

THE MEAT SECTORS AND THE BRAZILIAN ECONOMY: AN INTERREGIONAL INPUT-OUTPUT APPROACH

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1. BACKGROUND

The Brazilian meat production in 1999 is estimated at 12.8 million tons. The main productive chains of this sector are: the beef chain (6.7 million tons or 49.9% of the total volume produced); the poultry chain (5.0 million or 37.5% of the total volume produced); and the pork chain (1.7 million tons or 12.6% of the total volume produced). Brazil is the world's second largest beef producer (13.6% of the world's total volume); third largest poultry producer (12.5% of the world's total volume); and it is still the eighth largest pork producer (2.0% of the world's total volume). Brazil is also the world's third largest beef exporter (9.2% of the world's total volume); second largest poultry exporter (12.7% of the world's total volume); and thirteenth largest pork exporter (1.3% of the world total volume). Brazil's share in the world beef and pork market might increase since some Brazilian producer areas are becoming free of some animal's diseases, an important meat export barrier. The Brazilian herd is distributed as following: 34% in the Middle West region, 23% Southeast, 16,5% South, 14,5% Northeast and 12% in the North region. The beef processing industries are concentrated in the Southeast. Around 36.0% of the Brazilian pigs are raised in the South region (close to the largest part of the slaughter and pork process industry), 20.0% are concentrated in the Southeast, where the slaughter houses and process industries have improved the technology used; 13% in the Middle West, where there are good perspectives of expansion, following the increase of corn and soil been productions; 7.0% in the North and 24% in the Northeast regions, and are used to the subsistence, but the installation of meat process industry in the Northeast are changed that situation. The pork processing industry is concentrated in the South and Southeast. The Brazilian poultry sector is concentrated in the South region, 45.0%, and 55.0% are distributed as following: 29.0% in the Southeast region, 15.0% in the Northeast, 6.0% in the Middle West and 5.0% in the North region. The poultry slaughter and processing industries are also concentrated in the South and Southeast. Actually, the pig and poultry raising and the slaughter sectors are changing to the Middle West, following the corn and soil been crop. The transport conditions among Middle West, North and Northeast regions are been improved, and the meat processing industries are moving from South and Southeast to the other regions.

2. OBJECTIVES

Due to the importance of the meat sector for the Brazilian economy it was important to know how the product transference of the animal-breeding and slaughter sectors and the meat processing industries take place among the Brazilian regions and how this can impact the national economy. In this paper we analyze the significance of the meat processing industry to the national and regional economies. The construction and the use of five regions interregional input-output table of 1995 has been accomplished.

3. METHODS

This study was conducted mainly in three stages. Initially, we used the Brazilian input-output matrix for the year of 1995 (IBGE, 1997), in which some sectors of the Production and Input Tables were aggregated into 23 different sectors. These tables permitted us to study the meat industry sector. We calculated how much a specific sector demands from the other sectors (Rasmussen/Hirschman backward linkage indices) and how much those other sectors demand of it (Rasmussen/Hirschman forward linkage indices). Then we separated the impacts of the certain sector from the rest of the economy (the pure inter-industrial linkage indices). Second, we constructed and used a five region interregional input-output table, also with 23 sectors in each region (total: 115 sectors), for the year of 1995, for the Brazilian economy, which was based in GUILHOTO (1999). We used these tables to calculate the Rasmussen/Hirschman backward and the forward linkage indices as well as the pure linkage indices. The meat sectors were estimated through their extraction from the other sectors. Finally, we compared the present significance of the meat industry, among regional and the national economies.

Input-Output Model: Inter-industries flows in a specific economy are determined by technological and economic factors, and these flows can be described by a system of simultaneous equations represented by: $X = AX + Y$ (1), where X is a vector ($n \times 1$) and it contains the value of total production by sector; Y is also a vector ($n \times 1$) and it contains the final demand values; and A is a ($n \times n$) matrix which contains the production technical coefficient (LEONTIEF, 1951, in GUILHOTO et al., 1994; GUILHOTO, 1995; MILLER & BLAIR, 1985). In the model above, the final demand vector is usually considered exogenous to the system; thus, the total production vector is determined only by the final demand vector, that is: $X = BY$ (2) and $B = (I - A)^{-1}$ (3), where B is a ($n \times n$) matrix which contains the Leontief inverse matrix. Starting from equation (13), we can evaluate the impact of different changes in the final demand on the total production, import volumes and total salaries. Thus, $\Delta X = B \Delta Y$ (4), $\Delta M = m \Delta X$ (5) and $\Delta S = s \Delta X$ (6), where ΔY , ΔX , ΔM and ΔS are ($n \times 1$) vectors which show respectively the final demand increase, and the impacts on the total production volume, on the import values and on the salary totals; m and s are diagonal ($n \times n$) matrices in which the diagonal elements are the import and salary coefficients. Starting from equation (3), and following Rasmussen (1956) and Hirschman (1958), we can determine which sectors present high linkage power in a specific economy. That is, we can calculate how much a specific sector demand from the other sectors (backward linkage indices) and how much those other sectors demand of it (forward linkage indices).

