some enterprises generate synergies that are studied also by means of input-output linkages (Porter: 1990). Hoen (2002) has also dealt recently with the identification of clusters within an input-output matrix, but with a different methodology and results.

Input-output (I-O) techniques will be used here in a double sense: first as a tool for searching and obtaining information in order to construct blocks; and second, when blocks are already constituted, to analyse intra and inter block relations.

Finally, the block approach could also be seen as a way of systematic construction of what is known as "satellite accounts". The intention of this arrangement is the combination of activity categories from National Accounts that could be regarded as representing particular groups of related industries.

1.2) Block Constituents

Goods, services and commercial activities, which are strongly related, form blocks. There are different ways of blocking activities: by purchases or by sales. If an activity is blocked by its principal purchases it is because such purchases are its main input. If it is blocked by sales, it means that this activity is a specific input of the buying sector. When an activity is blocked by principal sales and purchases, it has the two properties.

Blocks are formed by activities that are the "main organizers". This term connotes the "attraction" they have over others. It means that in the absence of main organizers the block structure could easily change and even disappear. Accordingly, those main organizers are considered as "key activities or sectors".

There are different "stages" inside a block. Starting from the initial steps that are connected with private and public consumption, it then spreads to backward linkages - termed the intermediate steps - and then to the final stages. Participating in each stage we could find "non economic" activities such as technology, education, unions, professional co-operatives, etc. which are specifically related to other "economic" activities.

Some activities may specifically relate to particular blocks in certain geographical areas. These activities shall be referred to here as "random activities"

The relations among blocks are called "intersections", which are activities belonging to more than one block. An activity can attract others or be attracted by them within a particular block by purchase relations, and in other by sales relations.

There are also "non specific" relations among blocks "connections". But these relations are not taken into account when regarding the process of forming blocks, because this market does not affect the activity in a specific way when considered in relation with the others.

On the other hand "blocked" activities can have relations with "non blocked" activities. This denomination refers to those activities, which lack specific relations.

Finally, blocks establish connections with the Public Sector by means of fiscal functions and regulatory policies. [2]

In conclusion this methodology enables us to find out new relations of economic and non-economic activities inside blocks, between them and with non-blocked activities, taking into account all the private activities and the relations with the Public Sector

---

[2] Direct participation by the government in economic activities, that is in the production of goods, services and in commercial sectors, could be treated for the purposes of block formation in the same way as the private sector.

2) An Algorithm for the Identification of Sectoral Blocks

The aim of this section of the paper is to present an algorithm to generate sectoral blocks by means of partitions of the I-O matrix.

In order to perform the process of forming blocks, we need an adequately disaggregated matrix [3].

The method of forming blocks requires the matrix to be built according to Industry - Industry criteria [4] and be valued at "producer" or "basic" prices. According to the "static model" and excluded the "government exclusive" activities.

The algorithm was developed to identify "goods" and "services" blocks. In the following parts both are described.

2.1) BLOCKS OF GOODS

The process must start from a rectangular matrix in which (m) columns belongs to goods producers and (l) rows corresponding to raw materials and other material inputs, without considering the sales of packaging (tin/can/boxes) and other auxiliary inputs (fertilizers, energy, etc.). In other words, not taking into account, at this stage, these kinds of sales that, otherwise, could discontinue the chain of transformation from one product into another [5].

After that it is possible to apply the process of forming blocks by starting from purchases or sales. Here we start with the first one. [6]

a) Forming Blocks by Purchases

It starts by obtaining the matrix of technical coefficients A of range l x m dividing each element X_{ij} of the transaction matrix by total production value of sector j.

For each activity j ($1 \leq j \leq m$) from A is obtained the activity k to which it is the main specific purchase, it means that a_{kj} = Max a_{ij} for a certain j, being $1 \leq i \leq l$ forming a pair (k,j). This means that activities k and j have constituted the same group. When this condition isn't founded it is formed the pair (j,j) revealing that no group is formed.

When all the m columns are analysed, combining all the pairs with elements in common forms new sets.

---

[3] The more disaggregated the matrix is, the smaller the significance of the values in its main diagonal. In practice these are no longer maximum values, in most of the sectors, in matrices of more than two hundred sectors. It is clear that the lower the level of development in a country, the smaller the order of the matrix necessary to arrive to those results.
[4] This is so because it is proposed –as we have seen- to link the purchases-sales of the local unit in each specific market.
[5] Working without this proposition it is possible, for example, that tinned fruit and vegetables be linked with tin cans, which prevents the linking with fresh fruit and vegetables.
Afterwards packing, and the remaining materials (energy, commerce, transport and other services) are incorporated into the blocks where they have specific sales.
[6] The sectors that make their principal specific purchases from abroad do not participate in the construction of purchases blocks.

When this process is finished provisional blocks have been formed, integrated by two or more activities. Beside those activities, which were "blocked" themselves (j,j), remained "unblocked" with the others.

Based on these groups as columns and rows are created an aggregated matrix, that is applied to iterate until the groups reach the principal purchases to themselves. In other words the maximum value of the purchases are on the main diagonal, while some activities would not belong to any block. This is the sufficient condition to new blocks no longer be formed in a following iteration by purchases.

Next step requires going to the original matrix.

b) Forming Blocks by Sales

The procedure is similar to the previous one. It starts generating the coefficient of deliveries matrix E of range *l*x*m* dividing each element X_{ij} of the transaction matrix by total sales (production value) of sector *i*.

Those activities that have its principal sales with *j*>*m* (services and commerce) or at final demand: Consumption, Investment or Exports, are not considered by sales in the blocks constitution.

Then, for each activity *i* (1$\leq$ *i* $\leq$ *m*) from *E* is obtained the activity *k* to which it is the main specific sale, it means that e_{ik} = Max e_{ij} for a certain i, being 1$\leq$ *j* $\leq$ *l* forming a pair (*i,k*). This means that activities k and i have constituted the same group. When this condition is not founded it is formed by the pair (i,i) revealing that no group is formed.

