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Spatial urban restructuring for economic growth with distribution: The case of Ceara (Brazil)

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government as a main purchaser of products. More common approaches require the involvement of the government as a facilitator of development through the provision of appropriate conditions. Supporting the development of several urban centers within the interior through the creation of infrastructures (Bar-El and Benhayoun, 2000), investing in human capital formation and improving public social services could probably lead to healthier economic growth (Epstein and Jezeph, 2001; Isserman, 2001; Kim and Kim, 2002; Bar-El and Felsenstein, 1990), leading to lower levels of poverty and to a more equal distribution of income, through the following expected effects:

1. Better conditions in the urban interior would attract some of the industrial activities, using its potential of abundant supply of land and labor force.
2. Such conditions would attract more rural migrants within the interior, increasing the urbanization process and improving the spatial distribution of the population.
3. The diminution of the population in the rural area would improve higher levels of productivity in agriculture (by diminishing the disguised unemployment) and therefore increase the income level.
4. Stronger urban centers within the interior can stimulate the development of non-farm employment in the rural sector, by providing necessary economic support services (Zhu, 2000; Biles and Pigozzi, 2000).

The government of Ceara has clearly identified the need for the integration of policies to achieve a better distribution with policies for economic growth. An important measure recently taken is the establishment of a Secretariat for Regional and Local Development, and the initiation of a process of elaboration of a few regional development master plans.

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migrate to towns within the interior). The lack of job opportunities is reflected by the rapid growth of employment in services with low and stagnant productivity, again hinting at the existence of disguised unemployment. This again leads to high levels of poverty and inequality.

3. The ability of the metropolitan region to absorb excess labor force is apparently quite limited: the growth of the industrial sector is not fully reflected by a growth in employment (the share of industry in employment even shows a decreasing trend), and while the service sector shows growth, it also shows zero productivity growth. This may indicate that other than the growth of the productive tourism sector, much of the labor force in services actually reflects a growing hidden unemployment also in the metropolitan region.

The persistence of poverty and inequality can therefore be explained by a concentration of economic growth in the metropolitan core, while the excess labor force from agriculture cannot find appropriate employment conditions in the rural area or in the local regional towns, or competes mostly for low productivity jobs in the metropolitan region.

As indicated above, two main factors come to play in this distorted economic situation. One is the excessively low pace of urbanization and the other is the excessively strong spatial concentration of urban growth in the metropolitan region. The alternative policy that could be considered is thus one of adaptation of urban structures to the changing economic structure. Urban development is subject to “market failure” and is therefore generally guided or supported by government policy. In its evaluation of the economic growth process in Ceara, the state government has actually reached the conclusion of the need for a more space-balanced approach. In addition to the measures that have been already taken for the diminution of poverty in the short run and in the long run (education programs, support to small enterprises, agricultural extension, etc.), the government has initiated a policy of regional development, trying to identify urban centers in the interior that can be stimulated and provided with the necessary conditions for the development of new economic activities that respond to the needs of the population of the interior.

Much research has been done and still needs to be done in order to identify the optimal policy measures to be taken by the government. An approach of “demand-driven” models has been suggested for the specific case of the development of small enterprises in Ceara by Tendler and Amorim (1996), involving the intervention of

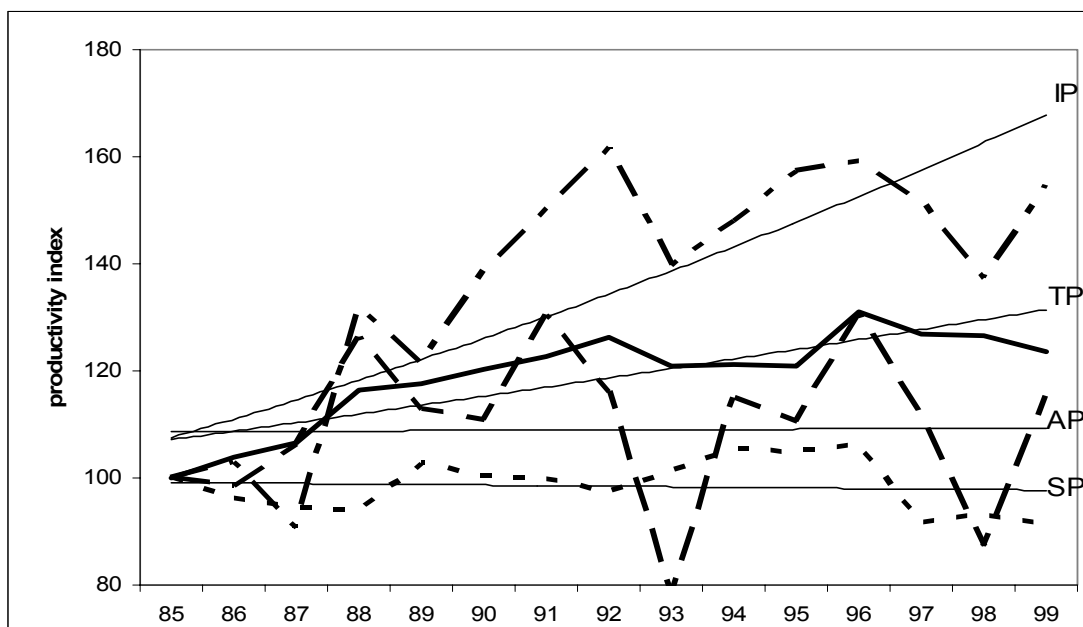
The findings lead quite clearly to the following interpretation of the process of growth with insufficient diminution of poverty and with widening gaps in income distribution. The efforts made for the stimulation of economic growth are for the most part focused on attracting industrial and tourist activities, generally without sufficient regional considerations. Those activities find the best location in the metropolitan region, where the conditions of access to labor force, supply of infrastructures, access to markets and tourist resources (mainly the seashore) are best. The urban features that are required for a process of industrialization are much less accessible in the interior, where cities are much smaller and provide much weaker infrastructures. If we disregard the social inequality problem and the probable future negative implications of unequal distribution on long-term growth, theoretically, this could be a steady free market and efficient equilibrium of the core-periphery type, achieved through concentration of the economic activity in the metropolitan region and through increasing inequality in the distribution of income. However, although we do not have data on productivity in each region, the zero growth productivity in agriculture and in services throughout the 14-year macro-growth period raises doubts about the economic efficiency of this solution.

