Decentralized Urban Development and Industrial Location Behavior in São Paulo, Brazil

A Synthesis of Research Issues and Conclusions

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Abstract

Each city in a region competes over time for private and public resources with which to move toward its potential, efficient size. That size, and the rate at which it is approached, is conditioned by many factors, including the nature of national, sector-specific policies; the spatial distribution of prior infrastructure investments; and the ease with which labor and capital can be mobilized to exploit emerging local opportunities.

These factors can interact in ways which eventually yield faster employment growth among secondary regional centers than in the historically preeminent metropolitan areas. A study of the urban system in South/Southeast Brazil suggests that such a "polarization reversal" is underway.

In the wake of sustained regional development, firms in an increasing number of sectors become less susceptible to agglomeration economies associated with city size, and more sensitive to localization economies linked to local own-industry size. These benefits, in turn, fall off quite rapidly with the growth of own-industry clusters, and are thus consistent with a more decentralized pattern of urban industrial development.

At this stage, the growth of secondary centers beyond the metropolitan periphery depends primarily on new establishments rather than on the transfer of metropolitan plants or the establishment of metropolitan branches.

While secondary city officials have a limited role to play in this process, they can help foster development by responding to demands for the rapid, coordinated introduction of public services at the local level.
Preface

The research was undertaken by a team of World Bank consultants and staff, in collaboration with the University of Sao Paulo (Brazil) Fundacao Instituto de Pesquisas Economicas and the Brazilian Census Bureau.

The paper was written in close collaboration with William Dillinger (WUDOR), consultants Vernon Henderson and Peter Townroe, and researcher Eric Hansen. Michael Cohen and Kyu Sik Lee (WUDOR) provided substantive editorial help. Errors of omission and commission remain the responsibility of the author.
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SUMMARY AND CONCLUSIONS

Summary

Each city in a regional system of cities competes over time for private and public resources with which to move toward its potential, efficient size. That size and the rate at which it is approached can be affected to only a limited extent by any public sector actions taken at the local level. More important will be the particular stage of development at which the region finds itself; the national institutional constraints which affect the way private and public resource mobilization takes place; and the given set of natural and manmade resource available to each city and its hinterland. It is nevertheless reassuring for secondary city managers to know that each of these determinants of potential size tends to evolve, often spontaneously, in ways which encourage growth outside historically pre-eminent centers. One illustration of this is the way incremental agglomeration, or clustering, benefits tend to fall off for firms in many industries as any given city grows larger; at the same time big city disamenities (land costs, labor costs, congestion, pollution) create pressures for development of alternate locations.

The trends in the evolution of the Sao Paulo system in South/Southeast Brazil point clearly to a shift in growth patterns of population and industrial employment, such that secondary centers now grow more rapidly than the metropolis. This process is being led by a combination of net stationary expansion and by the establishment of new, independent units. Relocations and new branches play a smaller role in urban development, except for encouraging suburbanization and, to a lesser extent, exurbanization to nearby free-standing centers. This is because relatively few relocations and branches involve "moves" across more than 30 kilometers from the municipality of "origin."

Plant location decisions help explain why branching and transfers play a secondary role, and why "births" are so important to the evolution of most localities. The search for a location is part of a complex set of decisions, which are usually tackled by a strategy of limited search, economizing on information gathered and evaluated. Most alternatives considered are within short commuting distances of the investors' existing plants or residence. Within this radius the factors that tend to receive the greatest attention are land and building costs, road access, and the condition of public infrastructure.

Though secondary city officials are forced to live with their city's limited attractiveness to metropolitan-based transfers and branches, they can turn limited search to their advantage by fostering new local activities that ignore metropolitan location options. Planners are unlikely successfully to promote local development by attempting to modify radically those city features that arise spontaneously, such as agglomeration economies. Instead they can concentrate on providing for the rapid, coordinated introduction of public services at the local level. They might wish to find ways to
accelerate the development of leasable space for capital-starved, smaller firms. Finally they can act as advocates for the business community with national sector line agencies.

The development of secondary centers is being held back by the outmoded structure of intergovernmental relations. Forceful steps are needed to link national grants to improved local efforts to mobilize tax resources. In addition consideration should be given to setting up a municipal development banks that would allow localities to compete for development loans repayable at market rates.

National authorities in charge of sector line agencies can also provide the appropriate environment for local development by avoiding most specific spatial initiatives and concentrating on improving sectoral policies. In the Brazilian South/Southeast region there is reason to believe that non-spatial industrial promotion policies and policies affecting federal- and state-supported infrastructure investments still favor historically pre-eminent centers to the detriment of newer, secondary centers. Given these distortions, spatial incentives that attempt to redirect forcibly the location patterns of businesses involve a misdirection of public effort. The best spatial policy is a set of efficient sectoral policies.

Conclusions

Understanding Urban Concentration, Deconcentration, and Decentralization

Each city in a regional system of cities competes over time for private and public resources with which to move toward its potential, efficient size. That size and the rate at which it is approached can be affected to only a limited extent by any public sector actions taken at the local level. More important will be the particular stage of development at which the region finds itself and the national institutional constraints which affect the way private and public resource mobilization takes place.

This situation arises because the potential employment size for any given city will depend on the local composition of goods and services produced. The potential size of any local industry will depend on several factors. First is the relative availability of different natural and manmade resources. Second, is the extent to which the established subsectors of activity can lower their costs by reaping agglomeration economies through own industry growth. Third, is the extent to which the size of the local market attracts footloose industries (financial and business services, high technology manufacturing).

\[1/\] Excepting those involving interregional linkages in communications and transportation, where the spatial phasing of investments is inevitable.
One might argue that the manmade resources, at least, are subject to local manipulation. This is true to only a limited degree. The quantity and quality of local skilled labor does seem to be sensitive to the variety of public services available at the local level; a concerted effort to improve area services could have a developmental impact. Conversely, however, major regional transport facilities (expressways, ports, railroads) involve investments and coordinated area planning beyond any one city's capacity to influence decisively. Many attractive city features, such as a full array of business and financial services, and a large network of local parts and components suppliers, arise spontaneously.