When all the *i* rows are analysed, new sets are formed by joining all the pairs with common elements.

When this process is finished, there remain provisional blocks integrated by two or more activities. Beside those activities, which were "blocked" themselves (*i,i*) remained "unblocked" with the others.

Based on these groups as columns and rows are created an aggregated matrix, that is applied to iterate until the groups reach the principal sales to themselves. In other words the maximum value of the sales are on the main diagonal, while some activities would not belong to any block. This is the sufficient condition to new blocks no longer be formed in a following iteration by sales.

c) Forming Purchases - Sales Blocks

When the process of forming blocks by purchases and sales is finished; sets of purchases - sales are formed. At this stage sets of purchases contained in sets of sales or vice versa are incorporated into the large set.

Then, a matrix of these groups is constructed.

d) Iteration

Starting from the last matrix the sequence: a), b), c) is repeated until no more changes were registered. Under these conditions the iteration $n+1$ must give the same results as the iteration n (convergent). At this moment as a result of the application of the algorithm "blocks of goods" are formed.

e) Final Conformation of Goods Blocks

The given matrix presents the dominance of its principal diagonal. In consequence all the explicit or implicit blocks [7] are constituted and the other activities are considered "unblocked"

At this moment should be included into the blocks the sales of those indirect activities, which have specific relations with others in particular blocks.
Those activities that belong to more than one block are the final intersections

The obtained result is the structure blocks of goods.

2.2) BLOCKS OF SERVICES

The process of forming blocks proceeds in the same way as the forming blocks of goods. But the specific main relations are here services relations.

The former process considers, *m* producer sectors and, *l* direct materials, conforming a rectangular matrix of range *lxm*.

Then, in this case is considered the matrix, which has columns higher than *m*. As in the case of goods some activities constitute "specifics" inputs, which we can assume belong to the row *t* (included).

Supposing that the original matrix of goods and services is range *zz*, then the matrix for the blocking process is the rectangular matrix where the *aij* is represented by $m < i \leq t$; $m < j \leq z$; and the e_{ij} is represented by $m < i ? z, m < j ? t$.

2.3) INCORPORATION INTO THE BLOCKS THE REMAINED I-O ACTIVITIES

Comprising those goods activities that also have specific relations in service blocks and vice versa which, so far, were not blocked because of the methodological reasons that were mentioned.

Activities of commerce, which have the main margins of sales with specific activities, are blocked at this stage.

2.4) BLOCKS OF COMMERCE

Commerce blocks (using I-O) can only be constructed by considering specific "margins of sales"; because the specific purchases are not taking into account in the matrix.

2.5) BLOCKS CONFORMATION

Formed at this step are the blocks and the intersections of the activities among them; implicit blocks and non-blocked activities, according with the aggregation level of the available matrix.

---

[7] Which have the main specific purchases/sales within the activity.

Once blocks have been formed, it is possible to ascertain relations among them by incorporating other specific but not "principal relations", which are in turn creating, in many cases, new intersections.

2.6) Identification of other possibilities of blocking activities

This process consists in incorporating into the blocks those activities that cannot find specific relations by means of I-O techniques; as happens with capital goods sales (static model) or specific purchases of commercial activities.

The same thing happens with some service blocks which have specific linkages with final consumers, as happens with tourism, education and health.

Finally we must incorporate into the blocks activities or institutions, which register their non-economic specific relations: technology, education, unions, professional cooperatives, etc.

2.7) Sectorial Blocks Matrices

These matrices connect economic activities inside the blocks, and among them, with non-blocked activities: public as well as privates[8]. Both, inside and outside the transactions matrix could be specifics or connections.
On the other hand these matrices can be updated using samples combined with other proper information.

3) Sectorial Blocks Matrices: Partition and Desegregations in Regional Block Matrices

Discussed here is the identification of block activities in intra national spaces.

If a disaggregated matrix is available it is possible to apply the algorithm of block formation. In this case sales and purchases to and from other regions or countries are considered exports or imports. If all the information is available at a regional level it is possible to disaggregate the national matrix in regional matrices constituting a system of interregional relations based on sectorial blocks constitution.

When it is not possible to obtain, at regional level, the information available at national level; it is possible analyse particular spaces where I-O matrices are available: County, State, or other regional desegregation; and applying the algorithm in this space.

The following matrix belongs to an Argentine Province (La Pampa) and is only an example of the application of the algorithm at a partition and desegregation of the national matrix in a particular region of the country, as it is mentioned above.

---

[8] Obviously those sectorial matrices have all the properties that the original matrix has

La Pampa Province Matrix aggregated in blocks (1993).

Current prices.

