TEXTO PARA DISCUSSÃO Nº 98

# INDUSTRIAL SPECIALIZATION AND REGIONAL COMPETITIVENESS IN BRAZIL

Mauro Borges Lemos

Maio de 1996

UNIVERSIDADE FEDERAL DE MINAS GERAIS
FACULDADE DE CIÊNCIAS ECONÔMICAS
CENTRO DE DESENVOLVIMENTO E PLANEJAMENTO REGIONAL

# INDUSTRIAL SPECIALIZATION AND REGIONAL COMPETITIVENESS IN BRAZIL(*)

**Mauro Borges Lemos**
Professor of Department of Economics, Federal University of Minas Gerais, Brazil. Ph.D. in Economics, University of London.

**CEDEPLAR/FACE/UFMG**
**BELO HORIZONTE**
**1996**

---

* This paper is supported by a research programme on regional development carried out by Centre of Regional Development and Planning (CEDEPLAR), Federal University of Minas Gerais, Brazil. This programme is funded by the Research Supporting Foundation of Minas Gerais (FAPEMIG). My gratitude to Professor Clelio Campolina Diniz, the research coordinator, who has shared with me this challenge. I would like to thank Leo Guerra, the research computer programmer, and Isabel Marri, my research assistant, for their restless help during all stages of this study.

Ficha catalográfica

| | |
|---|---|
| 332.(81)<br>L557i<br>1996 | LEMOS, Mauro Borges.<br>Industrial specialization and regional competitiveness in Brazil. Belo Horizonte: CEDEPLAR/UFMG, 1996.<br>38p. (Texto para discussão; 98)<br>1. Desenvolvimento regional. 2. Especialização industrial - Brasil. 3. Brasil - Condições econômicas. I. Universidade Federal de Minas Gerais. II. Centro de Desenvolvimento e Planejamento Regional. III. Título. IV. Série. |

**SUMÁRIO**

## INTRODUCTION

The aim of this paper is to analyse regional competitiveness based on contemporary industrial specialization in manufacturing of Brazilian regions. The expected result of the study is to show that the new industrial pattern of regional development in Brazilian regions has undergone increasing changes since the new open trade policy in the early nineties. After more than 30 years of protection by import substitution programmes, Brazilian manufacturing has been severely exposed to international competition. Import tariffs were substantially dropped while tax incentives for export promotion were reduced or eliminated. As a result, external exposure has imposed on Brazilian enterprises and domestic subsidiaries of multinational enterprises a widespread need for technological updating, specially the adoption of information-based technologies in production.

In addition to this ongoing updating of established enterprises, industrial restructuring has also stimulated the emergence of High-Tech firms both in new consolidated industrial districts. The location of these new districts has been concentrated in the South and Southeast, where more than ninety percent of manufacturing output is already concentrated.

In order to capture the effects of manufacturing restructuring on changes in regional specialization and competitiveness an updated data base was used, which provided employment information for the 1986-94 period.

Section 1 introduces this study in the relevant literature on regional development. Section 2 provides a brief historical background of recent regional development in Brazil. Section 3 describes the methodological procedures: regionalization and identification of industrial agglomerations; coefficients of regional specialization and export base; and identification of structural and differential sources of regional growth based on shift-share aggregate method. Section 4 shows the results and analyses the basic features of regional competitiveness based on industrial specialization of the regions. Finally, the concluding remarks of the study stress the difficulties to compare the results of the Brazilian industrial agglomerations with findings by the international literature about recent development of industrial districts.

## 1 ANALYTICAL BACKGROUND

The analytical background of this study comes from two distinct bodies of literature on regional development. First, the conventional but fruitful literature on regional economics related to regional growth theory. Second, the recent developments on economic geography regarded with the emergence of new industrial districts in developed countries.

The regional growth theory provides the idea of increasing returns applied to regional growth, which had both its beginning from Myrdal's insights on economic development (Myrdal,1963) and its formal treatment by Richardson's regional growth theory (Richardson, 1973). The modelling of Richardson's theory had its best development in the classical work of Boventer (1975), who successfully made it operational and testable.

What is of interest here is the use of agglomeration factor as the key variable to understand regional development. Firstly, intra-urban agglomeration economies due to increasing returns direct regional

development towards economic polarization and concentration. As soon as excessive agglomeration increases intra-city factor costs, decreasing returns tend to predominate and dispersion of economic activity takes place based on inter-regional agglomeration economies. Finally, dispersion takes a selective shape since location of competing regions attracting new investments tends to favour those with less frictional costs, which is a hindrance for the spacial spreading of inter-regional agglomeration economies. Hence, regional development takes the shape of a ***"decentralized concentrated dispersion"*** (Richardson, 1973).

Further contributions on the subject were made by several authors, and is worth while mentioning Friedman's idea of ***"polarization reversal"***(Friedman,1972).

On the other hand, the recent literature on industrial districts gives additional hints to understand industrial restructuring in the space. Certainly, the new wave of diffusion of information technologies has been an inducing device for the emergence of this new literature on economic geography. The basic idea of Scott (1988) and Storper (1989) is that rising flexible production system has opened the door to lessen the regidity of industrial specialization towards "flexible specialization", which has provided the basis for regions embarked on this new technological base to consolidate their locational attractiveness.

The critical point made by Markusen (1994) to this idea of "flexible specialization" is paradoxally its regidity to understantd the diversity and complexity of atractiveness of new industrial districts. Such diversity is classified by her in four "pure" types of industrial districts: Marshallian and its Italian variant; hub and spoke, state-anchored, and satellite-platform.

The great advantage of this basic classification is flexibility to analyse real cases which have emerged in the spacial complexity. From this it is possible to join institutional aspects with economic variables for a better understanding of that complexity.

Further, this broadening of the new district approach makes possible to incorporate the Newly Industrializing Countries in its analytical scope, since the idea of "flexible specialization" is far away from the complex reality of regional development of the NICs.

## 2 HISTORICAL BACKGROUND

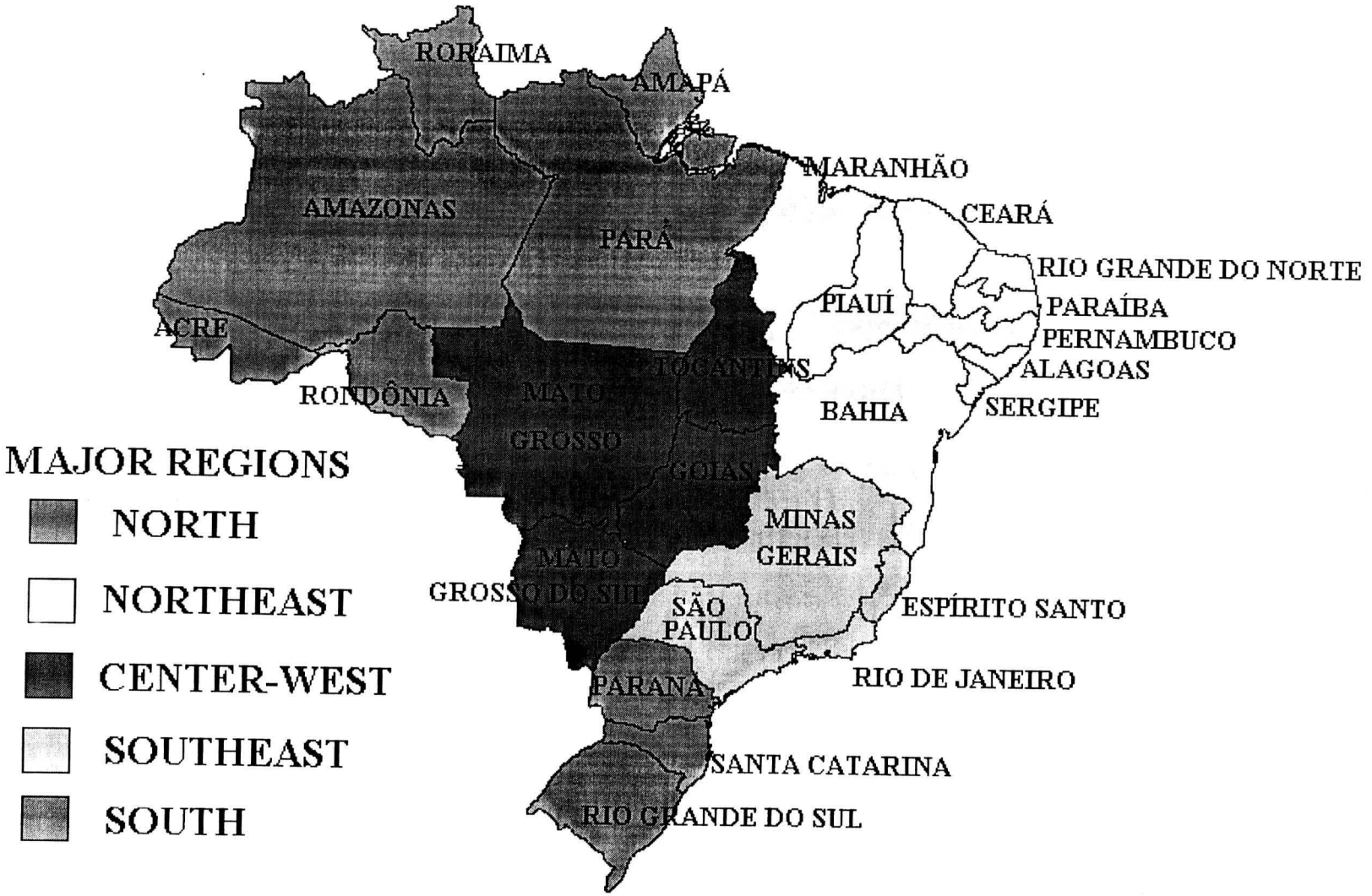
The seventies marks the turning point of regional development in Brazilian industrialization. This development has been characterized by an early phase of strong geographic concentration in the long 1930-1970 period followed by a recent phase of relative decentralization.