National policies can, as noted, have a significant impact. Discriminatory policies toward agriculture depress the hinterland around certain cities that could otherwise flourish. Industrial protection measures that penalize producers likely to locate in smaller centers, or that promote producers likely to locate in larger centers, appear to have substantial effects. If the capital markets — for private or public use — are organized in such a way that access is rationed by non-price mechanisms, then the growth of particular groups of cities will suffer. For those who worry about city size distribution, efficient sectoral policies may be the most significant weapon at the disposal of the public sector to nudge cities toward their potential, efficient size.

Even then, however, account needs to be taken of the development stages through which the region or nation is passing. No amount of good policy-making will produce a large industrial metropolis or a flourishing set of industrial secondary cities with more than 100,000 inhabitants in a poor, small region.

Public and private resource constraints, and the limits imposed by regional purchasing power and labor force quality on regional production size and diversity, all these will dictate probable outcomes at any one point in time. One should therefore not be surprised to find the early emergence of one or two "city states" in a region, better equipped than all rivals, and only a very selective development of some resource-rich secondary centers. Elsewhere, small rural-oriented service centers will dot the landscape. With rising economic development levels metropolitan deconcentration will inevitably emerge, as will new secondary cities within day commuting distance from the most developed cores. At this stage, policies to stop "sprawl" or limit the geographic perimeter of a metropolis will be as futile as premature attempts to "create" secondary centers.

Factors Promoting Decentralized Development: Illustrations from the Sao Paulo Region

One fear that is often voiced is that decentralized development is made almost impossible by the accumulation of clustering economies available to firms operating in historically pre-eminent centers. Evidence from the urban history of developed countries suggests otherwise, and confirmation that similar factors are at work is found in South-Southeastern Brazil.
Once the most severe constraints associated with low levels of economic development are removed; it appears that agglomeration economies are primarily linked to the local size of the industry to which a firm belongs. These economies are important — typically cutting costs by 10% as an industry doubles its size around the mean. But, even here, the cost-cutting effects of doubling industry size falls off rapidly beyond the industry mean. At the same time, increasing city size itself appears to play only a secondary role in decreasing production costs. Since growing urban population brings with it rising land costs, labor costs, and congestion, a negative incentive develops over time to expel established standard technology activity from the initially preeminent centers.

Thus the basis for deconcentration is established, though only a few proximate free-standing centers are likely to receive a large transfer of dynamism from the metropolis through relocation of plants and opening of metropolitan-headquartered branches. Other secondary centers will grow independently, drawing on local entrepreneurship in the form of stationary expansions and "births."

This can be illustrated by looking at the recent evolution of Sao Paulo state. By 1980 urban population growth outside GSP exceeded that of the metropolitan area in all size classes above 20,000 inhabitants, and was led by the 10 centers whose population exceeded 100,000 in 1970. This was helped along by similar trends in industrial employment growth: all secondary city groupings grew faster than GSP over the recent past. Other indicators can be marshalled to demonstrate the depth of the new industrial transformation. Non-metropolitan growth cannot be explained by a fast growing mix of industries. The typical industries of the secondary centers are not growing rapidly by statewide standards; therefore good performance in these industries in the periphery is due to other factors, linked to the improving competitiveness of the area. Associated with this are other phenomena: value-added per worker is converging across space, and there is a systematic convergence in the broad industry mix profiles of the various subregions. As the earlier framework would suggest, this convergence is clearest among the group of cities located within 150 kilometers of Sao Paulo city.

Evidence gathered from the industrial censuses of 1970 and 1975 suggest that, statewide, industrial employment growth is due primarily (56%) to "mobile" components; i.e. births, branches, and transfers. Furthermore, births explain about two-thirds of the mobile growth. Looking across cities, it appears that rapidly growing areas recorded fast growth because of high net stationary expansion and high birth rates; the contrary was found elsewhere. This applies even when looking at non-traditional subsectors of industry across cities.

These data were supplemented by others, drawn from a random sample survey of 591 plants newly located in Sao Paulo state between 1977 and 1979. Transfers and branches tend to locate in the vicinity of the previous plant or headquarters, respectively. Thus 82% of branches and 51% of the transfers never left the city of origin; only 13% of the branches and 23% of the transfers moved more than 30 kilometers from the place of origin. Most of
these were city of Sao Paulo firms, suburbanizing or moving into more peripheral locations. Of this small minority of jobs, virtually 80%-90% moved no further than 100 kilometers from Sao Paulo city. Beyond that all new activity was overwhelmingly local in origin.

Taken together this suggests that it is crucial to shift from spatial strategies based on long-distance relocation or branching incentives to approaches that try to improve local conditions, per se. Some of the ways this can be done are apparent when one examines the factors that underlie plant location decision-making.

The Links Between Urban Decentralized Development and Plant Location Decisions in Sao Paulo

At the base of a system of cities lie individual economic agents whose decisions jointly have a great impact of the fate of any one city. For that reason it is interesting to explore the decisions of investors who must decide on the location of a new plant, be it through relocation, branching, or opening up an independent facility.

It is clear from interviews conducted with newly located firms in Sao Paulo state that location decisions are rare in the life of a firm. For firms already in existence, new locations generally are prompted by the need to respond to other pressures — to expand, to reorganize, or to enter into new product lines. Some of the reasons behind suburbanization and exurbanization include deteriorating conditions in the metropolitan center city, reflected by rising land, labor, and congestion costs. Finally, new, independent plants are forced to choose a location as one aspect of starting a business.

The search for a location is therefore part of a complex set of decisions. Investors tend to find information on market signals and future trends to be difficult to acquire and to interpret. Entrepreneurs with existing business face transactions costs if they wish to move, while management coordination problems are posed by branching. Births experience the burden of start-up costs, which create cash-flow problems over the early life of the enterprise.

The strategy most often identified by the survey to deal with these problems is one of limited search. Generally, the location of existing facilities or of the investors' residence is compared to only a few, well known areas, which are usually close by. In this environment, similar conditions prevail in many respects (proximity to known suppliers, proximity to known labor suppliers) but land costs, road access to alternate markets, the reliability or availability of particular utilities, and existence of leasable space may differ. In addition, certain forms of "soft" infrastructure (education, health, and recreational facilities) may vary to a noticeable degree. These differences are easier to evaluate, and trade-off against one another, in the context of general area similarity.

Distant areas create the necessity for a more general evaluation of factor markets. The survey suggests that recourse to widespread data
collection and evaluation is foreign to most firms. Firms do, in fact, appear
to ignore unfamiliar territory unless they belong to that minority committed
to a major move. Given this, it is not surprising that hypothetical or actual
packages of municipal incentives do little to alter behavior. Even more hard-
headed municipal planning, which accelerates the pace at which utilities
arrive in to industries in a city, must cope with the disappointing fact that
perceptions change slowly, and that immediate "pay-offs" are unlikely.