BLOCKS		BOVINE (exc. dairy products)	WHEAT	OLEAGINOUS	DAIRY PRODUCTS	SALT	METAL-MECHANIC AND CONSTRUCTION	INORGANIC CHEMICAL	TEXTILE	NON BLOCKED ACTIVITIES (1)	INTERMEDIATE SALES	Households consumption	Public consumption	Investments	Sales to others provinces
1	BOVINE (exc. dairy products)	120 952 735	20 474	347 747	0	0	0	0	351	3 524 518	124 845 825	39 225 409	0	0	244 379 9
2	WHEAT	0	20 316 556	0	0	0	0	0	0	1 930 343	22 246 899	18 669 265	0	0	14 512 3
3	OLEAGINOUS	0	81 597	12 962 786	296 994	0	0	0	0	303 092	13 644 470	5 533 058	0	0	55 594 0
4	DAIRY PRODUCTS	0	108 816	0	3 093 098	0	0	0	0	2 155 259	5 357 173	5 583 822	0	0	9 609 4
5	SALT	720 971	0	0	42 729	2 128 292	167 723	17 380	0	586 645	3 663 740	525 702	0	0	14 240 8
6	METAL-MECHANIC AND CONSTRUCTION	2 142 754	1 817 115	1 485 337	224 763	206 541	37 790 913	39 858	173 798	36 591 763	80 472 841	280 903 619	0	240 748 131	10 326 3
7	INORGANIC CHEMICAL	21 843	10 007	0	49 461	4 317	305 394	665 414	158 796	720 272	1 935 503	1 786 497	0	0	
8	TEXTILE	101 866	0	0	0	36 404	467 998	0	2 780 569	806 317	4 193 155	9 648 845	0	0	
9	NON BLOCKED ACTIVITIES (1)	61 155 631	19 213 403	17 194 747	3 848 074	8 926 122	124 099 059	1 746 486	3 801 861	440 107 726	680 093 109	566 475 850	344 746 818	0	317 281 9
	Purchases from other provinces and imports	185 095 800	41 567 967	31 990 617	7 555 120	11 301 676	162 831 087	2 469 138	6 915 374	486 725 935	936 452 714				
	ADDED VALUE	237 730 697	51 228 464	48 402 529	12 995 323	7 128 651	449 751 913	1 252 862	6 926 626	1 010 148 320	1 825 565 385				
	PRODUCTION VALUE	422 826 497	92 796 431	80 393 146	20 550 443	18 430 327	612 583 000	3 722 000	13 842 000	1 496 874 255	2 762 018 099				

BLOCKS:	ACTIVIDADES DEL BLOQUE EN LA PROVINCIA:
BOVINE	Forages (oats and sorghum)
	Bovine breed and hibernation
	Cattle slaughtering and processing
	Rendering and meat by-product processing
	Tanning and dressing of leather
	Leather footwear
WHEAT	Wheat
	Wheat mills
	Bakery products
	Fresh pasta manufacturing
OLEAGINOUS	Sunflower
	Sunflower oil
DAIRY PRODUCTS	Milk
	Dairy products
SALT	Salt quarrying
	Salt processing
METAL-MECHANIC AND CONSTRUCTION	Gypsum articles
	Mosaics
	Saw milling and planning of wood
	Furniture's
	Manufacture of carpentry
	Others wood products
	Others metal products
	Machinery and equipment
	Construction
	Real state, professional and rent activities
INORGANIC CHEMICAL	Soups and cleaning preparations
	Basic chemicals
TEXTILE	Weaving textiles
	Others textiles products
	Apparel (exc. leather)

(1) ACTIVITIES IN WHICH EXPLICIT LINKAGES WEREN'T FOUNDED IN PROVINCE

Soya
Electricity, gas and water supply
Financial intermediation
Public and private health
Corn
Motor vehicles parts
Motor vehicles bodies
Athletic footwear
Plastic packs
Iron and steal smelting
Non-ferrous metals smelting
Soft drinks
Printing of newspapers and magazines
Printing
Petroleum and Gas
Hotels and restaurants
Mineral water
Public and private education
Honey
Wholesale and retail commerce
Transport and communications
Personal services
Public administration and defence
Private households with employed persons

Source: Ana Mendez – DISA, NDREP, Ministry of Economy and Production.

4) Empirical Determination of Sectoral Blocks in Argentina

In this section we present the results of the blocking algorithm presented in section 2 when applied to the input-output matrices of Argentina for the years 1997 and 1984, with 124 and 220 sectors respectively. In addition, some important regional blocks in Argentina are discussed. These blocks were found by applying the algorithm at a regional level. This work was done by the Direction of Information and Sectoral Analysis (DISA) at the National Direction of Regional Economic Programming, Ministry of Economy and Production, Argentina.

The construction of blocks requires a highly disaggregated matrix. This condition enables us to discover relations among activities which are more closely related with transactions in real markets.

The best disaggregated information level for discovering block formation is one in which the more disaggregated information does not change the blocks constituents in general. However, internal activities would be more disaggregated in particular blocks.

The basic information of I-O for constructing blocks should be obtained at "local unit" level and classified in "activities" in order to achieve the optimum disaggregated information level mentioned above.[9]

If the basic information is excessively aggregated, as it is the matrix of Argentina for 1997 which has 124 activities only, when we applied the algorithm it is possible to find the block "cereals and oilseeds".

In the case of more disaggregated matrices - as Argentina 1984 with 220 activities- we identified the following blocks which have been disaggregated from the previous ones: "Wheat", "Rice", "Malt liquors and malt" and "Oilseeds".

Finally, other blocks like "Corn", "Soybean and sunflower", "Olive" and "Peanut" were disaggregated from the former ones by DISA.

In order to display the obtained results the blocks have been grouped according to the International Standard Industrial Classification of all Economic Activities Rev. 3, corresponding to the main organizers activities

Table 1 below displays information on blocks identified for two matrices: one with 124 sector (IOM 124), another with 200 sectors (IOM 220). And finally those obtained by the DISA. Tables 2 and 3 below list all blocks identified for the IOM 124 and the IOM 220 matrices.

---

[9] Then, when the blocks are constructed it is possible in this stage to consider other property forms, like "enterprises", "groups" of enterprises and new forms of properties like "investment founds".