In the first phase economic growth in Brazil was markedly concentrated in the Southeast states, specially in the states of São Paulo and Rio de Janeiro. As shown in Table 1, this region held in 1970 around 65 percent of Brazilian GDP whereas held 40 percent of population and only 10.8 percent of the country's total area. Furthermore, no less than 55 percent of GDP was concentrated in São Paulo and Rio. As expected, manufacturing was the driving force of GDP geographic concentration and these two states together accounted in that period for more than 70 and 60 percent of output and employment in manufacturing, respectively.

Since the early seventies, regional development in Brazil has undergone a new phase of relative decentralization of economic activity. The beginning of this process during the seventies took place under the fastest economic growth period of Brazilian industrialization. The differential growth rates among the emerging regions and the two regional poles have established the pace and extension of decentralization, which has been characterized as a process of polarization reversal (Azzoni, 1986, Diniz, 1994).

# FIGURE 1

## BRAZIL
## AND FEDERATIVE STATES



## TABLE 1

**BRAZIL - Regional Distribution of Geographic Area, GDP and Population, 1970/1990**

| Regions/States | Area | GDP | | Population | |
|---|---|---|---|---|---|
| | | 1970 | 1990 | 1970 | 1991 |
| Rondônia | 2.8 | 0.1 | 1.0 | 0.1 | 0.8 |
| Acre | 1.8 | 0.1 | 0.2 | 0.2 | 0.2 |
| Amazonas | 18.4 | 0.7 | 1.7 | 1.0 | 1.4 |
| Roraima | 2.7 | - | 0.1 | 0.0 | 0.1 |
| Pará | 14.5 | 1.2 | 2.3 | 2.3 | 3.5 |
| Amapá | 1.6 | 0.1 | 0.2 | 0.1 | 0.3 |
| North | 41.8 | 2.2 | 5.5 | 3.1 | 6.3 |
| Maranhão | 3.8 | 0.9 | 1.2 | 3.2 | 3.4 |
| Piauí | 3.0 | 0.4 | 0.5 | 1.8 | 1.7 |
| Ceará | 1.8 | 1.5 | 1.8 | 4.7 | 4.3 |
| R. G. do Norte | 0.6 | 0.6 | 1.2 | 1.7 | 1.6 |
| Paraíba | 0.7 | 0.7 | 0.7 | 2.6 | 2.2 |
| Pernambuco | 1.2 | 3.0 | 2.3 | 5.5 | 4.8 |
| Alagoas | 0.3 | 0.7 | 0.8 | 1.7 | 1.7 |
| Sergipe | 0.5 | 0.5 | 1.2 | 1.0 | 1.0 |
| Bahia | 6.6 | 3.8 | 6.1 | 8.1 | 8.2 |
| Northeast | 18.5 | 12.1 | 15.8 | 30.3 | 28.9 |
| Minas Gerais | 6.9 | 8.3 | 10.0 | 12.3 | 10.7 |
| Espírito Santo | 0.5 | 1.2 | 1.9 | 1.7 | 1.8 |
| Rio de Janeiro | 0.5 | 16.1 | 11.4 | 9.7 | 8.7 |
| São Paulo | 2.9 | 39.4 | 32.8 | 19.1 | 21.5 |
| Southeast | 10.8 | 65.0 | 56.1 | 42.8 | 42.7 |
| Paraná | 2.4 | 5.5 | 6.3 | 7.3 | 5.8 |
| Santa Catarina | 1.1 | 2.8 | 3.1 | 3.1 | 3.1 |
| R. G. do Sul | 3.2 | 8.7 | 7.3 | 7.2 | 6.2 |
| South | 6.7 | 17.0 | 16.7 | 17.6 | 15.1 |
| M. G. do Sul | 4.2 | - | 0.9 | | 1.2 |
| Mato Grosso | 10.4 | - | 1.0 | 1.8(*) | 1.4 |
| Goiás (1) | 7.6 | - | 2.3 | 3.2 | 3.3 |
| Distrito Federal | - | 1.0 | 1.7 | 0.6 | 1.1 |
| Central West | 22.2 | 3.7 | 5.9 | 5.6 | 7.0 |
| Brasil | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

**Source:** FIBGE - Brazilian Statistics Yearbook (Tab. 86.5)
FIBGE - Demographic Census, 1991, preliminary data
RODRIGUES, MCP "O PIB dos Estados Brasileiros", in: Conjuntura Econômica, dez/1993, pg. 82 - 84

**Note:** 1. Includes Tocantins
* In 1970 the States of M.G. do Sul e Mato Grosso were one unified state

The net result of polarization reversal in Brazil shown in Table 2 has really been the relative loss of industrial output of the Southeast region to the benefit of the others. The South and the North were the most benefited in terms of absolute and relative gains, respectively. However, these results deserve qualifications.

Firstly, despite the 11.5 percent loss in its relative share, the Southeast still holds 70 percent of the Brazilian industrial output. This loss was to a great extent due to the metropolitan area of São Paulo city, which decreased its relative share of Brazilian industrial output from 44 percent to 26.3 percent in the 1970-90 period. However, this relative loss of the metropolitan area has not meant an industrial decaying of the state of São Paulo as a whole. On the contrary, its hinterland has absorbed the greatest share of that 17.7 percent net loss, increasing its share in Brazilian industrial output from 14.1 percent to 23 percent (that is, 9 percent net gain) during the same period. The basic strategy of industrial policy of the state of São Paulo in the last 25 years was the development of a sophisticated transportation system, which enabled industrial dispersion from its metropolitan area to be channelized into a network of well-structured medium-sized cities at the state's hinterland.

Secondly, industrial decaying of Rio de Janeiro has played a secondary but an important role in this decentralization. Its net loss of relative share in Brazilian manufacturing employment from 1970 to 1994 is 6 percent. On the other hand Minas Gerais, the third industrial state in Brazil, has not lost its relative shares in output and employment and has even increased them slightly.

Thirdly, import substitution programmes during the late fifties, sixties and seventies were articulated with a deliberated policy of decentralization of economic development through huge public investments in social capital and tax incentives to locate industries in less developed regions (Diniz, 1994). This decentralization strategy paved the way for the expansion of the agricultural and mineral frontiers.

## TABLE 2

### Distribution of Industral Value Added and Employment According to Major Regions and States
**1970-1990**

| Regions and States Selected | VA | 1970 (1) | VA | 1985 | VA | 1990 (2) | Net Result | (2)-(1) |
|---|---|---|---|---|---|---|---|---|
| | | Employment | | Employment | | Employment | VA | Employment |
| Amazonas | 0,4 | 0,4 | 1,7 | 1,1 | 2 | 1,1 | 1,6 | 0,7 |
| Pará | 0,4 | 0,9 | 0,6 | 1,1 | 0,9 | 1,1 | 0,5 | 0,2 |
| Other States (RO, AC, RR, AP, TO(1991)) | 0 | 0,2 | 0,2 | 0,4 | 0,2 | 0,4 | 0,2 | 0,2 |
| North | 0,8 | 1,5 | 2,5 | 2,7 | 3,1 | 2,6 | 2,3 | 1,1 |
| Pernambuco | 2,2 | 3,3 | 2 | 2,7 | 1,8 | 3,8 | -0,4 | 0,5 |
| Bahia | 1,5 | 2,2 | 3,8 | 2,6 | 4 | 2,1 | 2,5 | -0,1 |
| Other States (MA, PI, CE, RN, PB, AL,SE) | 2 | 4,7 | 2,8 | 5,4 | 2,6 | 5,9 | 0,6 | 1,2 |
| Northeast | 5,7 | 10,2 | 8,6 | 10,8 | 8,4 | 11,8 | 2,7 | 1,6 |
| São Paulo | 58,1 | 48 | 51,9 | 45,1 | 49,3 | 44,9 | -8,8 | -3,1 |
| Metropolitan Area of São Paulo | 44 | 33,6 | 29,4 | 27,9 | 26,3 | 22,1 | -18 | -11,5 |
| Minas Gerais | 15,7 | 7,5 | 9,5 | 8,5 | 9,9 | 8,1 | -5,8 | 0,6 |
| Rio de Janeiro | 12,1 | 13,3 | 7,7 | 9,4 | 0 | 9,5 | -12 | -3,8 |
| Metropolitan Ares of Rio de Janeiro | 6,5 | 8,9 | 8,3 | 7,6 | 8,8 | 6,1 | 2,3 | -2,8 |
| Espírito Santo | 0,5 | 0,8 | 1,2 | 1,2 | 1,3 | 1,1 | 0,8 | 0,3 |
| Southeast | 80,8 | 69,7 | 70,9 | 64,2 | 69,3 | 63,1 | -12 | -6,6 |
| Paranß | 3,1 | 4,2 | 4,9 | 4,6 | 5,6 | 5,3 | 2,5 | 1,1 |
| Santa Catarina | 2,6 | 4,4 | 3,9 | 5,5 | 4,1 | 5,8 | 1,5 | 1,4 |
| Rio Grande do Sul | 6,3 | 8,2 | 7,9 | 9,9 | 7,7 | 9,3 | 1,4 | 1,1 |
| South | 12 | 16,9 | 16,7 | 20 | 17,4 | 20,3 | 5,4 | 3,4 |
| Central-West | 0,8 | 1,4 | 1,4 | 2,2 | 1,8 | 2,1 | 1 | 0,7 |

**Source:** Diniz and Crocco, 1995, p.12

The first phase of agricultural expansion in the 1950-60 period took place in the Southern states and enabled them to be integrated into industrial decentralization of São Paulo metropolitan area. In its second expansion phase during the seventies and early eighties, the agricultural frontier expanded towards the Centre-West region in a vast area of Brazilian *cerrado* lands. Despite the widespread effect on economic occupation, the region attractiveness to industrial location has been restricted to raw-material based industries.

In regard to the mineral frontier, its expansion has been concentrated in the North at the rich mineral reserves of Amazon. In addition, the North has been benefited by the establishment in the sixties of Manaus Tax Free Zone to the production and final assembling (from import materials) of consumer-goods to the internal market (Diniz and Santos, 1995).