The excess labor force from agriculture in the rural area, trying to find employment in non-farm activities, has three options: migrating to the regional town within the interior, migrating to the metropolitan region or staying “at home” in the rural area:

1. The growing disproportion between the share of the population still staying in the rural area (32%) or the share of labor force in agriculture (40%) and the share of agriculture in total GDP (6%) implies that this is a reaction of despair rather than a healthy efficient response to changing economic conditions. These figures actually imply that approximately one third of the state population remains in the rural area and refrains from migrating to urban areas, because of the lack of job opportunities in the urban area and the long distance from the metropolitan region (Lucas, 2001). In terms of poverty and distribution, this population actually grows poorer relative to the population that is engaged in more productive activities.
2. The fact that the rural population that is ready to leave the rural area and find alternative non-farm employment cannot find an appropriate response in the economy of the interior is reflected by the high share of migrants having to go to the metropolitan region (60%, as opposed to 40% of the rural migrants who

employment along the years can be found in the service sector (and not in industry, which leads the economic growth). One should not be misled by the growth of employment in this sector, as it is a direct result of stagnation in productivity during the entire 14-year period: the trend line for this sector as well as that of agriculture has a practically zero R square value, and a zero growth coefficient. Growth of employment in services, therefore, reflects to a large extent the accumulation of hidden unemployment and low levels of productivity. The sector of agriculture shows the same stagnation in productivity, with very heavy fluctuations that reflect the climatic instability and the fact that employment in this sector does not decline in times of low production. Again, this indicates the prevalence of constantly growing disguised unemployment levels and growing levels of poverty.

Figure 5: Index of productivity (1985=100) in Ceara by economic sector, 1985-1999



Conclusion

Our tentative conclusion is that economic growth with no policy of regional adaptation may lead to a core-periphery type of equilibrium, with both social inequality and economic inefficiency. The operational conclusion in terms of public policy reached by the government of Ceara is the need for a combination of sectoral policies (such as support for industry) and regional policies (such as support for infrastructures and education in the interior) in order to achieve both economic growth and a wider distribution of this growth.

Instead, we see a growth of the service sector, mainly in terms of employment: the share of the service sector in employment, which was about 20% in the seventies, grew to about 40% in the eighties, and stands at 46% at the end of the century. Some of this growth may be attributed to a growth of demand for services resulting from economic growth. Some of it is also certainly explained by the growth of tourist activities. However, some of it may be a sign of higher disguised or hidden unemployment.

Table 5: Distribution of employment and value added (in parentheses) by economic sectors, selected years (%)

| | 85 | | 90 | | 95 | | 99 | |
|-------------|------|--------|------|--------|------|--------|------|--------|
| Agriculture | 48% | (15%) | 43% | (12%) | 47% | (10%) | 40% | (6%) |
| Industry | 16% | (34%) | 15% | (34%) | 13% | (34%) | 14% | (38%) |
| Services | 36% | (51%) | 43% | (54%) | 40% | (56%) | 46% | (56%) |
| Total | 100% | (100%) | 100% | (100%) | 100% | (100%) | 100% | (100%) |

Source: PNAD in various years, and Anuario Estatístico do Ceara, 2000, Table 11.5

The gap between the rate of decline in the share of agriculture in employment and in value added is the complete opposite of the expected gap in a healthy process of economic growth: We would expect growth in productivity in a developing economy, improving technology, and consequently a more rapid decline of the share of agriculture in employment than its share in product. The data therefore testify strongly to the existence of a lack of adaptation of the agricultural sector to the process of economic growth in Ceara. A significant share of the excess labor force in agriculture does not find alternative employment in other sectors and remains in the agricultural sector, leading to low productivities (as measured by added value per worker) and actually to disguised unemployment.

Figure 5 shows the trends of productivity during the period of 1985 to 1999 for each economic sector and depicts a clear sign of the existence of some incongruity between growth, urbanization and spatial distribution. The estimated trend lines are:

$$\begin{aligned} TP &= 106e^{0.015t} & R^2 &= 0.70 \\ IP &= 104e^{0.032t} & R^2 &= 0.60 \\ SP &= 99e^{-0.001t} & R^2 &= 0.01 \\ AP &= 109e^{0.000t} & R^2 &= 0.00 \end{aligned}$$

The annual growth rate of productivity in Ceara (TP) is approximately 1.5%, reflecting the gap between the growth of output and the growth of employed labor force. However, when examining the behavior of the specific sectors, we find that the slow and quite irregular growth of industrial employment may be a consequence of a relatively rapid increase in productivity levels (IP). The most rapid and steady growth of

The consequence is a more rapid growth of population in the metropolitan region, as can be seen in Figure 4 above (an annual growth trend of 3.2%, as opposed to 2.7% in the urban area of the interior), and as a result, a stronger concentration of the population in the metropolitan region, as can be seen in Table 3, following a core-periphery model, more than a multi-focal model as described above: Over the 14-year period the share of the metropolitan region in total population grew from 31% to 39%. The process of urbanization is therefore a concentration process, creating a relatively large metropolitan region of 2.7 million inhabitants, with the big city of Fortaleza with approximately 2 million inhabitants, 10 times larger than the second largest city in Ceara, Juazeiro do Norte.