Table 1: RESULTS OF THE ALGORITHM APPLIED TO THE MATRICES OF ARGENTI

IOM 124	IOM 220	
BLOCKS OF GOODS		
Agriculture (vegetal) and it Industrialization		
Cereals and oleaginous: foods and other consumption products and their primary production, based in cereals and oleaginous	**Wheat**: bakeries and farinaceous products linked with flour milling and then with cereals; mainly, wheat. **Rice:** rice milling linked with growing rice. **Malt liquors and malt:** beer is the main product elaborated with barley and hop. **Oleaginous:** oils and fats starting from seeds and grains.	**Corn:** foods includin this cereal and linke and with their primary **Soya and sunflowe** these oleaginous. Bec one block **Olive** and **Peanut:** a blocks.
Sugar: food products and soft drinks originated in sugar mills, which process the sugar cane. **Other Industrial growing:** foods, other consumption products and their primary production.	**Sugar:** foods, pharmaceuticals, ethylic alcohol, beverages and paper; originate in sugar mills, which process the sugar cane. **Tobacco:** cigarettes and other processed tobaccos, linked to an intermediate production (blend) and it finishes in the primary production of leaves of tobacco. **Wine:** fundamentally composed by the wineries, starting from the grape vineyards. *Yerba mate*[10] **and Tea:** both of them constitute blocks integrated basically for the intermediate and final industrialization of leaves originated in the correspondent	**Spices and Aromatic** for a manufacturer corresponding primar

---

[10] Infusion of regional origin

IOM 124	IOM 220	
	plantations **Processed of coffee and spices** (implicit) [11].	
Fruit, vegetable horticultural specialties and nursery products: Contains a group of activities which register manufacturer processes, starting from the agriculture production	**Fruit, vegetable and spices:** Contain a group of activities, which register manufacturers processes, starting from the agriculture production. Cider (implicit) .	**Tomato:** tomato proc forms, linked with production. **Potato, beans, Or Capsicum and Lenti** These horticulture p cases products obtai in groups. **Flowers and orname** growing are based on **Apple-pear**: both a because the most imp combined, including t or other final produc integrated establishm **Grape**: the fresh pro vine that is not used b **Lemon, Orange, G Plum and Nuts** are o
Forestry, Paper and wood: composed by two main chains "wood" and "paper"; both obtain their specific inputs from the forestry and nursery plantations. **Printing and reproduction of audio and**	**Forestry, Paper and wood:** composed by two main chains "wood" and "paper"; both obtain their specific inputs from the forestry and nursery plantations. It presents here more disaggregated activities than the IOM-124.	

[11] "Implicit" means that the main specific linkages are inside the activity. Because of that they are considered as blocks. See M

IOM 124	IOM 220	
visual material (implicit)	Cork (implicit)	
Agriculture (animal) and it Industrialization	
Cattle raising and Farm: is constituted by red and white meats, leather factories and dairy products	**Bovine (excl. dairy products):** meat and leather products constituting chains by linking the slaughter houses of animals from the hibernation and breeding; followed by the corresponding specific foods, like forages. **Bovine dairy products:** products like cheeses and yoghurts linked with the production of milk in base form, from primary sector. This block doesn't maintain practical linkages in our country, with the other bovine block, because of the inexistence of cattle raisings double purpose. **Chickens and eggs**: the processing plants and refrigerators receive the input from the breeders. The suppliers of chickens facilitate poultry production, the foods and vaccines for their upbringing. The foods used in this process are in a majority of cases the specific use of the block. **Fur:** manufacture of fur raising animals in captivity.	**Pork:** constitutes a bl characteristics to "B Specially the meat ch **Horses:** their more i for sport activity, beca insignificant in Argenti **Goat**: dedicated to t products. *Camelidos[12]*: wool pro **Apiculture**: it is cons are provided the spec sector, by cottage bee **Hunting**: it is not very hunting" is the most in
Fishing: production and conservation of fishing products.	**Fishing**: production and conservation of fishing products.	**Squid, Prawn** and **H** resources. The *Pejerrey[13], Dora* the most important riv The **Trout** Is a highly

---

[12] *Vicuña*, *Guanaco* and *Llama* are ruminants of the Andes mountains

IOM 124	IOM 220	
Petroleum and Chemicals		
Petroleum and Gas: starts mainly in refineries of petroleum and gas originated in its extraction, and their transport by pipes **Chemical**: starts in a diverse variety of chemical and petrochemical final goods, which demand intermediate products and conclude in the basic chemicals. **"Soap, detergents and cosmetics"** (implicit).	**Organic Chemical:** fuels and other refinement products originating in petroleum and petrochemical products. These last ones establish a chain whose first link is the petrochemical final "rubber" "synthetic spun" "plastics" "fertilizers", are among others linked with the intermediate products and then with the basic petrochemicals, finishing off in the refineries; at this point merges the chain of fuels - which is the main destination of refineries- and petrochemicals. Finally the refineries are linked with the extraction of petroleum and gas that constitutes the final stage of the block. In Argentina organic chemistry was developed based on the petroleum. **Inorganic Chemical**: the main final products are: pharmaceuticals, cleaning, perfumes and pesticides linked with basic chemicals fundamentally of inorganic origin. It is not possible to specify more in the block due to some important products are imported, as long as others, because of the high level of aggregation of the available information.	
Textile and wearing apparel		
Textile: clothing is the first stage; this is provided by knit fabric. Others textile products are linked backward from fibers originated in animal and vegetal primary production.	**Cotton**: it is mainly integrated, for a wide range of clothing linked with textile materials originating mainly in cotton fibers provided by the agricultural sector and synthetic fibers in intersection with the petrochemical block **Sheep**: the wools final activity is clothing which is connected with weaving or the spinning if they are	

[13] Fish from fresh and sea waters
[14] *Dorado*, *Pacú* and *Surubí* are fishes mainly from rivers

IOM 124	IOM 220	
	integrated, it purchases from the laundries who are providing the wool by means of shearing. The meat is processed in slaughterhouses and refrigerators starting from the animals acquired in the primary sector. In the same manner as in dairy products the livestock works fundamentally as a capital goods due to the meat obtaining, in the country, has smaller economic importance than the wool.	
Products of Mineral Origin (excluded those dedicated to the chemistry)		