Finally, although substantial share of Federal government investments and incentives was directed to the lagging Northeast region, only the state of Bahia took off through a public-private joint venture to establish a large-scale petrochemical pole.

Despite the deliberate effort of Federal government to widen geographically the dispersion effect of polarization reversal, the geographic scope of industrial dispersion has been restricted and mainly confined to contiguous areas from the metropolitan pole of São Paulo, including medium-sized cities in the state's hinterland and metropolitan and medium-sized cities of Southeast and South states. This concentrated dispersion is called by Diniz (1994) a "polygonized development". In section 4 this emerging industrial areas will be shown and depicted.

## 3 METHODOLOGY

### 3.1 Region Criterion

The first methodological procedure is the criterion of region, which is the geographic unit to identify the industrial areas. The Brazilian census uses three basic geographic units: *state* as a federative self-governing unit; *microregion* as a geographic unit of a federative state comprising municipalities with contiguous areas and basic geographic homogeneity; *municipality* as the smallest self-governing unit based on a town.

Since the basic criterion to study industrial areas is the agglomeration factor, it seems that municipality is too narrow and state is too broad to capture, respectively, *intra-regional agglomeration economies* and *inter-regional agglomeration economies*, which are decisive inducing factors for developing industrial areas (Richardson, 1973). Even though a polarization criterion is not explicitly used to delimitate a microregion, in practice Brazilian census has taken account of this and in general a microregion is delimited based on a city polarizing smaller towns.

The choice of *microregion* as this study analysis unit has the additional advantage of being methodologically operational and compatible with the data base used.

### 3.2 Data Base

The data base of this study is *RAIS* of Brazilian Ministry of Labour. RAIS has a national-wide coverage of annual employment and wages of enterprises according to sector activities and regions (states, microregions and municipalities). Information to RAIS is compulsory for all enterprises operating in Brazil, regardless their origin, size and location.

Using this data base makes possible to update the study for the 1986-1994 period, which covers from the years just before the beginning of industrial restructuring in early nineties until 1994, when the most ambitious stabilization economic plan started (Plano Real).

Another advantage of this data base is its compatibility with industrial census in both sector and region classification.

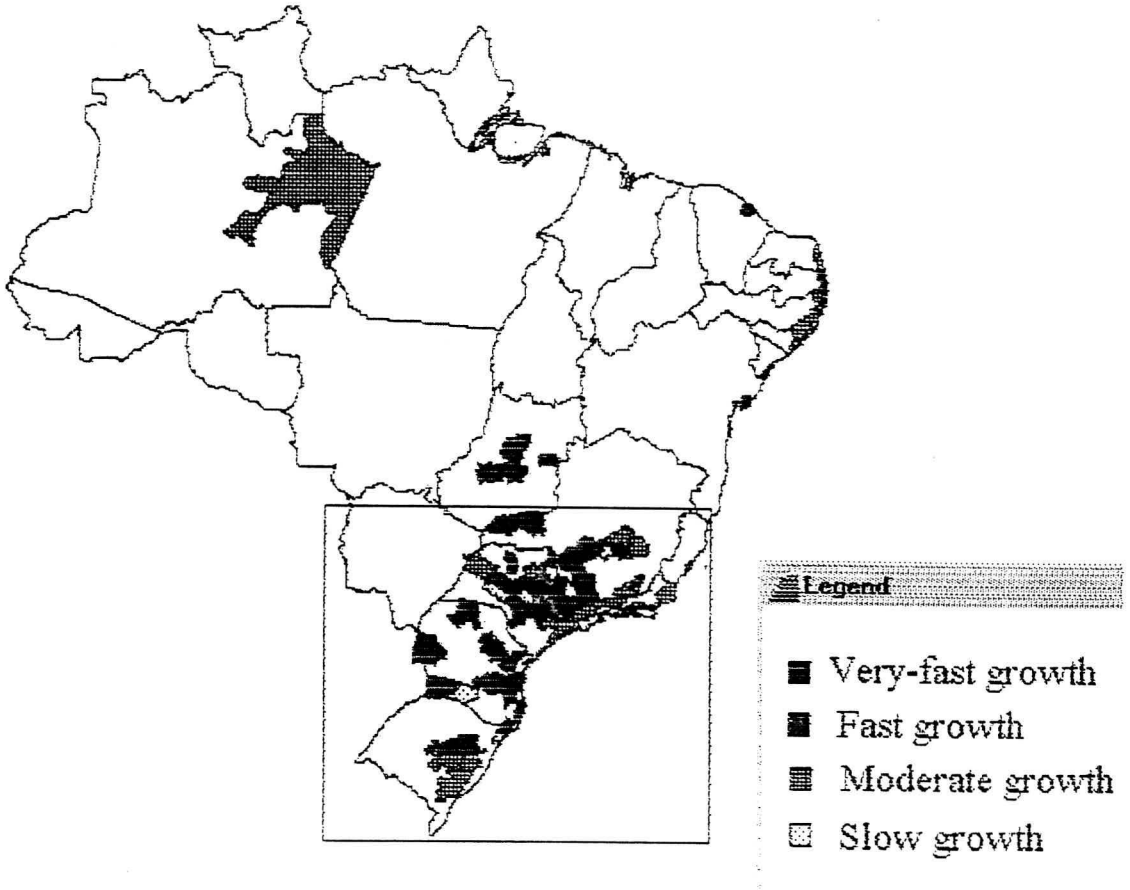
There are two limiting factors of RAIS for this study. First, non-registered enterprises working on *informal economy*, which is significant in Brazil, is not included in the data base. However, informal economy is far less significant in manufacturing (the study's focus) than in service. Second, employment instead of output is the variable to measure economic activity. For time-series intra-sectoral analysis a possible flaw is the level of labour productivity increase, which impair the use of employment growth as proxy of activity growth. In the case of Brazil, labour productivity increase has played an important role in rising unemployment during the coverage period, apart from unemployment rise due to devastating 1990-91 recession that hit domestic economy.

For cross-section inter-sectoral analysis a possible flaw is the differential labour productivity growth among sectors misleading, therefore, results of differential activity growth among them, that is, using employment data can overestimate slow productivity growth sectors and underestimate those of fast productivity growth.

Despite these limitations, RAIS is the only data base in Brazil that not only covers the universe of enterprises but also is updated. The last industrial census available in Brazil is the 1985 one, which is obviously outdated for analysing structural changes in the nineties.

It is needed to bear in mind these difficulties of using employment data in order to avoid misleading analysis of the study's results.

FIGURE 2 - Geographic Distribution of Brazilian Relevant Industrial Agglomerations by Employment Growth Rate, 1986/94



## TABLE 3

### Size Distributon of Brazilian Relevant Industrial Agglomerations 1991

| Federation Unit | RIAs | Employment | Relative Share (%) | Accumalated Share (%) |
|---|---|---|---|---|
| SP | São Paulo | 1410153 | 27.62 | 27.62 |
| RJ | Rio de Janeiro | 268581 | 5.26 | 32.88 |
| RS | Porto Alegre | 210257 | 4.12 | 37.00 |
| SP | Campinas | 186375 | 3.65 | 40.65 |
| MG | Belo Horizonte | 140415 | 2.75 | 43.40 |
| SC | Blumenau | 123225 | 2.41 | 45.81 |
| PR | Curitiba | 110128 | 2.16 | 47.97 |
| SP | São José dos Campos | 97120 | 1.90 | 49.87 |
| SP | Sorocaba | 86086 | 1.69 | 51.55 |
| PE | Recife | 83266 | 1.63 | 53.18 |
| RJ | Duque de Caxias | 83228 | 1.63 | 54.81 |
| CE | Fortaleza | 79354 | 1.55 | 56.37 |
| RS | Caxias do Sul | 75110 | 1.47 | 57.84 |
| SP | Jundiaí | 59262 | 1.16 | 59.00 |
| BA | Salvador | 58898 | 1.15 | 60.15 |
| RS | Taquara | 53783 | 1.05 | 61.21 |
| AM | Manaus | 52851 | 1.04 | 62.24 |
| SP | Piracicaba | 48948 | 0.96 | 63.20 |
| PE | Escada | 48478 | 0.95 | 64.15 |
| PE | Igarassu | 43086 | 0.84 | 64.99 |
| SP | São Carlos | 43027 | 0.84 | 65.84 |
| RS | Volta Redonda | 41358 | 0.81 | 66.65 |
| GO | Goiânia | 37752 | 0.74 | 67.39 |
| SP | Cubatão | 36324 | 0.71 | 68.10 |
| SP | Ribeirão Preto | 35011 | 0.69 | 68.78 |
| ES | Vitória | 34956 | 0.68 | 69.47 |
| RJ | Petrópolis | 34196 | 0.67 | 70.14 |
| PR | Londrina | 32906 | 0.64 | 70.78 |
| SP | Mogi-Guaçu | 30287 | 0.59 | 71.38 |
| RN | Natal | 29462 | 0.58 | 71.95 |
| MG | Ipatinga | 28951 | 0.57 | 72.52 |
| RS | São Bento do Sul | 28440 | 0.56 | 73.08 |
| PA | Belém | 27926 | 0.55 | 73.62 |
| MG | Juiz de Fora | 27855 | 0.55 | 74.17 |
| SC | Caçador | 27306 | 0.53 | 74.70 |
| SP | Franca | 25784 | 0.51 | 75.21 |
| PB | João Pessoa | 24996 | 0.49 | 75.70 |
| SP | Jaboticabal | 22342 | 0.44 | 76.14 |