Pure Inter-Industrial Linkages Index (GHS Approach): The pure inter-industrial linkage index is an alternative proceeding to separate the impacts of a certain sector from the other economic sectors. This proceeding can also be used to separate the impacts of the certain region from the rest of the economy, or still to separate the impacts of certain country from the economic

block in which it is inserted (GUILHOTO, SONIS, HEWINGS, 1996; GUILHOTO, HEWINGS, SONIS, 1997). This index is an improvement of the Cella-Clements approach. The basic idea is to isolate certain sector j from the rest of the economy and to define the effect of the total linkages of the sector j in the economy. That is, the difference between the total production of the economy and the production in the economy if the sector j does not buy inputs from the rest of the economy and it does not sell its production to the rest of the economy. This situation is equivalent to an elimination of a given industrial sector. We can isolate determined sector j from the rest of the economy considering an input-output system with two regions, which can be represented by the following direct Leontief coefficients (GUILHOTO, HEWINGS, SONIS, 1997).

4. RESULTS AND DISCUSSIONS

- The Rasmussen/Hirschman backward and forward linkage indices indicate that the meat industry demands products from the several other sectors, but it is not demanded by other sectors. That is, the meat industry is more connected to final demand.
- The meat industry sector can be considered a key-sector to the Brazilian economy - we are considering that key-sectors are those which display Rasmussen/Hirschman backward or forward linkage indices above 1.
- The total pure inter-industrial linkage index, proceeding used to separate the impacts of the certain sector from the rest of the economy, shows us that effects of the disappearance of the meat industry sector will result in a significant impact on the Brazilian economy.
- The regions South (S), Southeast (SE) and Middle West (MW) display strong Rasmussen-Hirschman backward indices, while the other regions display indices smaller than the first ones. This result is not surprisingly, because regions S, SE and MW concentrate the national meat industry.
- All regional meat industries show small Rasmussen-Hirschman forward indices, but the MW displays the smallest one. That is, the MW meat production is more connected to final demand than the other regions. We would like to emphasize that: a) in fact, in the MW there is a slaughter housing concentration while in the S and SE there is a meat processing concentration; b) the South and Southeast's productions (sausages, hamburgers, ham, etc) are exported from those regions to the rest of the country; c) the S and SE regions use to buy cattle or animal carcass from the other regions to slaughter and/or processing; d) moreover, in the regions S and SE are located the largest Brazilian sectors in terms of value added.
- The Pure backward, forward and total linkage indices behavior indicate that the disappearance of the South meat industry can affect strongly the national economy. The disappearance of the Southeast and Northeast meat industry can also affect the Brazilian economy, but with less intensity.

The results also show us that, in general, the meat sector is very important to the regional economies. The Southeast meat sector is the exception. The Southeast is the most industrialized region in Brazilian and its economic sectors are the largest sectors in terms of value added. The significance of the meat industry is not large when we consider the whole Southeast economy. However the significance of this sector to the national economy is strong. Moreover, as also showed, that sector probably demands inputs from several other sectors. Therefore, we can conclude that the Southeast meat industry is strongly interrelated with several sectors from other Brazilian regions. However, meat industries of the other regions are more connected with other sectors in their own regions.

5. CONCLUSIONS

This work analyzed the significance of the meat industry to the regional and the national economies of Brazil.

We could conclude that, among the regional meat sectors, the South meat industry is the most important, followed by the Southeast meat industry. We could also conclude that, in general, the meat sector is very important to the regional economies. The Southeast meat industry is the exception. The analysis showed that the Southeast meat industry is strongly interrelated with the other Brazilian sectors, while meat industries of the other regions are more connected with other sectors in their own regions.

These results let us raise some questions. As showed above, part of the Southeast industry tends to be transferred to the Middle West. Then, probably this transference will not affect the Southeast economy as a whole. As also showed above, part of the South meat industry tends also to be transfer to the Middle West. However, the South meat sector is more connected with it own sectors. Then, the disappearance of part of this sector probably will cause strong impacts in the South economy.

6. REFERENCES

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