From this, some policy advise results. First, the mobility that
helps modify location patterns at the margin seems to depend on generalized
regional growth pressures that are beyond the spatial planners perview.
Second, limited search procedures provide a proverbial silver lining to local
officials: business expansion and new, independent plant formation in
secondary cities takes place, in part, because more developed, historically
pre-eminent centers are not considered in the new location/expansion
decision. Secondary city planners thus have some breathing room within which
to operate. They need to consider carefully what specific initiatives may
make sense.

Several options are not credible. Planners cannot do much to create
a dense urban network of services. They can do little to create localization
economies. They should abandon the use of municipal incentives as a means to
diversify their city's industrial profile, especially when focused on
unreceptive firms located beyond the immediate commuting shed of the area.

It is possible for local planners to exploit their role as "god-
fathers" of the business community with the sector line agencies operating at
the regional and, less persuasively, at the national level. Anything that
provides for the rapid, coordinated introduction of public services at the
local level is beneficial to local firms. Improved services at the local
level can also help attract critically important supplies of skilled labor
without which much potential decentralized development will be blocked.
Pressure at higher levels may be useful, in the long-run, in raising the
consciousness of authorities who deal with the disbursement of long-term
capital, pricing of agricultural commodities, regional transport investments,
and industrial promotion incentives. Finally, if local authorities wish to be
more creative, and can find the resources, they could bypass the popular
notion of industrial estates and work, instead, for ways to improve the avail-
ability of leased space in the community. Beyond that, the initiative must
pass to the national level, where many policy reforms could be undertaken to
udge cities to a more efficient pattern of expansion.

National Policy-Induced Distortions: An Agenda for Reform

National initiatives to "improve" the mix of cities in a regional or
national system by specific spatial incentives is a poor substitute for
efficient policies across all sectors over which the government has some
impact. The best spatial policy consists of good sectoral policies.
Empirical demonstrations of this are harder to come by than other areas
discussed, both because the methodologies required are poorly developed and
because the data requirements are large. Nevertheless limited research findings and casual empiricism yield some suggestive results.

Non-spatial industrial promotion incentives favor larger, more diversified centers and penalize secondary centers specializing in more traditional lines of production. GSP, in particular, is rewarded, as are nearby communities at the forefront of national industrial diversification. Independent assessments, within and outside the Bank, suggests these policies are undesirable on non-spatial efficiency grounds; they also dull market signals implying new spatial patterns of employment. Those who argue that such benefits will be offset by higher land values ignore the ability of a metropolitan area to expand geographically. Those who argue that returns to investors will fall back in an on-rush of immigrating investors, ignore the creation of new own-industry localization effects in larger cities, as well as the impact of favoritism on the location decisions of the carriers of new technology.

Beyond that, there is evidence that, because of insufficient local autonomy in the field, spatial disparities exist between the value and the cost of urban services provide, possibly leading to lower than expected wages in favored, historically pre-eminent centers. This would not eliminate or reverse wage differences between center and periphery; it would however, lead to a less-steep wage gradient than would otherwise exist, especially if heavy subsidization of large centers continues over a long period of time. It is difficult to avoid the conclusion that centralized systems for determining services and charges, combined with revenue sharing formulas heavily favoring well-established industrial centers, works against the interests of secondary centers. Reforming, or at least reconsidering, these policies would surely be more cost effective than spatial initiatives such as those implemented in the underdeveloped Northeast region of Brazil.

If decentralized development is difficult to foster, it may be, first of all, because it is an irrelevant option given the particular stage of economic development many regions are passing through. Even if this is not a problem, far more fundamental reforms of sectoral policies are required than most governments wish to undertake. Efficient decentralization will not occur in an environment distorted by misplaced sectoral policies. In the final analysis, local initiatives and isolated projects at the local level are secondary in importance to national reforms.
I. Introduction

A. Background

In 1980, Sao Paulo state contained one-fifth of the 120 million citizens of Brazil over a land area approximately equivalent to the Federal Republic of Germany or the United Kingdom (see map 1). As an economic entity, the state contributes approximately two-fifths of net domestic product, including 60 percent of national manufacturing value-added. The per capita income in Sao Paulo, at $4,000, is twice the national average. Greater Sao Paulo (GSP), with 12.7 million people (1980) has half of the state population and one-tenth of the national population. It has grown at an annual average rate of 5.3 percent per annum over the last three decades, from a base of 2.7 million. GSP contributes one-quarter of net national product, and over 40 percent of Brazilian industrial value-added. Its per capita income now exceeds $5,000.

The size and rapid growth of GSP has become a source of ill-defined concern to local policy-makers. There are fears that this gigantic economic machine is creating, at the margin, more management problems than are justified by the benefits of added growth. There is a feeling that some resources presently lodged in GSP could be used more efficiently to strengthen other urban centers of different sizes in other areas of the country. In addition, the existence of GSP creates a potentially alarming concentration of economic, and thus political, power in a few square kilometers of the national territory and in the hands of a small fraction of the population. The case of GSP is just one of many around the world. In almost all cases there is the threat of public sector action to redirect growth forcibly so as to produce
greater spatial "balance". In some cases there are policies in place to accomplish this goal.

The World Bank makes loans to these same countries, for urban shelter, infrastructure, telecommunications, and transport projects. In the past many of these investments were directed at the largest centers, without much regard for the rest of the urban system. Now there is a growing effort to promote secondary center development, partly to create future countermagnets to the largest existing centers. 1/ In addition to this, the Bank maintains an active dialogue with its borrower countries on urban policies and institutional arrangements that bear on urban growth. The World Bank is thus being drawn into discussions about policies aimed at restraining the growth of major urban centers and/or promoting secondary centers. This requires an understanding of the forces involved in urban growth across all cities in a region or country, and of how policies might influence this process. Over the past decade considerable resources have been devoted within the Bank to review the analytical underpinnings of urban growth. 2/ The present report is a continuation of that work.

1/ To cite just six initiatives around the world, there is the Brazil medium-sized cities program, and secondary or regional cities programs in Mexico, the Ivory Coast, Kenya, Thailand, and the Philippines.