| Federation Unit | RIAs | Employment | Relative Share (%) | Accumalated Share (%) |
|---|---|---|---|---|
| SP | Bauru | 22314 | 0.44 | 76.57 |
| RS | Estrela | 22291 | 0.44 | 77.01 |
| MG | Divinópolis | 22003 | 0.43 | 77.44 |
| SC | Joinville | 21890 | 0.43 | 77.87 |
| SC | Criciúma | 20505 | 0.40 | 78.27 |
| SP | Amparo | 19396 | 0.38 | 78.65 |
| PR | Ponta Grossa | 18991 | 0.37 | 79.02 |
| SP | São José do Rio Preto | 18464 | 0.36 | 79.38 |
| RS | Pelotas | 18417 | 0.36 | 79.74 |
| AL | Maceió | 17795 | 0.35 | 80.09 |
| SE | Aracaju | 17571 | 0.34 | 80.44 |
| RJ | Campos | 16365 | 0.32 | 80.76 |
| SP | Jaú | 16292 | 0.32 | 81.08 |
| MG | Uberlândia | 16142 | 0.32 | 81.39 |
| MG | Pouso Alegre | 16074 | 0.31 | 81.71 |
| SP | Marília | 15884 | 0.31 | 82.02 |
| PR | Cascavel | 15629 | 0.31 | 82.32 |
| SC | Chapecó | 14678 | 0.29 | 82.61 |
| SP | Atalaia | 14513 | 0.28 | 82.90 |
| SP | Birigui | 14491 | 0.28 | 83.18 |
| RS | Santa Cruz do Sul | 14401 | 0.28 | 83.46 |
| SP | Tatuí | 14347 | 0.28 | 83.74 |
| DF | Brasília | 14328 | 0.28 | 84.02 |
| SC | Florianópolis | 13678 | 0.27 | 84.29 |
| SP | São João da Boa Vista | 13352 | 0.26 | 84.55 |
| MG | Varginha | 13231 | 0.26 | 84.81 |
| PR | Maringá | 13229 | 0.26 | 85.07 |
| SP | Botucatu | 12772 | 0.25 | 85.32 |
| AL | São Miguel dos Campos | 12640 | 0.25 | 85.57 |
| SP | Rio Claro | 12442 | 0.24 | 85.81 |
| SP | Bragança Paulista | 11979 | 0.23 | 86.05 |
| MG | Sete Lagoas | 11868 | 0.23 | 86.28 |
| MG | Itajubá | 11787 | 0.23 | 86.51 |
| RS | Cachoeira do Sul | 10816 | 0.21 | 86.72 |
| MG | Arcos | 10754 | 0.21 | 86.93 |
| SP | Araçatuba | 10302 | 0.20 | 87.13 |
| MA | São Luiz | 10192 | 0.20 | 87.33 |
| MG | Ubá | 10081 | 0.20 | 87.53 |
| RS | Erechim | 10006 | 0.20 | 87.73 |

**Source:** RAIS, Ministry of Labour - 1991.

### 3.4 Specialization and locational coefficients[2]

In order to refine the above taxonomy, coefficients of regional specialization and sectoral location were calculated as follows.

Specialization coefficient (S) gives the level of specialization of a region's industrial structure. It can be written as:

$$S_j = sum\ (|e_{ij} - e_{ti}|) / 2$$

where:

$S_j$ = *Coefficient of specilization of region j*
$e_{ij}$ = *share of employment of sector i in region j*
$e_{ti}$ = *share of employment of sector i in all the regions*

S can range from 0 to 1. If it is zero j industrial structure is very diversified and if it is one j has just one sector.

Coefficient of sectoral location (L) gives the share of a sector in a region *vis a vis* the share of this region in the total economy. It is a rough indication of the export base of a region, given by its sectoral specilization. It can be written as:

$$L_{ji} = E_{ij}/E_i \ / \ E_j/E_t$$

where:

$L_{ji}$ = *coefficient of location of sector i in region j*
$E_{ij}$ = *employment of sector i in region j*
$E_i$ = *employment of sector i in all regions*
$E_j$ = *total employment of all sectors in region j*
$E_t$ = *total employment of all sectors in all regions*

### 3.5 Shift-Share Analysis

A shift-share standard method utilized in literature is used in order to identify the main sources of both structural-sectorial and differential-regional changes in the RIAs.

---

[2] See detailed description and shortcomings of these coefficients in regional analysis in Haddad et al. (1989).

Despite its methodological limitations (Haddad *et al.*, 1989; Lemos, 1991), this method gives the basic source of a region growth, coming either from the sectoral structure of a region or from the location-specific factors not explained by the sectoral structure.

The aggregate shift-share of a region can be written as:

$$(g_{ij} - g) = (g_i - g) + (g_{ij} - g_i)$$
$$(g_j - g) = \Sigma_i a_{ij} (g_i - g) + \Sigma_i a_{ij} (g_{ij} - g_i)$$

where:

$g_{ij}$ = *growth rate of employment of sector i in region j*
$g_i$ = *growth rate of employment of sector i in all regions*
$g$ = *growth rate of employment of all sectors in all regions*
$a_{ij}$ = *employment of sector in region j* ($E_{ij}$) */ employment of all sectors in regions* ($E_j$)
$\Sigma a_{ij} (gi - g)$ = *structural source of growth;*
$\Sigma a_{ij} (g_{ij} - g_i)$ = *differential source of growth.*

## 4 MAIN FEATURES OF BRAZILIAN RELEVANT INDUSTRIAL AGGLOMERATIONS (RIAs)

### 4.1 Spacial Distribution and Differential Growth

The first salient aspect of Brazilian seventy-seven RIAs is its concentrated size distribution. The group of 50 thousand and more manufacturing employment comprising seventeen large cities, concentrates 62.2 percent of the sample's total, whereas twenty-six medium-sized cities of the 20-50 thousand group and thirty-three smaller cities of the 10-20 thousand group have, respectively, a share of 16 and 9.4 percent of that total. Its seems that urban size hierarchy due to intra-urban agglomeration factor has kept a strong influence on industrial agglomeration in Brazil, although flexible industrial location towards emerging medium-sized urban centres seems to become increasingly important.

As shown in Table 4, urban centres with relevant industrial agglomerations (that is, with more than 10 thousand manufacturing employment) have increased from thirty-four in 1970 to seventy-six in 1991. These forty-two new industrial agglomerations are all medium-sized centres with less than 50 thousand manufacturing employment, except for *Manaus*, a "satellite-platform"-like new agglomeration anchored by a tax-free regime (Diniz and Santos, 1995).

**TABLE 4**

**Relevant Industrial Agglomerations (RIAs) According to Size Distribution (Manufacturing Employment)**

| Size Group | 1970 | | 1991 | | NET | |
|---|---|---|---|---|---|---|
| | Number of RIAs (1) | Employment Share (2) | Number of RIAs (3) | Employment Share (4) | Result | |
| | | | | | (3)-(1) | (4)-(2) |
| Above 50,000 | 7 | 54.9% | 17 | 0.622 | 10 | 7.3% |
| Between 50,000 and 20,000 | 12 | 12.7% | 26 | 0.16 | 14 | 3.3% |
| Between 20,000 and 10,000 | 15 | 7.5% | 33 | 0.094 | 18 | 1.9% |

**Source:** RAIS. Ministry of Labour - Brazil
Diniz and Crocco (1995, p:28)

## TABLE 5

### Distribution of Relevant Industrial Agglomerations According to Major Regions in Brazil

| RIAs | 86-87 | | 90-91 | | 93-94 | |
|---|---|---|---|---|---|---|
| | Employment | Employment Share (%) | Employment | Employment Share (%) | Employment | Employment Share (%) |
| BRAZIL | 5394524 | | 4865074 | | 4279902 | |
| Total S and SE | 4767505,5 | 0,884 | 4244983,5 | 0,873 | 3766957,5 | 0,88 |
| South (S) | 983610 | 0,182 | 905138,5 | 0,186 | 878814 | 0,205 |
| RS | 503895 | 0,093 | 446436,5 | 0,092 | 423401,5 | 0,099 |
| SC | 279844 | 0,052 | 264754 | 0,054 | 259832 | 0,061 |
| PR | 199871 | 0,037 | 193948 | 0,04 | 195580,5 | 0,046 |
| Southeast (SE) | 3783895,5 | 0,701 | 3339845 | 0,686 | 2888143,5 | 0,675 |
| SP | 2760707 | 0,512 | 2398319 | 0,493 | 2072143 | 0,484 |
| MG | 421125,5 | 0,078 | 412557,5 | 0,085 | 398678 | 0,093 |
| RJ | 563940,5 | 0,105 | 493026 | 0,101 | 385706 | 0,09 |
| ES | 38122,5 | 0,007 | 35942,5 | 0,007 | 3616,5 | 0,007 |
| Center-West (CW) | 53440 | 0,01 | 48656,5 | 0,01 | 54328,5 | 0,013 |
| DF | 14462,5 | 0,003 | 12198,5 | 0,003 | 13770,5 | 0,003 |
| GO | 3877,5 | 0,007 | 36458 | 0,007 | 40558 | 0,009 |
| Northeast (NE) | 464710,5 | 0,086 | 469916,5 | 0,097 | 386818,5 | 0,09 |
| BA | 72700,5 | 0,013 | 63809,5 | 0,013 | 71285,5 | 0,017 |
| SE | 18545,5 | 0,003 | 18644 | 0,004 | 22121,5 | 0,005 |
| AL | 47622,5 | 0,009 | 47275,5 | 0,01 | 38305,5 | 0,009 |
| PE | 184554,5 | 0,034 | 191919 | 0,039 | 124584 | 0,029 |
| PB | 21579 | 0,004 | 25729,5 | 0,005 | 22665,5 | 0,005 |
| RN | 31428 | 0,006 | 30619,5 | 0,006 | 24890 | 0,006 |
| CE | 78973,5 | 0,015 | 81286,5 | 0,017 | 75930,5 | 0,018 |
| MA | 9307 | 0,002 | 10633 | 0,002 | 7036 | 0,002 |
| North (N) | 108868 | 0,02 | 101517,5 | 0,021 | 71797,5 | 0,017 |
| AM | 74517,5 | 0,014 | 70519,5 | 0,014 | 45347 | 0,011 |
| PA | 34350,5 | 0,006 | 309998 | 0,006 | 26450,5 | 0,006 |

**Source:** RAIS, Ministry of Labour-Brazil -1986, 1987, 1990, 1991, 1993, 1994.

This ongoing locational decentralization of industrial agglomerations has not been followed by geographic dispersion at a macro-spacial level. Geographic distribution of Brazilian RIAs shows that the Southeast and the South regions have kept their lion share of nearly 90 percent of RIAs' manufacturing employment during the recent period of 1986-1994, which underwent strong structural changes aroused by stabilization plans, economic slump, trade openness and technological restructuring.