IOM 124	IOM 220	
Metal-mechanic and Construction: it presents at the initial stage a group of activities, constituted mainly by the following ones: construction, transport equipment, machinery and equipment, other industrial inputs and durable consumption goods not considered in the previous activities. The final activities are related back with a diversity of intermediate stages. The factories of metallic and non-metallic minerals are among the main ones. The metallic factories are supplied by the steel industries, aluminium and other basic metals. The primary production of these is mostly imported as happens for example with the iron mineral and the bauxite[15]. As long as the factories of non-metallic are fundamentally originated, from the extractive activity of the country. The first industrialization of the metallic minerals and the mining of non-ferrous items used directly and indirectly in the construction, constitute the final stage of the block. Wood and petroleum products; are intersections connected to the final products **"Extraction of Minerals"; "Office and computer machines"; "Tubes and radio transmitters, TV and telephony"** constitute implicit blocks.	**Metal-mechanic and construction:** it enables us to identify a larger number of chains and links inside the block, analysed in 124 IOM of Argentina**.** **"Office accounting and computing machines"**(implicit)	
BLOCKS OF SERVICES		

---

[15] Other primary metals, which are produced, like copper, silver and gold, don't register forward linkages, because they are exp
Information of those products is not available at the aggregation level of the matrix.

IOM 124	IOM 220	
Transport: land transport for routes and trains, marine and its complementary activities.		
Tourism: air transport, which registers implicit linkages in Argentina, is mainly for passengers, belonging to the block tourism.		The main tourist de identified in Buenos Buenos Aires, the pro and the northwest o enlarge the linkages present some rand meals and entertainm
Finances and insurances: Constituted by the institutions dedicated to the financial and insurance activities.		
"Human health and veterinary activities": private and public human health medicinal products and veterinary activities.		
Other Implicit Blocks		
"Electricity" **"Telecommunications"** **"Motion pictures, radio and television"**		
NON BLOCKED ACTIVITIES		
They are composed, of those activities that cannot be assigned in particular to any block, neither to be considered as implicit lin evidential linkages in their interior. Because of that in this aggregation level they were considered as "non blocked." The activities t the following common characteristics: not to be classified in another part; or, be included in a wide number of sectors, which possible linkages.		
PUBLIC SECTOR		
Public administration and defense and plans of social security		

Table 2: BLOCKS ARGENTINA IN MATRIX WITH 124 SECTORS / IOM-124

CEREALS AND OLEAGINOUS
GROWING OF CEREALS, OIL SEEDS AND FORAGES
AGRICULTURE SERVICES
OILS AND OIL CAKES PRODUCED
MANUFACTURE OF WHEAT AND GRAIN MILL PRODUCTS
* MANUFACTURE OF PREPARED ANIMAL FEEDS
BAKERY PRODUCTS
MANUFACTURE OF FARINACEOUS PRODUCTS
MALT LIQUORS AND MALT
* FERTILIZERS AND PESTICIDES AND OTHER AGRO-CHEMICAL PRODUCTS

SUGAR
* SUGAR
OTHER FOOD PRODUCTS
SOFT DRINKS AND MINERAL WATERS

OTHER INDUSTRIAL GROWING
* INDUSTRIAL CROPS
* SUGAR
COCOA, CHOCOLATE AND SUGAR CONFECTIONERY
DISTILLING, RECTIFYING AND BLENDING OF SPIRITS
MANUFACTURE OF WINES
MANUFACTURE OF TOBACCO PRODUCTS

FRUIT, VEGETABLE, HORTICULTURAL SPECIALTIES AND NURSERY PRODUCTS
GROWING OF FRUITS AND NUTS
PROCESSING AND PRESERVING OF FRUIT AND VEGETABLES
GROWING OF VEGETABLES, HORTICULTURAL SPECIALTIES AND NURSERY PRODUCTS

FORESTRY, PAPER AND WOOD
FORESTRY AND LOGGING
* SAW MILLING AND PLANNING OF WOOD
* PRODUCTS OF WOOD, CORK, STRAW AND PLAITING MATERIALS
PULP AND PAPER
CORRUGATED PAPER AND PAPERBOARD AND OF CONTAINERS OF PAPER AND PAPERBOARD
OTHER ARTICLES OF PAPER AND PAPERBOARD
PUBLISHING OF BOOKS, BROCHURES, MUSICAL BOOKS AND OTHER PUBLICATIONS
PUBLISHING OF NEWSPAPERS, JOURNALS AND PERIODICALS
FURNITURE'S AND MATTRESSES
MANUFACTURING N.E.C

CATTLE RAISING AND FARM
FARMING OF CATTLE, WOOL AND DAIRY FARMING
FARM PRODUCTION
HUNTING
PRODUCTION, PROCESSING AND PRESERVING OF MEAT
DAIRY PRODUCTS
* MANUFACTURE OF PREPARED ANIMAL FEEDS
TANNING AND DRESSING OF LEATHER
MANUFACTURE OF FOOTWEAR
MANUFACTURE OF LEATHER PRODUCTS

FISHING
FISHING
PROCESSING AND PRESERVING OF FISH AND FISH PRODUCTS

PETROLEUM AND GAS
EXTRACTION OF CRUDE PETROLEUM, NATURAL GAS AND URANIUM
MANUFACTURE OF REFINED PETROLEUM PRODUCTS
GAS
TRANSPORT VIA PIPELINES

CHEMICAL
MANUFACTURE OF BASIC CHEMICALS
* FERTILIZERS AND PESTICIDES AND OTHER AGRO-CHEMICAL PRODUCTS
PLASTICS IN PRIMARY FORMS AND OF SYNTHETIC RUBBER
OTHER CHEMICAL PRODUCTS

* MAN-MADE FIBERS
* RUBBER TIRES AND TUBES; RETHREADING AND REBUILDING OF RUBBER TIRES
RUBBER PRODUCTS
* PLASTICS PRODUCTS
* ELECTRICITY DISTRIBUTION AND CONTROL APPARATUS