B. The Legitimacy of Spatial Concerns

Does it really matter that most of the consumption and production in a country takes place in a very few centers? The answer is a qualified "yes". It depends on a number of factors. Concerns for political stability and national security are legitimate reasons for introducing spatial equity considerations into the elaboration of national development policies. Furthermore, investors and workers may be operating within an economic decision-making framework that emits distorted signals about the most efficient pattern of future growth, whether sectoral or spatial dimensions are considered. Correcting or counteracting such deficiencies is a legitimate function of public policy, on purely efficiency grounds.

More specifically, fears exist that economic decision-makers face an environment, across different sized cities, where many inputs may be incorrectly priced. Thus, firms and workers in big cities contribute to the creation of negative externalities such as pollution and congestion. Yet these economic agents are rarely if ever taxed to pay for clean-up and for decongestion projects; instead, massive investments of resources (paid for largely by non-metropolitan dwellers) allow the big centers to continue to experience low-cost growth in a tolerably pleasant environment.

Price signals aside, market forces may operate imperfectly. One usually assumes, in arguing for laissez-faire attitudes on the part of public officials, that decision-makers know most of their options. In truth, they act with limited information. For example, investors in large cities appear to know less about alternative investment options in other centers than would be socially desirable. Even if an effort is made to explore other spatial opportunities, the entrepreneur may face difficult-to-quantify or difficult-to-forecast rewards and costs at different locations, forcing him back along
well-worn paths. This type of problem may perpetuate big city growth because attractive alternatives are ignored, especially by the well-heeled carriers of newer technology, sophisticated organizational techniques, and marketing know-how. Generally ill-equipped and weakly capitalized local firms are left to take up some of the slack at the hinterland locations; however, significant opportunities may be bypassed for some indeterminate period of time.

Furthermore, economic agents may face an environment distorted by the cumulative effects of public policies which deny different sectors and firms of different sizes access, on reasonably equal terms, to resources with which to respond to market signals. Similarly, economic agents in different locations may be denied access on roughly equal terms to resources, over and above the cited sector and size effects. This form of discrimination is coupled with a tendency to deny secondary center administrators financing for otherwise viable projects that could help promote local economic development. Given these distortions, particular centers, usually the larger ones, will be unduly blessed and grow faster than less favored areas.

Given the existence of such potential barriers to efficiency, individuals may have a perfectly legitimate claim in demanding an opportunity to participate in the development of national resources without having first to migrate into a handful of urban centers. 1/ In fact, even if the cited problems are not considered serious, there is still a case for having a spatial perspective to public policy. The public sector has a right to plan in anticipation of future patterns of comparative advantage, be they sectoral or spatial. In this case, the transition period to more decentralized patterns of growth can be shortened by making judicious investments and

1/ This presupposes a regional or national market large enough to support a diverse set of cities of different sizes.
otherwise molding location behavior. This can help bring forward the emergence of viable alternate centers for a wide spectrum of economic activity.

C. Project in the Context of the Spatial Issues Research Agenda

There is no doubt that a great deal has yet to be learned about the impact of public policy on the location of economic activity. The Bank has invested additional resources to explore this question by funding a research project aimed at understanding the trends in, and the behavioral underpinnings of, urban growth across a region centered on a fast growing metropolis, operating in the absence of explicit spatial policies. A focus on manufacturing firms was suggested by GSP's very high proportion of employment in that sector (38 percent in 1978). The working assumption was that, in the system of cities under consideration, manufacturing held great potential for expanding the economic base of these local centers. This assumption, in turn, was based on the belief that manufacturing firms are relatively more flexible than others in their choice of locations and more likely to rank higher in such measures as the generation of the local multiplier effects which contribute to the growth and diversification of the different parts of the urban economic system.

To mold spatial policies several factors must be understood. First, the context in which policy-making might take place must be clear. The past and present demographic and economic trends provide a background with which to answer a series of questions: would policies work with or against the tide of trends? How great is the "friction of space", given existing networks of transportation and communications? What is the growth and sectoral
composition of economic activity, nationally and by small area? What is the
degree of "mobile" growth? Where are people and jobs going, at the margin?

An understanding of behavioral relationships implicit in locational
choices is also important. Do they confirm, in broad strokes, the forms
indicated by past research in the presently industrialized nations? Do they
imply important barriers to shifts in the existing patterns of employment and
population location? To this must be added a review of the institutional
setting through which public policy is transmitted. To what degree does the
public sector create a discriminatory environment that works against economic
agents who could foster different locational patterns of activity? How easily
can that environment be changed?

Finally, a choice of instruments for spatial policy implementation is
required. This calls for a full exploration of operational objectives. The
value of metropolitan restraint policies must be debated, and with it the
ability directly to determine "optimal" city size. Policy-makers must decide
on the value of secondary center promotion in the presence or absence of near-
term impacts on metropolitan growth. Some framework must be developed for
trading-off the possible losses in the level of total productivity per unit of
labor if the present patterns of spatial activity are forcibly transformed. A
decision must be reached as to the economic agents that are subject to such
instruments. If an industrial spatial policy is appropriate, should it be
geared to branches and transfers, births, and/or in situ expansions? Should
particular destination areas be fostered or discouraged by manipulating their
relative attractiveness?

Even after these issues are resolved, the type of instruments that
are acceptable must be determined. How does one measure the attractiveness of
instruments that rank differently on budgetary resource use, resource
allocation bias, administrative costs, or impact on aggregate economic
growth? This problem cannot be addressed successfully unless the impacts of
the instruments can be monitored accurately once in place; unfortunately, such
impact evaluation requires data and analytical methods which are not fully
developed at this time.