In fact, intra-regional redistribution in the Southeast-South macro-space has been the major change in RIAs' distribution, which makes evident the pattern of polarization reversal in Brazil. This pattern fits quite well with a phase of regional growth characterized by Richardson (1973) as a process of "decentralised concentrated dispersion". That is, the associated *spacial dispersion* of national growth is *geographically concentrated* within which *locational decentralization* takes place. Since this concentrated dispersion in Brazil has not been evenly spread in the Southeast-South macro-space, it is characterized by Diniz (1993) as a "polygonized development", where decentralisation is taking place within a confined *geographic polygon* of a selected number of areas in this macro-space.

Decentralization direction is better seen by differential growth rate among industrial agglomerations. As described in Section 3, RIAs were classified in four groups according to their employment growth rate and from this basic groups they were ranked, as shown in Table 6.

In the slow growth group there are the two leading Brazilian industrial agglomerations, the metropolitan areas of *São Paulo* and *Rio de Janeiro*. In addition, there are eight large agglomerations with more than 50 thousand manufacturing employments and eleven medium-sized ones with more than 20 and less than 50 thousand employments, most of them belonging to the states of São Paulo and Rio de Janeiro. The remaining ones are from the decaying Northeast state of Pernambuco and the Northern tax-free zone of Manaus. Therefore, this group had kept the decreasing share tendency in the 1986-94 period, although still have around 60 percent of RIAs' manufacturing employment.

In contrast, the very-fast growth group had increased its share of less than 30 percent in 1986-87 to 35 percent in 1993-94, that is, a 13 percent increase in RIAs' manufacturing employment in seven years. This best performance group accounts for forty-two out of seventy-seven Brazilian RIAs (55 percent) and has a leadership of seven large industrial agglomerations of more than 50 thousand manufacturing employment (45 percent of group's share). Five of them are located in the Southeast-South macro-space, two metropolitan areas of state capitals (*Belo Horizonte* and *Curitiba*) and three medium-sized cities. The two others are *Salvador* and *Fortaleza*, which are capitals of Northeastern + states and have been benefitted by both state-anchored schemes and tourism. The remaining thirty-four best performers are medium-sized and small industrial agglomerations which to a great extent are spread over the so-called geographic polygon (Diniz, 1994), where economic growth in Brazil has been concentrated. For this reason, most of them are in the states of Minas Gerais, Parana, Santa Catarina and Rio Grande do Sul, which have benefited most from economic decentralization of São Paulo and Rio.

## TABLE 6

### Rank of Relevat Industrial Agglomerations by Group of Manufactoring Employment Growth

| Rank | RIAs | F.U. | Employment average (93-94) |
|---|---|---|---|
| | *50% Above Brazilian average* | | |
| 1 | Uberlândia | MG | 19.666 |
| 2 | Arcos | MG | 11.978 |
| 3 | Aracaju | SE | 22.122 |
| 4 | Pouso Alegre | MG | 16.412 |
| 5 | Goiânia | GO | 40.558 |
| 6 | Taquara | RS | 61.371 |
| 7 | Londrina | PR | 35.716 |
| 8 | São José do Rio Preto | SP | 20.820 |
| 9 | Cascavel | PR | 17.531 |
| 10 | Estrela | RS | 23.943 |
| 11 | Joinville | SC | 22.786 |
| 12 | Salvador | BA | 71.286 |
| 13 | Itajubá | MG | 12.112 |
| 14 | Santa Cruz do Sul | RS | 16.682 |
| 15 | Maringá | PR | 14.209 |
| 16 | Tatuí | SP | 14.277 |
| 17 | Bragança Paulista | SP | 12.522 |
| 18 | Franca | SP | 31.406 |
| 19 | Caxias do Sul | RS | 83.204 |
| 20 | Florianópolis | SC | 12.400 |
| 21 | Chapecó | SC | 16.062 |
| 22 | Varginha | MG | 13.257 |
| 23 | Birigui | SP | 20.169 |
| 24 | Brasília | DF | 13.771 |
| 25 | Botucatu | SP | 13.315 |
| 26 | Maceió | AL | 17.364 |
| 27 | São Carlos | SP | 42.397 |
| 28 | Bauru | SP | 22.950 |
| 29 | Mogi-Guaçu | SP | 31.133 |
| 30 | Criciúma | SC | 25.031 |
| 31 | São Bento do Sul | RS | 28.003 |
| 32 | Blumenau | SC | 129.559 |
| 33 | Curitiba | PR | 110.047 |
| 34 | Ubá | MG | 10.052 |
| 35 | Amparo | SP | 19.119 |
| 36 | Belo Horizonte | MG | 145.436 |
| 37 | Ponta Grossa | PR | 18.078 |
| 38 | Fortaleza | CE | 75.931 |

| Rank | RIAs | F.U. | Employment average (93-94) |
|---|---|---|---|
| 39 | João Pessoa | PB | 22.666 |
| 40 | São João da Boa Vista | SP | 12.737 |
| 41 | Piracicaba | SP | 48.181 |
| 42 | Divinópolis | MG | 22.079 |
| | *Between 25% and 50% above Brazilian Average* | | |
| 43 | Marília | SP | 14.342 |
| 44 | Jaú | SP | 17.496 |
| | *Between Average and 25% above Brazilian Average* | | |
| 45 | Caçador | SC | 25.992 |
| 46 | Ribeirão Preto | SP | 32.866 |
| 47 | Campinas | SP | 175.996 |
| 48 | Rio Claro | SP | 10.622 |
| 49 | Vitória | ES | 31.617 |
| | *Below Brazilian Average* | | |
| 50 | Sorocaba | SP | 83.461 |
| 51 | Jundiaí | SP | 54.999 |
| 52 | Sete Lagoas | MG | 10.879 |
| 53 | Porto Alegre | RS | 202.134 |
| 54 | Cachoeira do Sul | RS | 10.469 |
| 55 | Jaboticabal | SP | 18.524 |
| 56 | Juiz de Fora | MG | 25.216 |
| 57 | Ipatinga | MG | 25.649 |
| 58 | Duque de Caxias | RJ | 77.181 |
| 59 | Petrópolis | RJ | 30.699 |
| 60 | Belém | PA | 26.451 |
| 61 | Volta Redonda | RJ | 38.077 |
| 62 | Igarassu | PE | 29.391 |
| 63 | Natal | RN | 24.890 |
| 64 | São Paulo | SP | 1.269.257 |
| 65 | Atalaia | SP | 10.273 |
| 66 | São Miguel dos Campos | SP | 10.669 |
| 67 | Araçatuba | SP | 8.105 |
| 68 | Rio de Janeiro | RJ | 227.662 |
| 69 | São Luiz | MA | 7.036 |
| 70 | São José dos Campos | SP | 77.869 |
| 71 | Manaus | AM | 45.347 |
| 72 | Pelotas | RS | 15.411 |
| 73 | Recife | PE | 63.129 |
| 74 | Escada | PE | 32.065 |
| 75 | Erechim | RS | 10.188 |
| 76 | Campos | RJ | 12.089 |
| 77 | Cubatão | SP | 19.585 |

**Source:** RAIS. Ministry of Labour-Brazil-1993,1994

## 4.2 INDUSTRIAL SPECIALIZATION

The growth performance of Brazilian RIAs is better understood by analysing their specialization coefficients as shown in Table 7, which make possible the classification of industrial agglomerations in three specialization levels: *diversified, specialized* and *highly specialized.* The resulting eighteen (18) diversified RIAs have in general eight to ten relevant[3] manufacturing sectors out of twenty (20) two-digit sectors of Brazilian Industrial Census, whereas the specialized and highly specialized ones have five to seven and one to four relevant sectors, respectively.

By *relevant* it is meant a locational coefficient(LC) above 1. As discussed in Section 3, a LC > 1 of a sector in a region indicates a level of sector specialization which enable that sector to become an export base of the region. In Table 8, sectors with LC > 1 are classified by basic technological characteristics, that is, traditional, assembling and continuous flow. In addition, leading sectors within the "export base" sectors were defined as those with LC > 3, which indicates a specialization of a specific sector far above the other industrial agglomerations.

A close look at the slow-growth group shows a salient aspect of its diversified RIAs, which are large industrial agglomerations with either more than 100 thousand manufacturing employment or between 50 and 100 thousand. In this type of RIAs it seems that agglomeration diseconomies may be playing an important role to explain their employment growth below the Brazilian average. In the conspicuous case of the Metropolitan Area of *São Paulo* such diseconomies have favoured decentralization not only at intra-regional level to this state's hinterland but also at inter-regional level, even though to a restricted geographical area. In the other cases, it is expected that the intra-regional component is more relevant, unless the surrounding areas of these agglomerations are unable to attract investments and absorb the dispersion effect, such as the case of *Recife*, whose industrial regression has transformed its metropolitan area in an enclave.

Given their level of industrial diversification, these agglomerations usually do not have leading sectors, although it is clear from the data that leading sectors emerge from metropolitan cities such as *Rio de Janeiro* and *Recife* as a result of the strong presence of traditional industries in their industrial structures.

Still in this group there are a significant number of large and medium-sized agglomerations whose sectoral composition of their specializations have somehow handicapped their growth. Regarding the highly specialized ones, one of their difficulties to diversify is related to their specialization either in traditional industries, such as *Iguaraçu* and *Escada*, or in large-scale industries with weak intra-regional sectoral linkages, such as *Ipatinga*'s dependency on the steel-work industry.

---

[3] In this respect, "relevant" means a Locational Coefficient above 1 as will be explained below.