Reflections on productivity

We have shown that economic growth has led to urbanization, but probably at insufficient rates, and at too high a spatial concentration. We do not intend to formulate the “optimal” relationship between growth, changing economic structure, urbanization and spatial demographic distribution through rigid equations. Theoretically, the findings above could still reflect healthy economic behavior. A high share of rural population (low rate of urbanization) in relation to a decreasing share of agriculture in GDP could be explained by higher levels of non-farm activity in the rural area or by a transition to highly labor-intensive agricultural activities. An increasing concentration of the population in the metropolitan region could be explained by the existence of still high agglomeration economies. However, our hypothesis is that there is some incongruity between economic growth, urbanization rate, and spatial distribution of the population, and that incongruity is reflected by low productivity levels, as well as by persistent poverty and inequality.

This suspected incongruity is tested with the analysis of processes of change in employment and productivity (in terms of product per worker). The economic growth of Ceara in the last decade was led to a large extent by growth in industrial activity. Actually, the share of industry in the GDP of Ceara did grow, but its share in employment remained quite stable, with a slight downward trend. Table 5 provides the distribution of employment between sectors, as compared with the distribution of value added, copied here from Table 2 above. This economic growth can indicate growing productivity in the industrial sector, but the ability of this sector to absorb excess labor force is still rather limited. Its share in employment and product is still quite low.

hidden unemployment in agriculture. Much more alarming, however, is the fact that after 14 years, this proportion changes drastically, when the share of population in the rural area (32%) is more than 5 times higher than the share of agriculture in GDP (6%). The apparent conclusion is that the process of economic development (and industrialization) has led to urbanization, but at a rate that is much too low.

Changing spatial structure

The decline in absolute population in the rural area means that migration to the urban area is higher than natural growth. We would assume that rural population with no employment in agriculture would first try to find employment in industry or services in the urban area within the region (or develop non-farm employment in the rural area). The lack of such employment opportunities would stimulate migration to other regions or to the metropolitan region. A rough estimate of the flow of migrants from the rural area is made in Table 4 below. Assuming that natural growth rates are similar in the rural, urban and metropolitan sectors (1.4% a year), we estimate the net migration from the rural area to the metropolitan region and to the urban interior (as shown in Column d, the difference between Column c that calculates theoretical population at the average growth rate of 1.4% over 14 years, and Column b with the actual population). The result is an evaluated figure of 0.9 million migrants from the rural area during this 14-year period. Only 40% of them migrated to the urban sector within the interior, and 60% of them migrated to the metropolitan region (this is in net migration terms, meaning that this may also reflect some rural to urban interior migrants balanced by urban interior to metropolitan region migrants). Since we can assume that the natural growth rate is highest in the rural area, and lowest in the metropolitan region, those estimates can be considered as downward biased: real migration from rural areas is probably higher, and the share of the metropolitan region in the absorption of migrants is probably higher than the results shown in Table 4.

Table 4: Rough estimates of rural to urban net migration (millions and %)

| | 1985 | | 1999 | | Estimated net migration from rural area D=c-b | Share of rural migrants absorbed |
|----------------|------|-----|--------|---|--|----------------------------------|
| | a | b | Actual | Assuming no migration $c=a*(1.014)^{14}$ | | |
| CE | 5.8 | 7.1 | 7.1 | | | |
| Metropolitan | 1.8 | 2.7 | 2.2 | | 0.5 | 60% |
| Urban interior | 1.4 | 2.1 | 1.7 | | 0.4 | 40% |
| Rural interior | 2.6 | 2.3 | 3.2 | | -0.9 | -100% |

The population of the state POP(CE) grows at an annual trend of 1.4%, with a clear urbanization process as can be seen by high R square coefficients for the metropolitan region POP(MRF), growing at an annual rate of 3.2%, and for the urban interior POP(UI), at an annual rate of 2.7%. The rural interior POP(RI) shows a trend of decreasing population at an annual rate of 1.1%. We put aside at this stage the distribution of the urban population between the metropolitan and the non-metropolitan region (the interior) and focus on the pure urbanization process. The increasing urbanization process as visible from the figure is apparently a healthy response to the changing economic structure, with a decreasing emphasis on agriculture. The share of rural population has constantly declined over the years, from 77% in 1940 to 32% at the end of the century. In absolute terms, rural population has not increased at all since 1970 (and even slightly decreased), while all the population growth in the last 30 years has actually occurred in the urban sector.

The figures of the changing distribution of the population, as shown in the following table for the period of 1985 to 1999, confirm the existence of the urbanization process, but raise some important questions.

Table 3: Distribution of the population between the rural and the urban sectors (%)

| Year | 85 | 90 | 95 | 99 |
|------------------------------|-----------|-----------|-----------|-----------|
| CE (millions in parentheses) | 100 (5.8) | 100 (6.3) | 100 (6.7) | 100 (7.1) |
| MRF | 31 | 34 | 38 | 39 |
| Urban interior | 24 | 26 | 28 | 29 |
| Rural interior | 45 | 40 | 34 | 32 |

Source: PNAD, various years.

Focusing again on the pure urbanization process (putting aside the issue of distribution of urban population between the metropolitan and non-metropolitan area), the salient phenomenon from Table 3, when compared to Table 2, is the disproportionate share of the rural area in population in relation to the share of agriculture in the economy. Already in 1985, we find 45% of the population in the rural area, while agricultural production is only 15% of GDP. We do not necessarily expect the same figure, since there is no rigid correspondence between life in the rural area and involvement in agriculture. Also, employment in agriculture may be more labor intensive than in industry or services. However, following normal standards, it seems that the fact that the share of rural population (45%) was three times higher than the share of agricultural product (15%) already in 1985 reflects the existence of some