This research project concentrated on a selection of issues drawn
from the above listing. This summary, in turn, provides only selective
highlights of findings reported in greater depth in footnoted project papers;
it should not be considered a substitute for reading those reports. In Part
II a framework for understanding the development of an urban system is
discussed. In Part III, the evolution of the Sao Paulo urban system is
reviewed in light of the framework findings. Part IV outlines the project
findings on the degree to which agglomeration economies found in large cities
deter the emergence of newer, secondary centers. Part V explores the
relationship between the pattern of urban development and industrial plant
behavior. Part VI explores some policy distortions and their potential
effects on industrial location. Part VII provides some concluding
observations. The decision to conduct research in an areas where explicit
policy instruments are absent precluded research on their impact. This
omission is remedied, in part, by a research project, nearing completion, on
location behavior in the Greater Seoul (Korea) area. Finally, decisions made
at the time the project was conceived recognized the impossibility of devoting
much time or resources to cover issues whose understanding depended heavily on
institutional arrangements and bureaucratic behavior, including such subjects
as public investment decision-making and the operation of the banking
system. In a field as uncharted as this one it was unfortunate but inevitable
that only a few topics could be examined in depth.
II. A Framework for Understanding the Development of a System of Cities

A. The Determinants of City Size

City size is the outcome of complex market forces and public policy interactions which determine the distribution of sizes across an entire system of cities. Any city competes over time with other cities for capital, labor, and public investments under institutional constraints which govern access to various inputs and outputs. Within this environment, cities attempt to move toward their efficient size, given the costs associated with further growth and the benefits these centers can offer additional households and investors. In the long-run perspective provided by a model economy free of distortions and imperfections, distributions of national output would be associated with particular groups of cities of different sizes across the national landscape. 1/ It follows, then, that in the less perfect real world, improving the market environment within which national production decisions are made will lead to a different configuration of cities. Conversely, nudging the cities toward expansion paths more in line with efficient market signals will tend to increase and change the composition of national output.

The existence of cities is based on the uneven distribution over space of natural and manmade resources and on the uneven availability of

agglomeration, or clustering, economies in the production of goods and services traded between communities. Such factors make it beneficial for workers and firms to come together, despite the costs associated with density (land and labor costs) and the costs associated with congestion and pollution.

Employment size, for any given city, will depend on the composition of goods and services produced locally. Some commodities will be insensitive to cost reductions linked to clustering; firms engaged in these subsectors will abhor concentration in a few centers. Cities specializing in such goods and services will have a relatively modest long-run equilibrium size. For other commodities, the sensitivity to clustering will range from mild to very high. If the mix of subsectors in a city is heavily weighted toward those that are very responsive to the benefits of agglomeration, then that city will have the potential to become very large.

Agglomeration economies could take the form of locational economies, which, while external to firms, are internal to each industry grouping in a particular city. These economies would reflect, among others, possibilities for greater specialization among an industry's firms as industry size increases in an area; reduced cost in matching job categories with workers specialized in that industry; and more rapid transmission of new technology. Alternatively the agglomeration effects could be caused by urbanization economies. Such economies are external to both firms and their individual industries: they are the result of the overall level of economic activity in a city. This would reflect the impact of such factors as a larger labor market, a large business services sector, and economies associated with large scale provision of public infrastructure inputs. In both instances, whether localization or urbanization economies prevail, it is expected that firms in different industries will show differing sensitivity to these external
economies. Because agglomeration economies are, at least in part, activity-specific, most cities spontaneously specialize in what they produce. These cities trade with one another and with the rest of the world. The ratio of cities of any one type to any other is then a function of both the profile of national production and of the ease with which locations can adapt to market signals, competing with one another for the resources with which to expand.

There are limits to the degree to which urban areas can be expected to specialize even in a developed country context when the fewest constraints exist. At the most elementary level, it is costly to trade goods and services across space, and, therefore, some commodities are provided more or less ubiquitously. Beyond that, diversification may be explained by the use of a matrix into which industrial activity can be classified (Figure 1). On one axis are activities which are sensitive to localization economies, urbanization economies, or no agglomeration effects at all. On the other axis, activities can be classified as resource-using (and thus constrained by the location of such resources) or relatively footloose.

**Figure 1**

**Matrix of Industrial Activity**

<table>
<thead>
<tr>
<th>Relatively Sensitive to Localization Economies</th>
<th>Relatively High Proportion of Costs Represented by Natural Resources</th>
<th>Relatively Low Proportion of Costs Represented by Natural Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Processing</td>
<td>Relatively Sensitive to Localization Economies</td>
<td>Automotive Parts</td>
</tr>
<tr>
<td>Wood Products</td>
<td>Relatively Sensitive to Urbanization Economies</td>
<td>Publishing</td>
</tr>
<tr>
<td>Heavy Machinery</td>
<td>Relatively Insensitive to Agglomeration Economies</td>
<td>Apparel</td>
</tr>
<tr>
<td>Non-Metallic Minerals</td>
<td></td>
<td>Soaps, Dies, Paints</td>
</tr>
<tr>
<td>Furniture</td>
<td></td>
<td>Printing</td>
</tr>
<tr>
<td>Rubber Products</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 10 -
In the long term, one might have a series of scattered small or medium sized urban areas specialized in the exploitation of some resource and whose "core" firms are sensitive to localization economies. These "core" activities might include primary metals, heavy machinery, wood products, or food processing, for example. Because of the cost of intercity trade, groupings of footloose activities, such as financial and business services and some forms of manufacturing involving low resource content and/or high degrees of technological sophistication, would tend to cluster around the pre-existing centers. Among these footloose activities, some (publishing, apparel) may also experience cost-cutting urbanization economies that encourage concentration around large markets. At the limit one would get different clusters of economic activity coming together to form a large multinucleated metropolitan area. Even here there are limits to size, unless these are somehow offset by market imperfections and distortions: there are increasing costs to doing business or living in ever larger urban areas.

B. Urban Concentration, Deconcentration and Decentralization in the Course of Regional Development

Given the outlined framework, it is useful to think further about the evolution of a city system over time and across various stages of national or regional economic development. At low levels of income, the development of manufacturing activity is likely to be concentrated in relatively few urban centers, except for the very simplest artisan and food processing activities. Those urban centers will have some privileged resource, such as port facilities; a strategic position along rail or road networks; and/or an important political function. At such locations commercial and financial services are relatively well developed and a concentration of purchasing power exists. Given the limited size of the skilled labor pool, few locations
outside big cities could hope to assemble a diversified labor market. Finally industrial experience is so limited that firms seeking to maximize their knowledge of markets and new technology will seek large centers. Thus at early stages of development, most industries act as if urbanization economies associated with sheer city size are crucial; city specialization is rare and the intermediate city system suffers. Firms sensitive to agglomeration economies of any type and footloose firms seeking compact market areas will help to create one or two relatively large regional centers.