## TABLE 7

**Specialization Coefficients of Brazilian Relevant Industrial Agglomerations by Growth Group**

| RIAs | 86-87 | 90-91 | 93-94 |
|---|---|---|---|
| *Above Brazilian Average Diversified* | | | |
| Belo Horizonte | 0,23 | 0,21 | 0,20 |
| Curitiba | 0,31 | 0,26 | 0,28 |
| Maringá | 0,26 | 0,28 | 0,28 |
| Bragança Paulista | 0,29 | 0,25 | 0,28 |
| Pouso Alegre | 0,37 | 0,31 | 0,29 |
| São José do Rio Preto | 0,38 | 0,32 | 0,29 |
| Londrina | 0,32 | 0,30 | 0,29 |
| Florianópolis | 0,37 | 0,30 | 0,30 |
| Caxias do Sul | 0,31 | 0,31 | 0,31 |
| Fortaleza | 0,33 | 0,33 | 0,31 |
| Tatuí | 0,33 | 0,31 | 0,32 |
| Salvador | 0,34 | 0,33 | 0,32 |
| Amparo | 0,30 | 0,30 | 0,32 |
| *Specialized* | | | |
| Itajubá | 0,25 | 0,36 | 0,33 |
| Bauru | 0,41 | 0,33 | 0,34 |
| Mogi-Guaçu | 0,36 | 0,32 | 0,34 |
| Piracicaba | 0,34 | 0,35 | 0,35 |
| São João da Boa Vista | 0,35 | 0,31 | 0,36 |
| Goiânia | 0,40 | 0,36 | 0,37 |
| Varginha | 0,36 | 0,32 | 0,37 |
| Joinville | 0,39 | 0,38 | 0,38 |
| Botucatu | 0,35 | 0,42 | 0,39 |
| Blumenau | 0,41 | 0,41 | 0,40 |
| Arcos | 0,38 | 0,38 | 0,41 |
| São Carlos | 0,42 | 0,42 | 0,41 |
| Divinópolis | 0,43 | 0,40 | 0,41 |
| Aracaju | 0,49 | 0,44 | 0,42 |
| Criciúma | 0,46 | 0,43 | 0,42 |
| Ponta Grossa | 0,42 | 0,40 | 0,42 |
| Brasília | 0,43 | 0,38 | 0,42 |
| Uberlândia | 0,36 | 0,37 | 0,43 |
| João Pessoa | 0,44 | 0,39 | 0,44 |
| Cascavel | 0,48 | 0,44 | 0,46 |
| Chapecó | 0,58 | 0,49 | 0,48 |
| Santa Cruz do Sul | 0,49 | 0,58 | 0,49 |
| Maceió | 0,49 | 0,51 | 0,50 |
| Estrela | 0,51 | 0,51 | 0,51 |
| Ubá | 0,60 | 0,59 | 0,59 |
| *Highly Specialized* | | | |
| Birigui | 0,56 | 0,53 | 0,61 |
| Taquara | 0,63 | 0,63 | 0,63 |

| RIAs | 86-87 | 90-91 | 93-94 |
|---|---|---|---|
| São Bento do Sul | 0,69 | 0,65 | 0,67 |
| Franca | 0,76 | 0,75 | 0,74 |
| *Between 25% and 50% above Brazilian Average Specialized* | | | |
| Jaú | 0,41 | 0,32 | 0,33 |
| Marília | 0,44 | 0,40 | 0,42 |
| *Between Average and 25% above Brazilian Average Diversified* | | | |
| Rio Claro | 0,28 | 0,32 | 0,22 |
| Campinas | 0,24 | 0,26 | 0,25 |
| Vitória | 0,33 | 0,30 | 0,27 |
| *Specialized* | | | |
| Ribeirão Preto | 0,34 | 0,35 | 0,38 |
| Caçador | 0,56 | 0,57 | 0,60 |
| *Below Brazilian Average Diversified* | | | |
| Duque de Caxias | 0,17 | 0,24 | 0,20 |
| Jundiaí | 0,20 | 0,23 | 0,21 |
| Rio de Janeiro | 0,23 | 0,22 | 0,22 |
| Recife | 0,23 | 0,22 | 0,23 |
| São Paulo | 0,21 | 0,22 | 0,23 |
| Sorocaba | 0,22 | 0,22 | 0,25 |
| Porto Alegre | 0,29 | 0,27 | 0,30 |
| Erechim | 0,37 | 0,33 | 0,30 |
| *Specialized* | | | |
| Araçatuba | 0,42 | 0,37 | 0,34 |
| Juiz de Fora | 0,34 | 0,38 | 0,37 |
| Petrópolis | 0,37 | 0,38 | 0,39 |
| São José dos Campos | 0,41 | 0,42 | 0,39 |
| São Luiz | 0,42 | 0,40 | 0,41 |
| Cachoeira do Sul | 0,41 | 0,44 | 0,42 |
| Natal | 0,43 | 0,43 | 0,43 |
| Cubatão | 0,47 | 0,49 | 0,44 |
| Belém | 0,41 | 0,44 | 0,46 |
| Manaus | 0,52 | 0,54 | 0,49 |
| Pelotas | 0,58 | 0,54 | 0,50 |
| Campos | 0,57 | 0,54 | 0,56 |
| Volta Redonda | 0,55 | 0,53 | 0,59 |
| *Highly Specialized* | | | |
| Sete Lagoas | 0,59 | 0,62 | 0,61 |
| Jaboticabal | 0,61 | 0,61 | 0,62 |
| Igarassu | 0,64 | 0,67 | 0,65 |
| Ipatinga | 0,72 | 0,75 | 0,74 |
| São Miguel dos Campos | 0,78 | 0,76 | 0,76 |
| Escada | 0,80 | 0,79 | 0,77 |
| Atalaia | 0,82 | 0,81 | 0,79 |

**Source:** RAIS, Ministry of Labour - 1986, 1987, 1990, 1991, 1993, 1994.

## TABLE 8

### Export Base of Brazilian Industrial Agglomerations by Growth Group and Specialization Level

| F.U | RIAs | Number of industries | type* | | | leading sectors * | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trad. | Assem. | C. Flow | Trad. | | Assem. | | C. Flow | |
| *50% Above Brazilian Average* | | | | | | | | | | | |
| *Diversified* | | | | | | | | | | | |
| MG | Belo Horizonte | 8 | 1 | 3 | 4 | | | | | | |
| PR | Curitiba | 12 | 5 | 2 | 5 | | | | | | |
| PR | Maringá | 5 | 5 | | | 1 | FU | | | | |
| SP | Bragança Paulista | 7 | 3 | 1 | 3 | | | | | | |
| MG | Pouso Alegre | 7 | 4 | 1 | 2 | | | | | | |
| SP | São José do Rio Preto | 6 | 4 | | 2 | 1 | FU | | | | |
| PR | Londrina | 6 | 6 | | | 1 | FU | | | | |
| SC | Florianópolis | 8 | 6 | | 2 | 1 | FU | | | | |
| *Specialized* | | | | | | | | | | | |
| RS | Caxias do Sul | 5 | 2 | 2 | 1 | 1 | FU | | | | |
| CE | Fortaleza | 7 | 6 | | 1 | | | | | | |
| SP | Tatuí | 8 | 5 | 1 | 2 | | | | | 1 | PT |
| BA | Salvador | 7 | 2 | 1 | 4 | | | | | 1 | CH |
| SP | Amparo | 7 | 1 | 2 | 4 | 1 | TEX | | | 1 | SO |
| MG | Itajuba | 5 | 1 | 2 | 2 | | | 1 | ME | | |
| SP | Bauru | 6 | 5 | | 1 | 1 | BE | | | | |
| SP | Mogi-Guaçu | 7 | 4 | 1 | 2 | 1 | LE | | | 1 | PA |
| SP | Piracicaba | 5 | 2 | 1 | 2 | | | 1 | MC | | |
| SP | São João da Boa Vista | 5 | 3 | 1 | 1 | | | | | | |
| GO | Goiânia | 7 | 5 | | 2 | 1 | BE | | | 1 | SO |
| MG | Varginha | 5 | 3 | | 2 | | | | | | |
| SC | Joinville | 5 | 4 | 1 | | 1 | TEX | 1 | ME | | |
| SP | Botucatu | 4 | 2 | 1 | 1 | | | 1 | MT | | |
| SC | Blumenau | 7 | 3 | 1 | 3 | 1 | TEX | | | | |
| MG | Arcos | 6 | 3 | | 3 | | | | | | |
| SP | São Carlos | 4 | 3 | 1 | | | | 1 | MC | | |
| MG | Divinópolis | 4 | 3 | | 1 | 1 | MO, TEX | | | | |
| SE | Aracaju | 4 | 3 | | 1 | 1 | TEX | | | | |
| SC | Criciúma | 6 | 4 | | 2 | | | | | | |
| PR | Ponta Grossa | 7 | 4 | 1 | 2 | 1 | FO | | | 1 | PA |
| DF | Brasília | 5 | 4 | | 1 | 2 | BE, PU | | | | |
| MG | Uberlândia | 5 | 4 | | 1 | 1 | TO | | | | |