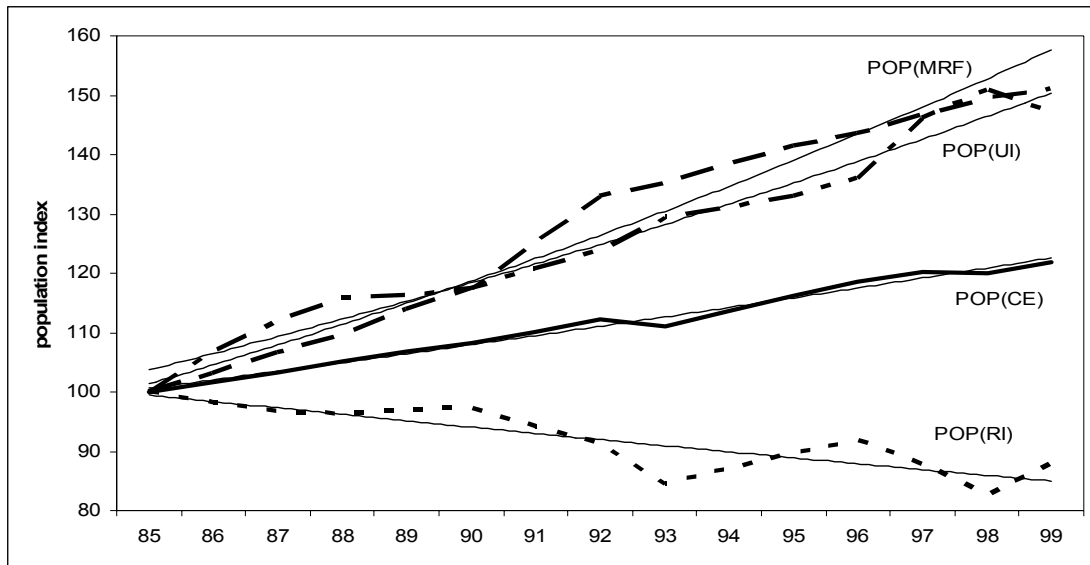
| Year | 85 | 90 | 95 | 99 |
|-------------|-----|-----|-----|-----|
| Total | 100 | 100 | 100 | 100 |
| Agriculture | 15 | 12 | 10 | 6 |
| Industry | 34 | 34 | 34 | 38 |
| Services | 51 | 54 | 56 | 56 |

Source: Anuario estatístico do Ceara, 2000, Table 11.5, page 356

Urbanization

At this stage, we ask ourselves to what extent the changing economic structure has led to a changing demographic structure, or in other words, to what extent the diminution of the relative weight of agriculture in the economy led to a diminution of the share of the rural population. As previously stated, we deal with three categories of population: the rural interior, urban interior and metropolitan region. The following figure shows the growth of the population index in the state as a whole and in each of the three categories (the population in each group is set at 100 in 1985).

Figure 4: Growth of population by category, 1985- 1999.



The trend lines in Figure 4 show the changes in the population index as a function of time t (t taking values of 0 in 1985 to 14 in 1999). The estimated functions are:

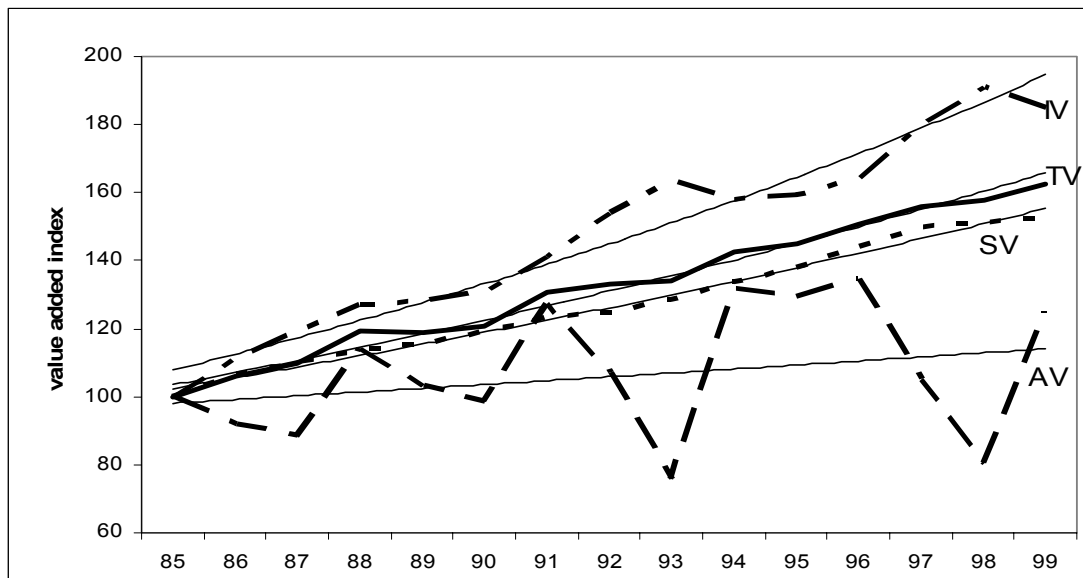
$$\text{POP(CE)} = 99 e^{0.014t} \quad R^2 = 0.99$$

$$\text{POP(MRF)} = 98 e^{0.032t} \quad R^2 = 0.97$$

$$\text{POP(UI)} = 101 e^{0.027t} \quad R^2 = 0.97$$

$$\text{POP(RI)} = 101 e^{-0.011t} \quad R^2 = 0.74$$

Figure 3: Index of value added (1985=100) in Ceara by economic sector, 1985-1999



Source: Anuario Estatístico do Ceara, 2000, Table 11.4.

Total GDP in Ceara displays an annual growth rate of 3.4%, as shown earlier. This growth of value added is mainly led by industrial growth, at an annual rate of 4.2%, followed by services. The interesting, though not surprising, result is that the growth of agricultural value added is the only one with an extremely low R square, reflecting the existence of extreme fluctuations in agricultural production (mainly as a result of droughts), with no significant trend of growth over the years. The problem of instability of agricultural production is treated by the Secretariat of Rural Development through various important programs, some of which are oriented towards increasing productivity and others focused on alleviation of poverty problems caused by droughts and climatic conditions.