Even if each urban area had the right fully to exploit its potential tax base, and even if they could compete on equal terms for funds a well-developed capital market, it is likely that the few pre-eminent centers would receive the lion's share of resources with which to develop physical and social infrastructure during the earliest stages of industrialization. As it is, these cities are usually subject to a centralized allocation of public investment resources; national metropolitan areas tend to get a greater overall share of these than a market solution might dictate. In either instance, the strategy behind encouraging concentration is to create industrial city states which can operate as a "nation" with only a fraction of the additional telephones, paved roads, power plants, and educational facilities needed to recreate a similar environment at multiple points in space. Over time, infrastructure constraints are likely to be relaxed. The market for manufactured goods in the region will grow in size and the range of goods that can be produced in decentralized locations at competitive prices will increase. All other things being equal, some firms performing relatively standardized tasks with relatively "mature" technology may be interested in locations in the urban periphery, since the rising factor costs in larger centers (land, labor, congestion) no longer make the level of big city agglomeration economies as attractive as they were initially.
Unfortunately these peripheral centers may not be equipped to receive transfers or branches, or to nurture new firms. This is because the alternatives must be capable of generating a threshold level of agglomeration economies, social overhead capital, entrepreneurs, labor with different skills, and capital flows. In the absence of "adequately equipped" secondary centers, the threshold problem may allow a large urban cluster to have declining marginal net benefits from certain forms of additional economic activity and yet remain more attractive to producers and to recipients of factor payment than competing alternatives. This dilemma is likely to be resolved, in practice, either by deconcentration into a metropolitan region or by the slow independent emergence of more distant large centers.

These regional metropolitan areas are likely to grow, and to receive public resources with which to cope with growth, because the propulsive local activity is important from a national, sectoral point of view. Included among those types of cities are the ports through which agricultural and mining products flow overseas, as well as major mining or agricultural service and processing centers. These cities are likely to depend on local entrepreneurship, given the evidence on location patterns discussed below. In a sense it is the very difficulty that the metropolitan entrepreneur has in appropriating this distant source of activity that guarantees the ability of hinterland development.

Deconcentration is a much more predictable outcome. It appears inevitably in the course of regional development because the advantages of proximity to central city services and markets can be preserved while some of the disadvantages (land costs) can be sharply reduced. If one posits a model that stresses risk-averse behavior by firm managers in the presence of uncertainty about present conditions and future trends, then deconcentration should be the main way that historically pre-eminent centers transmit growth
to the periphery and relieve the managerial pressures of rapid urbanization. It permits urban areas originally distant from the core gradually to become incorporated into the process of modern economic growth.

Ideally, as resources become more abundant, the public sector might anticipate future spatial patterns of comparative advantage by shifting resources toward the periphery generally or by providing additional resources to intermediate, secondary centers where the rate of return on infrastructure investments includes a modest "infant city" premium. The premium would allow public investment analysts to recompute the social rate of return from these projects to include a margin for bringing forward the emergence of viable alternative locations for a wide spectrum of activities. Planning is rarely so systematic but, with economic development infrastructure is nevertheless extended over wider and wider areas. With due regard to lags in entrepreneurial perception of improved infrastructure — once new facilities are in place — it eventually becomes apparent to decision-makers that an increasing number of centers are ready to accept a diversified portfolio of industrial activity. The question then arises whether smaller population centers are actually able to generate the combination of relatively low factor costs and sufficient agglomeration economies to compete with larger, more established urban areas. In addition, it is unclear whether local entrepreneurs, acting alone, are adequate substitutes for the dynamism provided by metropolitan entrepreneurs, acting through branches and transfers, and presumed to have at least on initial advantage in knowledge about technology, plant management, and marketing. The history of urban growth in the more developed countries suggests that, with lags of uncertain duration, these problems can be overcome.
C. Public Policy Implications of Framework

The system of cities literature contains lessons for public policy makers. The abstract beauty of the concept of efficient city size or efficient city size distribution does not support the notion of using "optimal geography" as a policy objective. Given the type of data and analytical tools available, "optimal size" estimates for a city at any one point in time can vary by a factor of two or three if the estimated determinants-of-size parameters differ from their (unknown) true values by 20 or 25 percent. It makes sense, however, to implement policies that nudge centers toward their potential size, whatever that might be, by improving the performance of the market.

More specifically, one can act to force agents to absorb the full burden of externalities like congestion and pollution by instituting user charges which can be used to finance socially appropriate local investments. This will produce efficient levels of congestion and pollution and firm-level planning that takes the associated costs into account. In addition, one can act to improve the mobilization and distribution of resources for social overhead capital, so that more centers have an opportunity to bid for grants loans, and expand in response to market signals. This is particularly appropriate for the metropolitan periphery, which is likely to emerge at an earlier stage than most secondary centers. Attempts to fight deconcentration in the name of controlling "sprawl," on the other hand, would seem counter-productive.

One can also act to reconsider those national economic promotion policies which provide differential access to public sector favors, discriminating by type of activity, firm size, and location. It should be stressed, in this regard, that even if explicit spatial discrimination is absent, and access to incentives for any given activity or firm size is
everywhere the same, the differing activity and firm size profiles of cities may still create indirect effects if, for example, very sophisticated sectors and very large firms -- which are found in few centers -- are treated preferentially. The primary goal here should be sectoral efficiency, broadly speaking. Eliminating sectoral distortions may do more for decentralized development than all the myriad spatial efforts conventionally proposed by Third World policy-makers.

Finally, should location behavior research uncover evidence that entrepreneurs find it very costly to assemble information on base data and market trends in centers other than those that are historically pre-eminent, it may make sense for the public sector to invest some resources in information gathering and dissemination. Such investments could be justified by assuming that there are social benefits to more efficient location decision-making, benefits which are not captured by individual firms. This holds true even if it becomes apparent that the only outcome is to accelerate deconcentration and intermediate distance (100-150 kilometers) transmission of growth impulses from the metropolis, with no discernible impact on more distant secondary centers. Given the nature of city system evolution, efficient deconcentration and the development of nearby centers is a crucial precursor to more generalized decentralized development.

III. Urban Trends in the Sao Paulo Region

A. Background

The framework developed in Part II can be used in several ways. First, it can provide useful background for understanding the historical...
development of the urban system in a region or a country. Second, it can help place recent trends in perspective, broadening the implications of and providing the links between secondary data powers. Finally, it provides some propositions which can be subject to more rigorous testing. For organizational purposes, the first two applications are discussed in this section, while an empirical exercise on the nature of agglomeration economies and the public policy implications of such findings are discussed in Part IV.