TEXTILES
* INDUSTRIAL CROPS
PREPARATION AND SPINNING OF TEXTILE FIBERS; WEAVING OF TEXTILES
FINISHING OF TEXTILES
* MANUFACTURE OF TEXTILES PRODUCTS
MANUFACTURE OF KNITTED AND CROCHETED FABRICS AND ARTICLES
MANUFACTURE OF WEARING APPAREL; DRESSING AND DYEING OF FUR
* MAN-MADE FIBERS

METAL-MECHANIC AND CONSTRUCTION
OTHER MINING AND QUARRYING
* MANUFACTURE OF TEXTILES PRODUCTS
* SAW MILLING AND PLANNING OF WOOD
* PRODUCTS OF WOOD, CORK, STRAW AND PLAITING MATERIALS
PAINTS AND VARNISHES
* PLASTICS PRODUCTS
GLASS AND GLASS PRODUCTS
MANUFACTURE OF NON-STRUCTURAL REFRACTORY AND NON-REFRACTORY CERAMIC WARE
STRUCTURAL NON-REFRACTORY CLAY AND CERAMIC PRODUCTS
CEMENT, LIME AND PLASTER
ARTICLES OF CONCRETE, CEMENT AND PLASTER
MANUFACTURE OF BASIC IRON AND STEEL
MANUFACTURE OF NON-FERROUS METALS
CASTING OF METALS
STRUCTURAL METAL PRODUCTS, TANKS, RESERVOIRS AND STEAM GENERATORS
FORGING, ROLL-FORMING AND TREATMENT AND COATING OF METALS
CUTLERY, HAND TOOLS AND GENERAL HARDWARE
OTHER FABRICATED METAL PRODUCTS N.E.C
ENGINES, TURBINES, PUMPS AND COMPRESSORS
GEARS, OVENS, LIFTING AND HANDLING EQUIPMENT AND OTHER GENERAL PURPOSE MACHINERY
AGRICULTURAL AND FORESTRY MACHINERY
OTHER SPECIAL PURPOSE MACHINERY
DOMESTIC APPLIANCES
ELECTRIC MOTORS, GENERATORS AND TRANSFORMERS
* ELECTRICITY DISTRIBUTION AND CONTROL APPARATUS
INSULATED WIRE AND CABLE
ACCUMULATORS AND PRIMARY BATTERIES
ELECTRIC LAMPS AND LIGHTING EQUIPMENT
TELEVISION AND RADIO RECEIVERS
MEDICAL, PRECISION AND OPTICAL INSTRUMENTS, WATCHES AND CLOCKS
MOTOR VEHICLES
BODIES (COACHWORK) FOR MOTOR VEHICLES; MANUFACTURE OF TRAILERS AND SEMI-TRAILERS
PARTS AND ACCESSORIES FOR MOTOR VEHICLES AND THEIR ENGINES
SHIPS, RAILWAY AND TRAMWAY LOCOMOTIVES AND AIRCRAFT
MOTORCYCLES, BICYCLES AND OTHER TRANSPORT EQUIPMENT N.E.C.
CONSTRUCTION

TRANSPORT
* RUBBER TIRES AND TUBES; RETHREADING AND REBUILDING OF RUBBER TIRES
PASSENGER LAND TRANSPORT
FREIGHT TRANSPORT BY ROAD
WATER TRANSPORT
AUXILIARY TRANSPORT ACTIVITIES

FINANCES AND INSURANCE
FINANCIAL INTERMEDIATION
INSURANCE

HUMAN HEALTH AND VETERINARY ACTIVITIES
MEDICINAL PRODUCTS
PUBLIC HUMAN HEALTH ACTIVITIES
PRIVATE HUMAN HEALTH ACTIVITIES
VETERINARY ACTIVITIES

IMPLICIT BLOCKS
EXTRACTION OF MINERALS
PRINTING AND REPRODUCTION OF AUDIO AND VISUAL MATERIAL

SOAP, DETERGENTS AND COSMETICS
OFFICE AND COMPUTER MACHINES
TUBES AND RADIO TRANSMITTERS, TV AND TELEPHONY
ELECTRICITY
AIR TRANSPORT
TELECOMMUNICATIONS
MOTION PICTURE, RADIO AND TELEVISION

NON-BLOCKED ACTIVITIES

COLLECTION, PURIFICATION AND DISTRIBUTION OF WATER
WHOLESALE TRADE
RETAIL TRADE
HOTELS
RESTAURANTS
POST AND COURIER ACTIVITIES
ENTERPRISE AND PROFESSIONAL SERVICES
REAL ESTATE ACTIVITIES
PUBLIC EDUCATION
PRIVATE EDUCATION
SOCIAL WORK ACTIVITIES
SEWAGE AND REFUSE DISPOSAL, SANITATION AND SIMILAR ACTIVITIES
ACTIVITIES OF MEMBERSHIP ORGANIZATIONS
PERSONAL AND REPAIRING SERVICES; RECREATIONAL, CULTURAL AND SPORTING ACTIVITIES
PRIVATE HOUSEHOLDS WITH EMPLOYED PERSONS

PUBLIC SECTOR

PUBLIC ADMINISTRATION AND DEFENSE; COMPULSORY SOCIAL SECURITY

*: Intersections

TABLE 3
BLOCKS: ARGENTINA, 220 SECTORS / IOM-220

WHEAT
WHEAT
WHEAT MILLS
BAKERY PRODUCTS
COOKIES AND CRACKERS MANUFACTURING
FRESH PASTA MANUFACTURING
DRY PASTA MANUFACTURING