The different growth rates of product in each sector lead naturally to a changing economic structure, in terms of the share of each sector in total GDP. It is difficult to analyze time series of those shares, because of the heavy fluctuations of the agricultural product as a consequence of the influence of droughts. However, the following table, showing the distribution of product between the three sectors at 5-year intervals, gives quite a clear picture of the decreasing share of agriculture and the increasing share of industry and services. The share of agriculture in the GDP of Ceara fell drastically from 15% in 1985 to 6% in 1999, with comparable growth of the share of industry and services.

strongest elements in the rural population have benefited from economic growth, but the weakest elements are still stagnating and have not found a solution by migrating to urban areas.

Summarizing the results of this short analysis, we find that the macroeconomic growth of the Ceara economy since 1985 did not contribute significantly to the reduction of poverty and inequality. Poverty levels did diminish to some extent, but most of the effect actually occurred during several years in the middle of the period. Inequality was not reduced, and may even be increasing, particularly within the rural areas. Most importantly, inequalities mainly result from gaps between the three population sectors: rural, urban and metropolitan.

Growth and changing economic structure

A process of economic growth on a national level is generally characterized by a change in the structure of the economy, mainly a diminution of the share of agriculture in the total state product and employment, an increase in the share of industrial activities, and a later stage an increase in the service sector. The process of economic growth in the Northeast of Brazil as a whole has been led by industrialization, although it has not been integrated into the economy of the nation (Goldsmith and Wilson, 1991). Figure 3 shows the trends of growth in total product in Ceara, and in each economic sector, in real terms, using an index based on the value for 1985 (100). For the sake of simplicity, we call “agriculture” all agricultural and cattle or fishing activities, “industry” includes manufacturing, construction and utilities, and “services” includes all kinds of services, private and public, economic services and social services.

In Figure 3, TV stands for total value added, IV for industrial value added, SV for services value added and AV for agricultural value added. Trend lines have been estimated for each of the sectors, using an exponential function in order to evaluate the growth rate trends. The estimated equations of the trend lines and their R squares are:

$$TV = 100e^{0.034t} \quad R^2 = 0.98$$

$$IV = 103e^{0.042t} \quad R^2 = 0.95$$

$$SV = 99e^{0.030t} \quad R^2 = 0.99$$

$$AV = 97e^{0.011t} \quad R^2 = 0.07$$

t is the time period: a value of 0 at year 1985 until a value of 14 in 1999.

G(MRF), probably reflecting the coexistence of entrepreneurs and workers in productive economic activities with unemployed, disguised unemployed or workers in low productivity activities. This may indicate the existence of migration from the interior to the capital, with no economic absorption ability of the capital. The Gini coefficients of the state of Ceara as a whole G(CE) show the highest values (around 0.62 during the years), reflecting both the inequalities within each population group and those between the groups. This is as high as in other states of Brazil, but probably much higher than in any other country in Latin America (Kim, 1997, p. 1913).

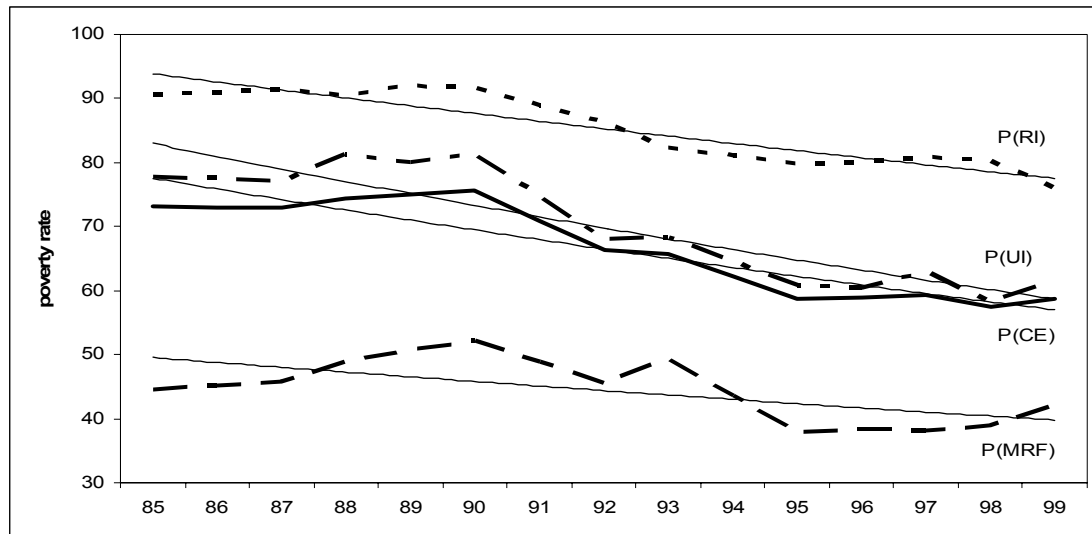
Other indicators such as the share of poorest 20% or poorest 50% in the total income do not show any increasing equality. Furthermore, the ratio between the average income of the richest quintile of the population and that of the poorest quintile seems to have increased during this period. This ratio fluctuates over the years. We will restrict this study to the results of 5-year periods, excluding years of extreme drought. This ratio is shown in Table 1, together with the Gini coefficients for those years.

Table 1: Distribution indicators in selected years: Gini coefficients and ratio of income of richest and poorest 20%.

| Year | 85 | 90 | 95 | 99 |
|--|------|------|------|------|
| Gini coefficients | | | | |
| CE | 0.62 | 0.63 | 0.62 | 0.62 |
| MRF | 0.61 | 0.62 | 0.60 | 0.62 |
| Urban interior | 0.53 | 0.52 | 0.58 | 0.56 |
| Rural interior | 0.40 | 0.46 | 0.47 | 0.49 |
| Ratio of average income of richest 20% and poorest 20% | | | | |
| CE | 22 | 24 | 27 | 29 |
| MRF | 21 | 26 | 22 | 25 |
| Urban interior | 14 | 13 | 21 | 20 |
| Rural interior | 8 | 11 | 13 | 20 |