| F.U | RIAs | Number of industries | type* | | | leading sectors * | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trad. | Assem. | C. Flow | Trad. | | Assem. | | C. Flow | |
| PB | João Pessoa | 6 | 4 | | 2 | 1 | BE | | | | |
| PR | Cascavel | 4 | 3 | | 1 | 2 | WO.FO | | | | |
| SC | Chapecó | 5 | 4 | | 1 | 2 | WO.FO | | | | |
| RS | Santa Cruz do Sul | 5 | 4 | | 1 | 1 | TO | | | | |
| AL | Macéio | 5 | 3 | | 2 | 1 | FO | | | | |
| RS | Estrela | 6 | 4 | | 2 | 2 | LE.AP | | | | |
| MG | Ubá | 5 | 5 | | | 1 | FU | | | | |
| *Highly Specified* | | | | | | | | | | | |
| SP | Birigui | 3 | 3 | | | 2 | LE.AP | | | | |
| RS | Taquara | 3 | 3 | | | 2 | LE.AP | | | | |
| SC | São Bento do Sul | 5 | 3 | | 2 | 2 | WO.PU | | | | |
| SP | Franca | 3 | 2 | | 1 | 2 | LE.AP | | | 1 | RU |
| *Between 25% and 50% above Brazilian Average Specialized* | | | | | | | | | | | |
| SP | Jaú | 6 | 4 | | 2 | | | | | | |
| SP | Marília | 5 | 3 | 1 | 1 | | - | 1 | MC | | |
| *Between Average and 25% above Brazilian Average Diversified* | | | | | | | | | | | |
| SP | Rio Claro | 8 | 3 | 3 | 2 | | | | | | |
| SP | Campinas | 10 | 2 | 3 | 5 | | | | | | |
| ES | Vitória | 5 | 3 | | 2 | | | | | | |
| *Specilized* | | | | | | | | | | | |
| SP | Ribeirão Preto | 9 | 4 | 1 | 4 | | | | | | |
| SC | Caçador | 5 | 4 | | 1 | 3 | WO. LE | | | 1 | PA |
| *Below Brazilian Average Diversified* | | | | | | | | | | | |
| RJ | Duque de Caxias | 11 | 5 | 1 | 5 | | | | | 1 | SO |
| SP | Jundiaí | 9 | 2 | 2 | 5 | | | | | | |
| RJ | Rio de Janeiro | 10 | 5 | 1 | 4 | 2 | TO,PU | | | | |
| PE | Recife | 10 | 6 | | 4 | 1 | TO | | | | |
| SP | São Paulo | 12 | 2 | 3 | 7 | | | | | | |
| SP | Sorocaba | 9 | 2 | 3 | 4 | | | | | | |
| RS | Porto Alegre | 8 | 3 | 1 | 4 | 1 | LE | | | | |
| RS | Erechim | 7 | 5 | 2 | | 1 | LE | | | | |
| *Specialized* | | | | | | | | | | | |
| SP | Araçatuba | 8 | 6 | 1 | 1 | 3 | MI,LE, BE | | | 1 | CH |
| MG | Juiz de Fora | 5 | 3 | | 2 | 1 | TEX | | | | |

| F.U | RIAs | Number of industries | type* | | | leading sectors * | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trad. | Assem. | C. Flow | Trad. | | Assem. | | C. Flow | |
| RJ | Petrópolis | 5 | 4 | | 1 | 1 | MI | | | | |
| SP | São José dos Campos | 7 | 2 | 2 | 3 | | BE,PU | 1 | MT | | |
| MA | São Luiz | 6 | 4 | | 2 | 2 | BE, GE | | | | |
| RS | Cachoeira do Sul | 5 | 2 | 1 | 2 | | | | | 1 | CH |
| RN | Natal | 5 | 5 | | | 2 | TEX, BE | | | | |
| SP | Cubatão | 6 | 3 | | 3 | 1 | MI | | | 1 | CH |
| PA | Belém | 8 | 5 | | 3 | 2 | WO,TO | | | | |
| AM | Manaus | 7 | 3 | 3 | 1 | | | 1 | ME | | |
| RS | Pelotas | 3 | 3 | | | 2 | LE,FO | | | | |
| RJ | Campos | 3 | 2 | | 1 | 1 | FO | | | | |
| RJ | Volta Redonda | 5 | | | 5 | | | | | | |
| MG | Sete Lagoas | 4 | 2 | | 2 | 1 | TEX | | | 2 | NM,MI |
| SP | Jaboticabal | 4 | 2 | 1 | 1 | 2 | FO,BE | | | 1 | RU |
| PE | Igarassu | 1 | 1 | | | 1 | FO | | | | |
| MG | Ipatinga | 1 | | | 1 | | | | | 1 | MI |
| AL | São Miguel dos Campos | 1 | 1 | | | 1 | FO | | | | |
| PE | Escada | 2 | 2 | | | 2 | FO,BE | | | | |
| AL | Atalaia | 2 | 2 | | | 2 | FO,BE | | | | |

**Source:** RAIS, Ministry of Labour - 1986, 1987, 1990, 1991, 1993, 1994.
* TRAD.= Traditional sectors; ASSEM = Assembling sectors; C.FLOW= Continuous-flow sectors

**Two-Digit Sectors:**

AP= Apparel
BE=Beverages
CE= Communication and Eletric equip.
CH=Chemicals
FO=Food
FU= Furniture
LE=Leather
MC= Mecanics
ME= Metalurgy
MI= Miscelaneus
MO= Motor industry
NMI= Non metalic Minerals
PA=Paper and pulp
PH=Pharmaceuticals
PT= Plastics
PU=Publishing
RU=Rubber
SO=Soap
TE= Textiles
TO=Tobacco
WO= Wood

On the opposite very-fast growth group, emerging diversified large agglomerations have been able to explore macro-spacial decentralization locational advantages (*Belo Horizonte* and *Curitiba*) and state-anchored schemes (*Salvador*), and diversify to dynamic assembling or continuous-flow industries, such as motor industry, capital goods and petrochemicals. A significant number of small and medium-sized agglomerations have been able to attract traditional industrial by exploring either their natural endowments, becoming specialized in a few number of industries, or their proximity to large agglomerations, whose spin-offs are transforming smaller towns into small diversified industrial agglomerations.

Attractiveness of emerging agglomerations to more dynamic or high-tech industries has been restricted to a few number of medium-sized urban centres in the redial influence of Metropolitan *São Paulo*, such as the case of *São Carlos* and *Itajuba*. In contrast, the highly-specialized very-fast-growth agglomerations, such as *Franca* and *Taquara*, have their attractiveness based on location-specific advantages of traditional industries.

Finally, most industrial agglomerations of the moderate and fast-growth groups are mature large and medium agglomerations that belong to the state of São Paulo and have since the seventies, been benefitted from decentralization of its metropolitan area. The case of the large industrial agglomeration of *Campinas* is very illustrative, since its proximity to the metropolitan *São Paulo* and its high standard university have attracted a diversified number of high-tech industries, specially under capital control of leading multinational corporations. (Diniz and Razavi, 1994)

### 4.3 Structural and Differential Sources of Regional Growth

The structural and differential sources of growth of Brazilian RIAs based on aggregate shift-share is shown in Table 9. Apart from rounding errors, the two sources should sum 1 (one)since the results are already presented in the decomposition form, that is, in proportional contribution of each growth component.

A first interesting finding is the predominance of the differential component in the 1986-94 period as the main source of growth of the very-fast growth agglomerations, irrespective of their size, specialization level or export base. That is, there are strong location-specific factors which make these agglomerations attractive to new investments. These locational advantages may come from natural endowments and "marshallian"-like cooperation among rival local-based enterprises with high level of specialization in traditional industries (Markusen,1994), as the cases of *Taquara* and *Franca* in the apparel-leather regional complex.

A contrasting example is *Salvador*, which thanks to strong support of Federal government to establish a large-scale petrochemical pole has been able to grow, although it is an enclave resembling a mix of the industrial district types described by Markusen as "Satellite-Platform" and "State-Anchored".

A third clear-cut case is the large industrial agglomeration of *Belo Horizonte*, capital of the third regional economy of Brazil, Minas Gerais. Starting its industrialization with an export base on a metal-work complex it has shifted in the last fifteen years to assembling industries, specially a modern motor-industry plant based on flexible production, which has enabled the flourishing of a network of specialized small and medium-sized suppliers. This has led to strong intra-metropolitan linkages which resemble Markusen's "Hub and Spoke" industrial type of industrial district, based on a few large key enterprises surrounded by a network of cooperative suppliers both inside and outside the district.

On the other hand, the very large agglomerations that have been the driving force of the slow growth group, show a predominance of structural source for their decreasing growth. Apart from the more complex case of the Metropolitan Agglomeration of *São Paulo*, it seems that sectoral specialization of those agglomerations in traditional industries have outdated their competitiveness initially based on intra-urban agglomeration economies. This phenomenon seems to reproduce smaller industrial agglomerations of this group, which have been unable to get rid off the descending profit-cycle phase of their mature industries (Markusen, 1985).

## TABLE 9

**Aggregate Shift-Share of Brazilian Relevant Industrial Agglomerations by Growth Group and specialization level**

| RIAs | 1986-87/1990-91 | | 1990-91/1993-94 | |
|---|---|---|---|---|
| | Structural | Differential | Structural | Differential |
| *Above Brazilian Average* | | | | |
| *Diversified* | | | | |
| Belo Horizonte | -1,98 | 2,98 | -0,11 | 1,11 |
| Curitiba | -0,18 | 1,18 | -0,24 | 1,24 |
| Maringá | 0,11 | 0,88 | 0,08 | 0,92 |
| Bragança Paulista | -0,21 | 1,21 | 0,37 | 0,63 |
| Pouso Alegre | 1,95 | -0,78 | 0,14 | 0,86 |
| São José do Rio Preto | -0,01 | 1,01 | 0,35 | 0,65 |
| Londrina | 0,16 | 0,84 | 0,13 | 0,87 |
| Florianópolis | 0,04 | 0,96 | -0,19 | 1,19 |
| Caxias do Sul | -2,48 | 3,48 | 0,21 | 0,79 |
| Fortaleza | 0,17 | 0,83 | -1,02 | 2,02 |
| Tatuí | 0,02 | 0,98 | -0,09 | 1,08 |
| Salvador | -0,02 | 1,02 | 0,10 | 0,90 |
| Amparo | -0,78 | 1,78 | -0,68 | 1,68 |
| *Specialized* | | | | |
| Itajubá | -0,04 | 1,04 | 0,04 | 0,96 |
| Bauru | -4,51 | 5,51 | 0,02 | 0,98 |
| Mogi-Guaçu | -0,09 | 1,09 | -0,20 | 1,2 |
| Piracicaba | -0,61 | 1,61 | -23,72 | 24,72 |
| São João da Boa Vista | 0,39 | 0,61 | -0,30 | 1,30 |
| Goiânia | 1,93 | -0,93 | 0,08 | 0,92 |
| Varginha | 0,17 | 0,78 | -0,36 | 1,36 |
| Joinville | 0,57 | 0,46 | -0,07 | 1,07 |
| Botucatu | 0,06 | 0,94 | 0,35 | 0,61 |
| Blumenau | 243,70 | -242,70 | -0,08 | 1,07 |
| Arcos | 0,16 | 0,79 | 0,02 | 0,98 |
| São Carlos | 0,21 | 0,79 | -0,70 | 1,70 |
| Divinópolis | 1,30 | -0,30 | -0,05 | 1,05 |
| Aracaju | -0,16 | 1,17 | 0,29 | 0,71 |
| Criciuma | 0,08 | 0,92 | 0,07 | 0,93 |
| Ponta Grossa | -0,16 | 1,13 | -0,24 | 1,24 |