B. Polarization in Historical Perspective 1/

Around 1900, Brazil was an economic archipelago, a series of small regional economies with limited links to one another. Each region had its own agricultural, industrial, and service base, and each possessed an associated system of cities. The motive force behind the expansion of any region was exports: on this foundation, other development blocks fell into place.

Sao Paulo city and its hinterland, largely contained within Sao Paulo state, was a region that had the opportunity to benefit from an export drive which was special in many respects: it was more sustained than any other experienced by the various Brazilian regions: it was labor-intensive and based on wage labor, thus creating a monetarized local market; and it was high valued with respect to land, thus returning, on average, substantial profits per hectare. The existence of this export base placed Sao Paulo city and its

environs at the forefront of Brazilian industrialization; employment rose from 10 percent to 27 percent of the national industrial total during the first half of this century. This industrial growth, along with the employment created by business services catering to industry and local agriculture, helped swell local populations within the later metropolitan boundaries from 240,000 in 1900 to 2.7 million in 1950.

Coffee arrived in Sao Paulo state in the 1850s and spread across the whole state during the following thirty years. Sao Paulo city was positioned to draw virtually all the benefits of the regional port, including those of being the political, financial and business services center of the state. The requirements of coffee production and distribution, and the incomes derived from coffee, generated activities that were useful to industrial growth. Among these were the following:

a) local production of goods and services to process, ship, and finance coffee;

b) local production of goods and services for the local market created by coffee incomes, given high interregional and international shipping costs;

c) agricultural production in the newly-exploited hinterland areas to meet regional needs for food and industrial raw materials given fertile soils, ever improving intra-regional transport facilities, and poor interregional links except by sea;

d) attraction of millions of European immigrants, whose education and skills enhanced local human capital;

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1/ This occurred even though the docks were located elsewhere, in Santos. The port itself was physically hemmed-in, located in disease-ridden lowlands, and isolated from the rest of the state by an escarpment. Sao Paulo city was linked to the port directly and thus dominated all access to Santos by land.
e) resources for investment in coffee-related and other activities, given weak interregional capital mobility; and
f) resources and local revenues with which to supplement or subsidize foreign investments in infrastructure in ports, transport links, and urban public utilities.

The public sector played a significant role in this process. The central government's reliance on customs revenues led to increasingly protectionist tariffs that sheltered local production of non-durable consumer goods, in particular. A decentralized system of intergovernmental fiscal relations allowed Sao Paulo state to have exclusive access to taxes placed on coffee exports: this permitted the state to control an independently-funded budget equal to roughly 35 to 40 percent of the national budget. These funds, combined at times with central resources, were applied to ventures that promoted economic development in Sao Paulo state and thus in Sao Paulo city. Among the most prominent examples, one can cite the use of subsidies to encourage the construction of railroads and ports; the use of public funds for the same purpose; the subsidization of European immigrant travel and subsistence expenses (almost exclusively centered on attracting workers to Sao Paulo state); and the establishment of schemes, backed by guaranteed foreign loans, to maintain the local currency earnings of coffee producers in the face of international price fluctuations.

Rio de Janeiro, the nation's capital and main rival to Sao Paulo, also benefitted from the largesse of the public sector. Yet Rio lost the race for industrial pre-eminence by 1920, handicapped by the lack of a rapidly growing captive hinterland; its poor potential for agricultural production was matched by the rapid exhaustion of its coffee soils, leaving much of the hinterland population dependent on subsistence agriculture for a living. The
nature of domestic industrial production at the time and existing transport
and communications barriers made access to resources and markets more critical
than pre-existing levels of clustering economies. In this environment, Sao
Paulo city was able to overcome the disadvantages of a later start in the
process of industrialization. When the era of more sophisticated domestic
industrial production arrived, Sao Paulo city (and its associated urban areas)
was far ahead of all competing centers in market size and in employment in
most industrial sectors. The rest of the country was still undeveloped or
incapable of generating or substituting for a prolonged export boom. So Sao
Paulo, city and state, continued to grow, drawing on firm-specific central
government subsidies for new sector development, benefitting from central and
state government measures to preserve coffee sector earnings, building its
industry behind import-restricting efforts meant to husband foreign exchange,
and conquering extra-regional markets as transportation barriers decreased.
As industry and as agriculture prospered in Sao Paulo, barriers to interstate
capital flows encouraged local reinvestment, while the volume of activity
began attracting significant foreign investment.

Over the period 1950 to 1980, there was a forcible transformation
in local production from an emphasis on consumer non-durables to a concen-
tration on consumer durables, intermediate goods, and capital goods. The
central government introduced an ever-larger number of industrial promotion
instruments — including trade protection and preferential access to long-term
capital — to compensate for the relatively high costs of production. Using
the same logic, it initially chose to limit expenditures on supporting

1/ A good introduction to spatial development in this period, available in
English, is the work of Katzman, op. cit.
infrastructural investments to areas like Sao Paulo city and Rio. In effect, Sao Paulo city and its environs became an industrial city state. Once again, as in the earlier period, a decentralized fiscal system gave Sao Paulo state control of resources equivalent to a third or more of national government revenues, resources which were plowed back into state infrastructure, with priority to serving GSP. As a result, GSP grew in population from 2.7 million to 12.7 million (1950-1980) and its industrial employment increased from 600,000 jobs to 1,461,000 jobs over the same period.

Central government programs between 1950 and 1964 acted decisively to build up industry in GSP, the local establishment of the Brazilian motor vehicles industry being a good example. Industrial promotion efforts, uneven in their sectoral orientation, had long-term effects that went well beyond the individual plants involved: the area increased its network of suppliers and business services, upgraded the skills of its labor force through on-the-job training, and, partly as a consequence, became a beacon for foreign investors arriving in Brazil.