In the state of Ceara, the average income of the richest 20% of the population was 22 times higher than that of the poorest 20% in 1985, and this ratio continued on an upward trend, reaching 29 in 1999. Within each sector (urban, rural and metropolitan), we can also detect signs of increasing gaps, suggesting higher benefits for the richer population from the economic growth. This is especially true for the rural population for whom signs of increasing inequality and of increasing gaps between the richest and the poorest are most clear: the gap of average income between the poorest and the richest has more than doubled during this period. This most likely reflects the fact that the

Figure 2: Poverty rates by year, for urban, rural and metropolitan population in Ceara



The estimated trend line shows a trend of diminution of 2.2% a year in poverty rates in the state as a whole. However, in contrast with the clear trend of growth of the GDP in Ceara, the changes in poverty and inequality are not quite clear:

1. The drop in the poverty rates in the state as a whole actually occurred only in the period of 1991 to 1995. During all the years before and after that period, poverty levels remained quite stable.
2. Evaluating data for the three population groups separately, we find large gaps between them, and no clear indication for the diminution of those gaps:
 - a. There is no clear trend of diminution of poverty in the MRF: we find a negative coefficient, but a quite low value of R square.
 - b. Poverty levels in the rural interior are much higher than in the urban interior, but the trend of diminution of poverty in the rural area is even slower (1.4% a year) than in the urban area (2.5%), leading to lower levels of poverty but to increasing levels of inequality.

Indicators of distribution do not show any clear improvement during this period. The most basic indicator, the Gini coefficient, as calculated by IPEA, does not show any diminution of inequality in the distribution of income in each of the three population groups, as can be seen in Table 1. Estimated trend lines all had a very low R square value, and none had a negative trend. The values of Gini in the rural interior G(RI) suffer very significant fluctuations as a consequence of climatic instability. Those of the urban interior G(UI) also are quite instable, most likely also due to the rural character of the urban economy. The inequality indicator is the highest for the metropolitan region

study on changes in regional inequality in Brazil, identifying a significant Beta convergence between Brazilian regions between 1939 and 1995 (Azzoni, 2001).

Compared with the Northeast region as a whole, Ceara eradicated a gap of 20% in GDP per capita within a decade, and now enjoys a slight advantage. The share of Ceara in the total Northeast economy has constantly increased from 12.5% at the end of the eighties, to 16% at the end of the nineties.

There are several alternative measures of poverty rates. Here we adopt the measure used by IPEA (Instituto de Pesquisa Economica Aplicada) for the calculation of time series of poverty rates. The poverty estimates are calculated from PNAD (Pesquisa Nacional por Amostra de Domicilios), an annual survey of the Brazilian national institute for statistics (IBGE). The calculations performed by IPEA are based on a poverty line of R\$68 per capita per month in 1999 prices (which is about the value of a minimum food basket, and roughly half a minimum salary). This is more or less equivalent to the measures used by the World Bank. We will calculate poverty rates for three separate population groups:

- a. The metropolitan region of Fortaleza (MRF), including the capital and several neighboring municipalities (today 39% of total population of the state).
- b. The urban interior (UI), including the entire urban population in the interior of the state, out of the metropolitan region (29% of total population).
- c. The rural interior (RI), including the entire rural population in the interior (32% of total population).

The relatively rapid growth in GDP per capita was actually accompanied by a trend of decreasing poverty rates, as can be seen in Figure 2. The poverty rate for the whole state of Ceara decreased from 73% in 1985 to 59% in 1999. Estimated trend lines for total poverty rates and in each population group are as follows (shown in Figure 2):

$$P(CE)= 79 e^{-0.022t} \quad R^2= 0.85$$

$$P(MRF)= 50 e^{-0.016t} \quad R^2= 0.42$$

$$P(UI)= 85 e^{-0.025t} \quad R^2= 0.82$$

$$P(RI)= 95 e^{-0.014t} \quad R^2= 0.86$$

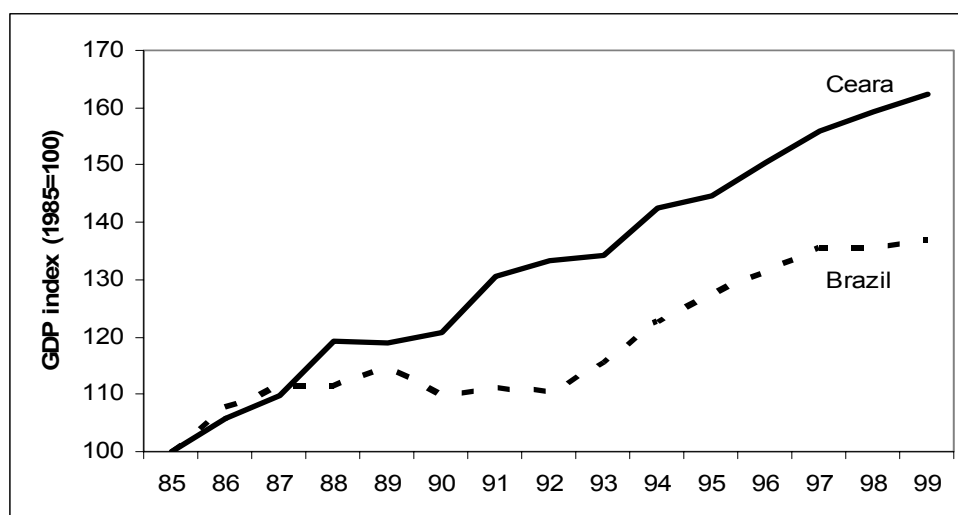
Where $P(CE)$, $P(MRF)$, $P(UI)$ and $P(RI)$ are the poverty rates for the whole state and for each of the three population groups, and t is the time period with values from 0 (in 1985) to 14 (in 1999).

industry and services). Third, we compare the changing economic structures with the urbanization process, both in terms of increasing shares of the urban population and in terms of regional distribution of the population. Fourth, we find the extent to which incongruence between changes in economic structures and demographic spatial structures are reflected by the levels of productivity in each economic sector. Then, we attempt to draw conclusions about an appropriate approach for the achievement of a more healthy economic growth with a more regional equalitarian distribution.