| RIAs | 1986-87/1990-91 | | 1990-91/1993-94 | |
|---|---|---|---|---|
| | Structural | Differential | Structural | Differential |
| Brasília | 2,53 | -1,53 | -0,45 | 1,45 |
| Uberlândia | 0,71 | 0,29 | 0,15 | 0,85 |
| João Pessoa | 0,17 | 0,83 | -0,14 | 1,14 |
| Cascavel | 0,11 | 0,86 | 0,10 | 0,90 |
| Chapecó | -1,14 | 2,14 | 0,21 | 0,79 |
| Santa Cruz do Sul | 0,74 | 0,26 | 1,98 | -0,98 |
| Maceió | 0,29 | 0,71 | 0,04 | 0,96 |
| Estrela | 0,26 | 0,74 | 0,34 | 0,66 |
| Ubá | 0,12 | 0,88 | 2,34 | -1,34 |
| *Highly Specialized* | | | | |
| Birigui | 0,05 | 0,95 | -0,12 | 1,12 |
| Taquara | 1,77 | -0,77 | 0,45 | 0,55 |
| São Bento do Sul | -1,01 | 2,01 | 0,90 | 0,10 |
| Franca | -0,23 | 1,23 | 0,51 | 0,49 |
| *Between 25% and 50% above Brazilian Average Specialized* | | | | |
| Jaú | -0,12 | 1,13 | 0,11 | 0,89 |
| Marília | 0,14 | 0,86 | 0,38 | 0,62 |
| *Between Average and 25% above Brazilian Average Diversified* | | | | |
| Rio Claro | 0,13 | 0,80 | -0,09 | 1,09 |
| Campinas | -0,60 | 1,60 | 1,11 | -0,11 |
| Vitória | 0,03 | 0,97 | -0,10 | 1,1 |
| *Specialized* | | | | |
| Ribeirão Preto | 0,29 | 0,71 | 1,23 | -0,23 |
| Caçador | 0,40 | 0,60 | -0,99 | 1,99 |
| *Below Brazilian Average Diversified* | | | | |
| Duque de Caxias | -0,30 | 1,30 | -0,21 | 1,21 |
| Jundiaí | 3,08 | -2,08 | 0,48 | 0,52 |
| Rio de Janeiro | -0,25 | 1,25 | -0,01 | 1,01 |
| Recife | -0,62 | 1,62 | 0,01 | 0,99 |
| São Paulo | 0,16 | 0,84 | 0,22 | 0,78 |
| Sorocaba | 0,67 | 0,33 | 0,76 | 0,24 |
| Porto Alegre | 0,00 | 1,00 | 2,51 | -1,51 |
| Erechim | 0,08 | 0,92 | 0,33 | 0,63 |

| RIAs | 1986-87/1990-91 | | 1990-91/1993-94 | |
|---|---|---|---|---|
| | Structural | Differential | Structural | Differential |
| *Specialized* | | | | |
| Araçatuba | 0,31 | 0,69 | 0,02 | 0,98 |
| Juiz de Fora | 2,86 | -1,82 | 0,13 | 0,87 |
| Petrópolis | -1,87 | 2,87 | -0,15 | 1,15 |
| São José dos Campos | 0,29 | 0,71 | 0,14 | 0,86 |
| São Luiz | 0,09 | 0,91 | 0,00 | 1,00 |
| Cachoeira do Sul | -6,20 | 7,20 | 1,98 | -0,98 |
| Natal | 0,42 | 0,58 | -0,14 | 1,14 |
| Cubatão | -0,19 | 1,19 | 0,04 | 0,96 |
| Belém | -0,67 | 1,67 | -0,77 | 1,77 |
| Manaus | 0,26 | 0,74 | 0,33 | 0,67 |
| Pelotas | -0,44 | 1,44 | -1,03 | 1,03 |
| Campos | 0,24 | 0,73 | 0,00 | 1,09 |
| Volta Redonda | 0,28 | 0,72 | 1,77 | -0,76 |
| *Highly Specialized* | | | | |
| Sete Lagoas | 2,24 | -1,24 | -16,90 | 17,90 |
| Jaboticabal | 0,51 | 0,49 | 0,08 | 0,92 |
| Igarassu | 0,16 | 0,83 | 0,09 | 0,94 |
| Ipatinga | -1,95 | 2,95 | 0,10 | 0,90 |
| São Miguel dos Campos | 0,84 | 0,15 | 0,26 | 0,80 |
| Escada | 0,71 | 0,26 | 0,02 | 1,02 |
| Atalaia | -0,28 | 1,37 | 0,00 | 1,26 |

**Source:** RAIS, Ministry of Labour - 1986, 1987, 1990, 1991, 1993, 1994.

## CONCLUDING REMARKS

From the above results it is possible to forward the following conclusions:

1) Brazilian Relevant Industrial Agglomerations (RIAs) are geographically concentrated in the South and Southeast, specially those in the upper performance ranks, that is, those in the groups above the Brazilian average of manufacturing employment growth;

2) Although there are strong evidences of an irreversible process of polarization reversal in Brazil, the dispersion effect of high-tech industries keeps close to the Metropolitan Area of *São Paulo* (MSP) and restricted to a few well structured cities in terms of human capital and scientific and technological services. However, the Brazilian crisis may have impaired their growth performance of these cities, as indicates the intermediate performance groups;

3) More dynamic industries that have favoured upper performance industrial agglomerations outside the direct radial influence of MSP are in general large-scale differentiated sectors, mainly assembling based ones;

4) The exceptions are continuous-flow industries, particularly petrochemicals, whose locations were biased by government regional policy;

5) So far, Brazilian industrial restructuring in the nineties has not changed the previous specialization of industrial agglomerations. Even the medium-sized and small agglomerations in the very-fast growth rank has not been able to attract new activities outside their core business. In fact, their advantages come from locational factors either natural endowments or "Schumpeterian" ones (Dosi, 1988), these latter resulting in technological updating of their traditional industries. As already said, the exceptions are those favoured by spin-offs of *São Paulo* City's intra-regional agglomeration economies;

6) The overlapping of economic stabilization with industrial restructuring turns the results of the present research provisional until post-stabilization phase can consolidate and make possible for structural analysis safer grounds for time-series data;

7) For this reason, any comparison with industrial restructuring in the economic space of other economies is preliminary. The Brazilian process of polarization reversal is still far behind the widespread effect of this process in the U.S. and Newly Industrializing Countries in Asia, such as Korea.

## REFERENCES


AZZONI,C. R. Indústria e reversão da polarização no Brasil. São Paulo:IPE-USP, 1986.

DINIZ, C. C. Polygonized development in Brazil: neither decentralization nor continued polarization.*International Journal of Urban and Regoinal Research*, v. 18,p.293-314,1994.

DINIZ, C. C., SANTOS B., F. Manaus: a satellite platform in the Amazon Region. Brazil:CEDEPLAR/Universidade Federal de Minas Gerais, maio 1995.(Texto para discussão).

-----, RAZAVI, M. *Emergence of new industrial districts in Brazil: São José dos Campos and Campinas cases.* Brasil :CEDEPLAR/ Universidade Federal de Minas Gerais, Nov. 1994. (texto para discussão).

----, CROCCO, M. A. *Economic Restruturing and Regional Impact: the new Brazilian industry map.*Paper prepared for the workshop "Economic liberalization and Production Reorganization in Latin America", at the institute of Developing Countries, Tokyo, October 29 November 3,1995.

DOSI, G. Sources, *Procedures, and microeconomic effects of innovation*, Journal of Economic Literature,vol XXVI,1988,p.1120-171.

FEIJÓ, C. A., CARVALHO, P. G. A evolução recente da produtividade e do emprego na indústria brasileira. *Revista Proposta*, No63 dez. 1994

FRIEDMAN, J. A general theory of polarized development. In: HANSEN, N.(ED.). *Growth centers in regional economic development.* New York: Free Press, 1972.

HADDAD, P. R., FERREIRA, C. M., BOISIER, S., ANDRADE, T. A. Economia regional: teorias e métodos de análise.Banco do Nordeste do Brasil,1989.

LEMOS, M. B., *Duas técnicas de análize regional elaboradas a partir de categorias espaciais: a regionalização e o método estrutural-diferencial.* tese para o concurso de professor titular apresentada ao Departamento de Ciências Econômicas- FACE/UFMG.Belo horizonte, março de 1991.

MARKUSEN, A. Profit cycles, oligopoly and regional development. Boston : MIT Press, 1985.

----. Stick places and slippery spaces. *Journal of Economic Geography*,1995.

MYRDAL, G. Economic theory and underdeveloped regions.London: Duckwdorth,paperback edn, London:Methuen, 1963.

RICHARDSON, H.W. *Regional Growth theory*. London: Macmillan, 1973.

SCOTT, A. Flexible production systems and regional development: the rise of new industrial Space in North America and Western Europe.*International Journal of Urban and Regional Research*, v. 12, n.2, p.171-186, 1988.

STORPER, M. The transition to flexible specialization in industry: external economies, the division of labor and the crossing of industrial divides. *Cambridge Journal of Economics*, v. 13, p.273-305, 1989.

von BOVËNTER, E. Regional growth theory, *Urban Studies*,12, 1-29, 1975.