RICE
RICE GROWING
RICE MANUFACTURING

MALT LIQUORS AND MALT
BARLEY
HOPS
MALT, BEER, AND MALT LIQUORS

OLEAGINOUS
OIL SEEDS
VEGETABLE OILS AND FATS

SUGAR
SUGAR CANE
FLAVOR SYRUP
CANE SUGAR REFINING
MANUFACTURE OF COCOA, CHOCOLATE AND SUGAR CONFECTIONERY
COFFEE, TEA AND *YERBA MATE* CONCENTRATE MANUFACTURING
ETHYL ALCOHOL
SPIRITS
SOFT DRINKS

TOBACCO
TOBACCO
TOBACCO STEMMING AND REDRYING
CIGARETTES
OTHER TOBACCO PRODUCTS

WINE
GRAPE VINEYARDS
WINE

YERBA MATE
YERBA MATE
YERBA MATE MILLS

TEA
TEA
TEA MANUFACTURING

FRUIT, VEGETABLE AND SPICES
FRUIT, VEGETABLE, AND SPICES
FRUIT AND VEGETABLE PRESERVING

FORESTRY, PAPER AND WOOD
* FORESTRY
* SAW MILLING AND PLANING OF WOOD
* MANUFACTURE OF CARPENTRY
PREFABRICATED WOOD BUILDINGS
VENEER, PLYWOOD, AND ENGINEERED WOOD PRODUCT
WOODEN BOXES
COFFIN
OTHER WOOD PRODUCTS
FURNITURE (EXCLUDED METALLIC)
PULP MILLS
PAPER AN CARDBOARD (PAPERBOARD)

PAPER AND PAPERBOARD BOXES
OTHER PAPER AND PAPERBOARD PRODUCTS
PRINTING OF NEWSPAPERS AND MAGAZINES
PRINTING AND BINDING
LITHOGRAPHIC PRINTING
NATURAL TANNIN
* PRINTING INK
MATCHES
OTHER CHEMICAL PRODUCTS
MUSICAL INSTRUMENTS
BROOMS, BRUSHES AND PAINT BRUSHES
PAPER RECYCLABLE MATERIAL

BOVINE (EXCL. DAIRY PRODUCTS)
RYE
MILLET
LIVE STOCK
SORGHUM
OATS
BURLEY FORAGE
CATTLE SLAUGHTERING AND PROCESSING
RENDERING AND MEAT BYPRODUCT PROCESSING
FISH FLOUR AND NON-EDIBLE ANIMAL FATS
ACCESSORY FOR CLOTHES
SALTY AND PEELED LEATHER
TANNING AND DRESSING OF LEATHER
WOMEN'S HANDBAGS
OTHER LEATHER GOODS MANUFACTURING
LEATHER FOOTWEAR
VETERINARY MEDICINE
SOAP AND CLEANING PREPARATION

BOVINE DAIRY PRODUCTS
MILK
DAIRY PRODUCTS AND ICE CREAMS

CHICKENS AND EGGS
FARMING PRODUCTS
CORN
BIRD SEED
CHICKEN SLAUGHTERING AND PROCESSING
SOUPS
CROPS MILLS (EXC. WHEAT)
OTHER FOOD PRODUCTS
ANIMAL FEEDS

FUR
FUR CLOTHES
PREPARATION OF FUR AND FUR ARTICLES

FISHING
FISHING
PROCESSING AND PRESERVING OF FISH AND FISH PRODUCTS

ORGANIC CHEMICAL
PETROLEUM AND NATURAL GAS
HANDBAGS AND LUGGAGE'S
MATTRESS
ALCOHOL MANUFACTURING (EXC. ETHYL)
BASIC PETROCHEMICAL
PLASTIC AND SYNTHETIC RESINS
* PETROLEUM AND COAL DERIVED PRODUCTS
* OTHER RUBBER PRODUCTS
PLASTIC PACKS
PLASTIC PRODUCTS
SPORTS PRODUCTS
PENS AND PENCILS
COMMERCIALS
OIL REFINERIES

INORGANIC CHEMICAL
FERTILIZER MINERALS
ICE

INDUSTRIAL GAS MANUFACTURING
BASIC CHEMICALS
FERTILIZERS, NITROGEN COMPOUNDS AND PESTICIDES
MANUFACTURE OF PHARMACEUTICALS AND MEDICINAL CHEMICALS
SOAP, PERFUMES AND TOILET PREPARATIONS

COTTON
COTTON
* OTHER INDUSTRIAL GROWING
PREPARATION OF COTTON FIBERS
* PREPARATION OF TEXTILE FIBERS (EXC. COTTON)
SPINNING TEXTILES
WEAVING TEXTILES
FINISHING TEXTILES
OTHER WEARING PRODUCTS
BED AND TABLE LINEN
BAGS
CANVAS ARTICLES
BLANKETS
MANUFACTURE OF MADE-UP TEXTILE GOODS EXCEPT WEARING APPAREL
SOCKS
KNIT FABRIC FINISHING
KNIT FABRIC MILLS
CARPET AND RUG
CORDAGE
OTHER TEXTILES PRODUCTS
SHIRTS
OTHER APPAREL MANUFACTURING
RAINCOATS
ATHLETIC FOOTWEAR
MAN-MADE FIBERS
TIRE MANUFACTURING AND RETHREADING