After 1964 public policy began to have a somewhat different impact on the spatial organization of activity. A relentless pace of industrial growth was maintained over a number of years, pushing many GSP producers to the limits of their plant capacity at a time when the liabilities of producing locally were made clearer (high nominal wages, high land costs, increased congestion and pollution). This encouraged short-distance relocations from Sao Paulo city and its inner suburbs. This industrial growth also promoted additional development in suburban and exurban locations, helping to build the

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1/ Belo Horizonte, capital of the aptly named state of Minas Gerais (General Mines), itself adjacent to Sao Paulo and Rio states, was an exception that proves the rule. Its metallurgical potential, which could be put to good use serving the industrial centers, made it a logical candidate for public investments that would otherwise be absent.
industrial base of communities that were relatively far (100-150 kilometers) from downtown Sao Paulo city. Simultaneously decentralized development took place at an accelerated rhythm in other regions, especially the regional metropolitan areas. All this was accompanied by massive state and federal investments in infrastructure upgrading across a wider area than in the past; by 1975 the worst constraints to locations in the periphery of the Sao Paulo system and in the larger cities of the country had been overcome. Sectoral programs for new natural resource exploitation and the "liberation" of agriculture through improved price incentives and generous credit subsidies opened new possibilities for associated, more decentralized industrial growth. Finally, programs with a specific spatial bent were introduced, most notably in the subsidization of industrial development in the states of Northeast Brazil (see Section VI) and of commercial and industrial diversification in Manaus, on the Amazon.

Even during this last period, other institutional arrangements worked to perpetuate the pre-eminence of GSP. In spite of tax system reforms, the fiscal system forced states and localities to rely heavily on the proceeds on an industrial value-added tax collected at the point of origin, while providing for only limited revenue redistribution. This gave GSP the wherewithal to "tend its own garden", while providing state resources to create a privileged hinterland. As a result deconcentration was encouraged more forcefully than widespread decentralized development. In addition, key development institutions — like the subsidies-granting Industrial Development
Council and the National Development Bank 1/ -- ignored space except as a consequence of narrow sectoral promotion policies.

What is occurring in urban Brazil today is a slow rearrangement of activity in space given the workings of market signals and of primarily sectoral policies. With lags of different lengths, firms are responding to the release of constraints in secondary centers outside GSP. In an environment such as this, dramatic changes are unlikely to occur in short order. In particular, the gains GSP experienced over many decades will not be dissipated easily.

C. The Emergence of Deconcentration and Limited Decentralized Development 2/

Even though urban population growth has fallen over time, it is still considerably higher than total population growth; 3/ fully half of Brazil's

1/ The Council provided deep subsidies for as much as 3/4 of new manufacturing investment during the "miracle growth" years (1968-1973); Sao Paulo state (and GSP, by implication, with 7 out of 10 industrial jobs in the state) received half the subsidized investment. The Bank was more selective in its choice of sectoral programs and more cognizant of Sao Paulo's alternate sources of medium- and long- term financing (reinvested profits, foreign credit, local banking). Nevertheless, Sao Paulo received 40 to 50% of its resources before 1970 and 30-40% thereafter through 1975.


3/ During the decade of the 1950s, urban growth averaged 5.6%. By the 1970s, it had fallen to 4.4% per year. Total population growth declined from 3.0% to 2.5% per annum.
population now lives in centers with 20,000 or more persons in 1970. Greater
Sao Paulo's share of population has stabilized at 21 percent. Greater Rio has
grown at relatively slow rates over the last three decades and now holds 15
percent of national population. Sixteen large agglomerations (with 250,000
population or more in 1970) hold another third of the urban inhabitants, while
smaller centers contain the remaining third. Though GSP set the standard for
urban growth in the 1950s and, to a lesser extent the 1960s, during the last
decade the growth rates of all other size categories (except Rio) have
surpassed that of the largest metropolis, which increased at the national
urban average.

Within Sao Paulo state, areas radiating from GSP, along the road axes
to Rio and to points west, especially those within 150 kilometers, have shown
great dynamism over the last decade. By 1980 the urban population growth of
state urban areas outside GSP exceeded those of the metropolis; 1/ it was led
by ten centers which, in 1970, had populations in excess of 100,000 persons.

This change in relative growth ranks is being helped by trends in
industrial employment growth. Nationally, during 1970-1975, the growth rate
in urban manufacturing (7.1% per annum) was exceeded by most city size classes
outside Greater Sao Paulo (6.5%) and Greater Rio (3.9%). This pattern
recurred between 1975-1980. 2/ Slowly, the overwhelming share of
manufacturing employment located in Greater Sao Paulo and Greater Rio is
falling, from nearly 60% in 1950 to 47% in 1980. The largest agglomerations,

1/ These trends should not shift attention away from the large absolute
population growth in GSP. It gained 4.4 million inhabitants between 1970
and 1980.

2/ Between 1975-1980, total urban industrial employment rose at a rate of
4.3%, while GSP grew at 3.4% and Greater Rio increased at 1.5%.
with 250,000 or more inhabitants in 1970, now contain roughly 22% of the jobs; while medium-sized and smaller centers contain about 31% of employment.

In Sao Paulo state, manufacturing growth in all secondary city size classes now exceeds the rate in GSP. This trend emerged prior to the reversal of population growth rankings and had continued since. If shift-share analysis is used to separate industrial growth into its component parts, it is apparent that secondary city growth at rates above the state average is not attributable to the fact that its mix of industries are "fast growers" at the statewide level; the reverse is, in fact, true. Instead, there is a significant, positive residual growth, which implies a swing away from the metropolitan area in the balance of comparative advantage for a wide range of industries. This is true for both 1960-1970 and for 1970-1975, using either employment or value-added data.

These results are reinforced by information available on value-added per worker, expressed in constant cruzeiros. At a two-digit level of disaggregation, areas outside GSP have undergone a transformation which has brought the hinterland into a position of increasing parity with the

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1/ Growth is mechanically disaggregated into three components: a) growth that would have been recorded in an area that had increased employment (or value-added) at the average state growth rate for all industry; b) additional growth which is attributable to the particular mix of industries in the area and is calculated by subtracting (a) from the employment expected if each sector in an area had grown at its state average rate, be that higher or lower than the all industry average; and c) a residual "differential shift" growth which remains unexplained after considering the impact of (a) plus (b). The use of shift share analysis is rare in the developing country context, though the methodology itself is quite conventional; see B. Stevens and C. Moore, "A Critical Review of the Literature on Shift-Share Analysis as a Forecasting Technique", Journal of Regional Science, 20, pp. 419-437. The data is reviewed in P. Townroe and J. Roseman, "Sectoral Influences on Spatial Changes in Manufacturing: Sao Paulo State, Brazil, 1960-1975," Washington, D.C., Urban Development Department Discussion Paper, Report No. 15, The World Bank, October 1982.

2/ The industrial data for 1980 only became available in 1984, and was thus not analyzed in the individual project working papers.