Economic growth, poverty and inequality in Ceara

The state of Ceara (CE) as a whole is one of the poorest states in Brazil. Its GDP per capita is less than half that of Brazil. However, the economic policy implemented over the past decade has led to rapid growth in the economy of Ceara in comparison with the national economy, as can be seen in Figure 1.

Figure 1: Real growth of PIB in Ceara and in Brazil (index: 1985=100)



Source: IBGE and IPEA.

In real terms, the GDP of Brazil has grown by 37% from 1985 to 1999, while that of Ceara has grown by 62% during this same period, for an average annual growth rate of 2.3% in Brazil as compared with 3.5% in Ceara. The growth rate of the population was about the same in Ceara and in Brazil (about 1.4% a year during this period). Consequently, the real per capita growth in Ceara was quite significant (about 2.1% a year) as compared with very modest per capita growth in Brazil (about 0.7%). As a result, the gap of GDP per capita between Ceara and Brazil was considerably reduced during this period: in 1985 Ceara's GDP per capita reached 40% of that of Brazil, and this increased to about 48% in 1999. This is consistent with the results of a

under different assumptions and parameters, may also explain a simultaneous growth in various regions. Krugman himself explains in a later article (Krugman, 1999) the action of “centrifugal” along with “centripetal” forces that may lead to the concentration of economic activity in more than one geographical area. The coexistence of multiple locations of economic growth is justified by other factors in recent research: physical capital mobility (Forslid, 1999), decreasing cost of trading ideas (Baldwin and Forslid, 2000), differing qualities of land (Lanaspa and Sanz, 1999) and influence of the public sector (Lanaspa, Pueyo and Sanz, 2001; Bar-El and Parr, 2003). Challenging the core-periphery model is now leading to the development of alternative models (Copus, 2001; Fishman and Simhon, 2002).

Following this short review of theoretical considerations and recent contributions to the literature, we suggest the following conceptual outline, to be tested with the experience of the State of Ceara in Brazil:

- a. Macroeconomic growth does not necessarily contribute to the diminution of inequality and may even increase it, consequently constraining the prospects for growth in the longer term.
- b. Economic growth in a less developed economy implies a process of industrialization and a declining share of agriculture in the economy.
- c. Industrialization requires a process of urbanization. In regional terms, this may result in a concentration of population and economic activity in the metropolitan region, increasing gaps with other regions.
- d. The influence of economic growth on increasing regional inequality does not necessarily reflect a healthy free market behavior and may be a result of capital market or labor market imperfections. The distribution of economic growth in a few regions may be more efficient and equalitarian, and may be theoretical justified.
- e. The existence of a regional market failure leading to concentration of growth and to inequalities may be identified through distorted productivity levels in various economic branches.

We now present an empirical analysis of the process of growth in the State of Ceara (Brazil) during 14 years of macroeconomic growth. First we analyze the rate of growth as compared to the growth of the whole nation, and evaluate changes in poverty levels and in distribution indicators. Second, we identify changes in economic structure in the process of growth, in terms of changing shares of the three main sectors (agriculture,

economic process and consequently limits the prospects of growth. An important model was recently developed by Fishman and Simhon (2002), showing that a high concentration of wealth leads to low degrees of specialization and productivity and, therefore, to a vicious circle of underdevelopment.

The main arguments presented above explaining the relationship between growth and inequality actually relate to both inter-personal inequalities and inter-regional inequalities. In this article, we will primarily focus on the second pattern: inter-regional inequalities. If, at least to a certain extent, inequalities are the result of capital market or labor market imperfections, the question is whether efficient free market equilibrium is reached through spatial concentration of economic activity (leading to inequality) or through a more dispersed distribution.

Industrial development has been used as a main engine for economic development, absorbing the excess labor force from agriculture and leading to an urbanization process. It is not our intention here to enter into the polemics around industrialization policies in developing countries and their influence on development (see, for example, Rostow, 1960; Myrdal, 1968; Gwynne, 1986). Instead, we focus on the question of the impact of industrialization on the spatial features of urbanization.

Krugman (1991) established a significant starting point with the development of a rather simplified model for the explanation of geographical concentration of manufacturing. He explains, using a two-region, two-sector model, how a concentration of manufacturing activity may happen in one region, depending on the interaction between three main parameters: the share of manufacturing in the economy, the existence of economies of scale and the level of transportation costs. This core-periphery (CP) model implies that economic efficiency considerations lead to a heavy concentration of the population around the manufacturing activity in one region (core), while the second region (periphery) will be less populated and based on agricultural activity. However, further developments of Krugman's model, mainly implementing changes in some basic assumptions, have led other scholars to different conclusions. Lanasa and Sanz (2001) find that assuming the existence of congestion costs and abandoning the assumption of constant transportation costs lead (using the same basis of Krugman's CP model) to the existence of various asymmetric stable equilibria, thus providing a "theoretical justification for economic landscapes in which large industrial belts coexist with smaller ones" (p. 437). We can state that the theoretical structure established by Krugman may justify a concentration of manufacturing activity, but

selected populations or regions. Another perspective is the potential conflict between achieving goals of increasing employment and increasing income: broadly speaking, achieving higher levels of growth and income generation may imply the adoption of higher technology or capital-intensive processes, leading to a limited increase of employment (see several empirical analyses, such as Morley, 1978 and Bar-El, 1984 for Brazil; Williams, 1981 for Arkansas; Jaksch, 1974 for Columbia).