SHEEP
WOOL
LAUNDRY WOOL

METAL-MECÁNIC AND CONSTRUCTIÓN
* FORESTRY
* OTHER INDUSTRIAL GROWING
IRON MINERALS
MINING OF NON-.FERROUS METAL ORES
QUARRYING OF STONE, CLAY AND SAND
OTHER NON-METALLIC ORE MINING
* PREPARATION OF TEXTILE FIBERS (EXC. COTTON)
* SAW MILLING AND PLANING OF WOOD
* MANUFACTURE OF CARPENTRY
MANUFACTURING OF PAINTS, BURNISHES AND MASTICS
* PRINTING INK
EXPLOSIVES AND AMMUNITIONS
* PETROLEUM AND COAL DERIVED PRODUCTS
* OTHER RUBBER PRODUCTS
ARTICLES OF PORCELAIN, CERAMIC AND STONEWARE
GLASS CONTAINERS
FLAT GLASS
RESISTANT GLASS
MIRRORS AND VITREOUS
COMMON BRICK
BRICK MADE BY MACHINES AND TILES
REFRACTORINESS MANUFACTURING
CEMENT
CLAY
GYPSUM
CEMENT AND CONCRETE ARTICLES
MOSAICS
MARBLE AND GRANITE
OTHERS NONMETALLIC MINERALS
IRON AND STEAL
BASIC PRODUCTS OF NONFERROUS METALS
HAND AND EDGE TOOLS
FURNITURE'S AND METALLIC ACCESSORIES
TANKS AND METAL CONTAINERS
CONSTRUCTION METAL STRUCTURES

POWER BOILER
ORNAMENTAL AND ARCHITECTURAL METAL PRODUCTS
NAILS AND SCREWS
TIN CANS
OVENS AND STEAM GENERATORS
WIRE MANUFACTURING
OTHERS METAL PRODUCTS
ENGINES AND TURBINES
AGRICULTURE MACHINERY AND EQUIPMENT
METALS AND WOOD WORKING MACHINERIES
SPECIAL INDUSTRIAL MACHINERIES
BALANCES
ELEVATORS
REFRIGERATORS, LAUNDRY MACHINES AND AIR CONDITIONER EQUIPMENTS.
WEAPONS
KNITTING AND SEWING MACHINES
OTHERS NON-ELECTRICAL MACHINERIES
ELECTRICAL EQUIPMENTS
RADIO AND TV EQUIPMENTS
COMMUNICATION EQUIPMENTS
HOUSEHOLD ELECTRICAL APPLIANCES
BATTERIES
ELECTRIC LAMP BULB
ELECTRIC CONDUCTORS
OTHERS ELECTRICAL APPLIANCES
SHIPS AND BOATS BUILDINGS
RAILWAY AND TRAIN WAY LOCOMOTIVES AND ROLLING STOCK
MOTOR VEHICLES MANUFACTURING
MOTOR VEHICLE PARTS
MOTOR VEHICLE BODIES
TRACTORS
MOTORCYCLES AND BICYCLES
AIRCRAFTS
OTHER TRANSPORTATION EQUIPMENT
PROFESSIONAL AND SCIENTIFIC EQUIPMENT
PHOTOGRAPHIC EQUIPMENT AND OPTICAL INSTRUMENTS
WATCHES AND CLOCKS
JEWELRIES
MANUFACTURING INDUSTRIES N.E.C
PUBLIC AND PRIVATE CONSTRUCTION
GLASS RECYCLABLE MATERIAL
METAL RECYCLABLE MATERIAL

IMPLICIT BLOCKS
PROCESSED OF COFFEE AND SPICES
CIDER
CORK
OFFICE, ACCOUNTING, AND COMPUTING MACHINES

*: Intersections.

BIBLIOGRAPHY

✍✍Hewings G.J.D. y Jensen, R. C. (1986): "Regional, Interregional and multiregional Input-Output Analysis", in *Handbook of Regional an Urban Economics*, Volume I, Edited by P. Nijkamp, Elseiver Science Publishers BV.

✍✍Hoen A. (2002): "Identifying Linkages with a Cluster-based Methodology", in *Economic Systems Research*, vol. 14, no. 2, pp. 131-146

✍✍Leontief, W. (1986): *Input-output economics*, Oxford University Press, New York.

✍✍Lifschitz, E. (1988): "Emblocamiento de los cuadros de insumo-producto correspondientes a las actividades productoras de bienes. Propuesta Metodológica" en *Eslabonamientos productivos en Argentina, Brasil y México (II Seminario Internacional). ,*Universidad Autónoma Metropolitana, Ciudad de México.

✍✍Lifschitz, E. et al (1992): "Eslabonamientos Productivos: Enfoque metodológico y Presentación de las matrices sectoriales", en *Estudio para el diseño de Política Públicas,* PNUD-Gobierno Argentino-BIRF, Buenos Aires; pag. 1-108

✍✍Lifschitz, E.; Szyld, D.; Sauber, B.; (1986): "Partitioning, Aggregating and Updating Input-Output tables, methodological aspects of Sectorial Matrices" in *Eighth International Conference on Input-Output Techniques*; UNIDO; Sapporo, Japan.

✍✍Mercado, R. (2003) "Empirical Economywide Modeling in Argentina", Working Paper, Lozano-Long Institute of Latin American Studies.   University of Texas, Austin

✍✍Merle, G. (1997): "El Método de Emblocamiento de E. Lifschitz", en *Obtención de matrices sectoriales por medio de algoritmos de emblocamiento,*Trabajo de Licenciatura- Facultad de Ciencias Exactas y Naturales – Dep. de computación, UBA, Argentina.

✍✍National Institute of Statistics and Census, Secretary of Economy Policy, Ministry of Economy and Production, Argentina (2001): *Matriz Insumo Producto. Argentina 1997.*

✍✍Porter, M. E. (1990): *The Competitive Advantage of Nations*, New York, Free Press.

✍✍PyIO.   Phython   Module   for   Input   Output   Analysis. http://www2.uiuc.edu/unit/real/pyio/pyio.htm.

✍✍Ramos J. (1999): *Una estrategia de desarrollo a partir de los complejos productivos (clusters) en torno a los recursos naturales. ¿Una estrategia prometedora?,* CEPAL, Santiago de Chile.

✍✍Secretaría de Industria y Comercio Exterior (1986): *Actualización del cuadro de insumo-producto de los sectores productores de bienes. Argentina 1984.,*Programa de Naciones Unidas para el Desarrollo (PNUD), Buenos Aires.