The hypothesis of the existence of a Kuznets U-curve (growth causes growing inequality in the first stages and growing equality in the second phase, see Kuznets, 1955), or of a “trickle down” effect or a spread effect through which the first inequality stage is followed by benefits to the poorer segments of the population (“growth first, distribution later”) was not generally supported by empirical findings. To mention just a few empirical findings in the past years, Michel (1991) finds a concentration of growth in higher income percentiles and similar results using Gini coefficients, for the period after the 1982 recession. Lee (1994) finds similar results for that same period in London, leading to growing gaps and a tendency toward long-term dependency. Limited trickle-down effects are also found in developing countries such as Pakistan (Goheer, 1999), India (Gupta, 2000) and Taiwan (Hsieh and Hsing, 2002). Recent theoretical explanations for the existence of free market equilibrium at high levels of inequality have been elaborated, primarily on the basis of financial market behavior. Matsuyama (2000) elaborates a model in which the distribution of wealth in one period affects the supply and demand for credit, which, in turn, affects the distribution of wealth in the next period. Assuming that economic development projects that generate higher returns require a minimum level of investment and assuming the existence of borrowing constraints, growth would lead to equilibrium with a growing inequality. Under certain conditions, however, the same model could lead in the long run to Kuznets curve type of development, with a diminution of inequalities. Similar conclusions are reached using a model proposed by Aghion and Bolton (1997), suggesting that government intervention may be needed to achieve decreasing inequalities.

The trade-off between growth and distribution should not be considered a static phenomenon, stating a price to be paid in terms of social costs for attaining economic growth. The dynamic and very important element that is generally indicated in most studies is the negative long-term influence of unequal distribution of income on future growth. The argument, in general terms, is that concentrated growth leads to the exclusion of large proportions of production factors (workers, land, etc.) from the

Using the case of Ceara, a state in Northeast Brazil, we will provide some evidence that continuing gaps and poverty are consistent with a lack of adaptation of demographic geographical distribution to changing economic structures. Furthermore, we want to show that such a lack of adaptation reduces the level of labor productivity, and as a result limits the potential of growth of the state as a whole.

The state of Ceara has a population of approximately 7.5 million, and its inhabitants are among the poorest in Brazil. In the last decade or two, the state government has undertaken activities that have led to a relatively high level of macroeconomic growth. That said, inequality and poverty remain a major concern, particularly in the interior of the state and most specifically in the rural areas. The economic growth seems to have mostly affected the metropolitan region, while the rural areas and small cities in the interior still suffer from the implications of instable agricultural conditions and difficulties in establishing competitive non-farm activities. The state government has been deeply concerned with this situation, and since the beginning of the millennium has been devising policies designed to ensure more balanced growth and long-term alleviation of poverty. Those policies are for the most part oriented towards the reinforcement of the interior of the state through spatial reorganization and support for the development of non-farm activities in the rural areas. These efforts were initiated and led by Governor Tasso Jereissati and by State Secretaries Pedro Sisnando Leite (Rural Development), Monica Clark (Planning and Coordination) and Carlos Matos (Agriculture).

Some theoretical considerations

The issue of the relationship between economic growth and income distribution or poverty has been widely analyzed over the past several decades. Growth does not necessarily lead to an improvement in equality. On the contrary, many researchers have approached this question from various angles and shown the potential of increasing inequality as a consequence of economic growth (Kim, 1997). In very general terms, the process of economic growth may require a higher concentration on stronger elements of the economy: investments in regions with better infrastructures, in populations with better education and skills, etc... The “big push” theory, first conceived decades ago by Rosenstein-Rodan (1943, 1961) already implies concentration processes due to the indivisibility of production and supply of social overhead capital (among other factors). Such a concentration naturally leads to the concentration of benefits from growth in

Introduction

Countries in the developing world are continually struggling to solve their development problems by implementing various policies for economic growth (investing in infrastructures and education, providing incentives for capital investments, etc.). In many cases, however, it seems that economic growth, even when it is achieved, does not necessarily resolve the fundamental problems such as poverty and unequal income distribution that constantly plague these countries, (Cardoso and Helwege, 1992; Selowsky, 1981). The question of whether a conflict exists between economic growth and income distribution has already been widely analyzed in the literature over the past several decades (see the excellent review by Kim, 1997). This question is particularly acute in the case of growth of developing countries, where such growth is generally accompanied by a changing structure of economic activity: a transition from agricultural to industrial and service activities. This article focuses on one important potential source of growing inequalities as a consequence of economic growth: the incompatibility of structural economic changes and structural demographic spatial changes. Using case study, we attempt to show the consequences of such incompatibility and to suggest the need to devise appropriate development policies for the achievement of coherence between structural economic changes and structural spatial demographic changes (Rondinelli and Ruddle, 1978).

The transition from agriculture to industry, and later to services as major branches in the process of economic growth of less developed countries may naturally require a higher level of urbanization. Theoretically, such a process occurs naturally as a response to increasing labor supply from agriculture to more urban-oriented activities.

Our hypothesis is that the process of urbanization resulting from the transition from agriculture to industry and services is not sufficient to generate healthy and equalitarian economic growth. We argue that the coexistence of economic growth with unequal distribution of income and continuing poverty can be explained by the lack of a spatial adjustment of urbanization. In the absence of appropriate conditions for urban development outside the metropolitan core, the process of urbanization is distorted in two ways. First, it is biased towards the metropolis. Second, it is quantitatively restricted. Consequently, the economic transition process is inefficient and generates unbalanced growth.

Spatial urban restructuring for economic growth with distribution

The case of Ceara (Brazil)

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Abstract

Macroeconomic growth does not necessarily lead to the reduction of poverty or to a more equal distribution of income in developing countries. This study examines this issue from a regional perspective and claims that this is due to a large extent to an economically unjustified concentration of growth in the metropolitan region. We review the recent theoretical core-periphery debate and the rationale for the existence of simultaneous cores of development. Using the case of the state of Ceara in Northeast Brazil, we find a persistent and even growing unequal distribution of income in spite of the relatively rapid macroeconomic growth and show that this is not an efficient free-market equilibrium: the growth of productivity in agriculture and in services is zero, and the urbanization process is insufficient, leaving much of the rural population in a state of hidden unemployment. Furthermore, the migration process leads to an overly heavy concentration of population in the metropolitan region. The primary conclusion drawn from the findings is the need to adopt a regional policy that includes spatial reallocation of public expenditures for physical and human infrastructures, leading to a spatial urban restructuring.