

# Development Policy in Puerto Rico, 1952-1980: An Example of Successful Industrial Decentralization

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## **ABSTRACT**

Creating industrial jobs is a common strategy in Latin American economic development plans. Puerto Rico promotes industrialization under FOMENTO by giving incentives to encourage investors and by encouraging investment in peripheral areas over the primary urban centers. Tests of changes in location between 1952 and 1980 show that the decentralization policy has been successful. Analysis of the employment data reveals that durable as well as non-durable manufacturing shifted beyond the primary urban center of San Juan. This pattern of successful industrial decentralization is especially unusual when the results are compared to those published by Gwynne and others.

## **INTRODUCTION**

Industrialization is the single most important process in economic development (Gwynne 1986), but it creates linkages and, often, dependencies with the world capitalist economy, and its concentration in advantageous locations leads to regional disparities. To enhance industrialization and to foster economic development, a common early postwar policy in Latin American nations was an import substitution strategy; but then policy shifted to export promotion over the last two decades. Initially, theorists expected that the import substitution policy would create greater self sufficiency. In fact, research on the consequences of import substitution shows a continued and greater dependence on the industrial core than was initially envisioned. Hence, it appears that nations engaged in import substitution strategies participate in a global integration on the multi-national scale.

Using a core-periphery approach, Gereffi and Evans (1981) compared the patterns of dependent development in Brazil and Mexico. Finding those nations to be too industrialized for the peripheral label, yet not centers of innovation, Gereffi and Evans developed the concept of semi-periphery. Semi-peripheral states have expanded and diversified manufacturing capacity owned largely by foreign capital. These nations exemplify a convergent model of dependent development. Convergence comes from a historical evolution with a strong role for direct foreign investment. This begins with a unique primary product export economy through horizontal, then vertical import substitution, and finally the diversified export promotion from 1970 to the present. The implications for this paper are that even the most developed Latin American economies are still dependent, even after repeated attempts at import substitution.

Within developing nations the patterns of industrial location are highly concentrated. Gwynne (1982) examined the implications of traditional location theory on the pattern of industrial centralization in Latin America. In Weberian theory, the least cost location is the large coastal city or the one at the center of the transportation network, and that primate location attracts industries seeking a market location, raw material assembly, and external imports of material and equipment. Gwynne (1986, 1987) noted that the level of centralization in manufacturing in the most advanced industrialized countries showed 50 percent of the manufacturing [end p. 79] workforce in the major agglomeration and even greater concentrations in less industrialized nations. These findings suggest rather bleak prospects for smaller nations in industrialization generally and decentralized industrial policy specifically. This paper describes the impact of a planned industrial decentralization program in Puerto Rico between 1950 and 1980.

## **BACKGROUND**

An example of regional development policy emphasizing decentralized industrial growth occurs in Puerto Rico under the Economic Development Administration also known as FOMENTO. Before FOMENTO, there were experimental efforts in state ownership, and the policy took its present form in the early 1950s when the agency began a program of promoting and coordinating industrial development (PRIDCO 1956). In the beginning, unemployment rates were high, and half of the industrial jobs were in the primary metropolitan area, San Juan. FOMENTO emphasized progressive dispersion of investments among spatial jurisdictions on the island; it sought to improve economic life in even remote communities (Odell and Preston 1973).

Although high unemployment rates and concentrated economic activity certainly provided the challenge necessary for such a program, Puerto Rico itself had advantages to offer. Its location and political situation made it particularly suitable for the evolving process of transnational vertical integration currently evident in global industrial locations (Dicken 1986). Other advantages included the 1950s political decision on commonwealth status and such specific advantages for investors from the mainland United States as taxation, customs, and tariff arrangements. In addition to labor and tax advantages, the development policies were enhanced by FOMENTO policies that coordinated the efforts of governmental agencies to increase cooperation. FOMENTO also took a more active role by providing such incentives as quicker training, building grants, loan support, and tax exemptions. Not available equally in all places, the tax exemption program demonstrates FOMENTO in action because it creates specific zones of comparative tax exemption with the largest grants to industrialists locating in the remote, non-metropolitan (peripheral) jurisdictions, and the smallest exemptions given in the principal cities (Odell and Preston 1978, 173). The initial program sought to locate at least one factory in each jurisdiction. Later the program of exemptions related jobs to population with an initial goal of one job per one hundred people and later one job per fifty people (pico 1974).

## **INDUSTRY IN DEVELOPING COUNTRIES**

In his work on industrialization in developing countries, Weiss covers almost the same period and gives a framework for analysis. Noting substantial yet uneven growth in developing countries, Weiss also found a shift of from 21 to 31 percent in capital goods between 1963 and 1980 (Weiss 1988, 10). This signals a shift from light consumer goods with simple technologies and few scale economies, to more advanced, independent industrial operations. In the disparate group labeled "developing," Weiss reports that overall manufacturing employment grew at a rate of 4 percent per year between 1960 and 1970 (Weiss 1988, 8). Reliance on the export of a small number of primary commodities changed with developing nations showing a small increase in exports across a variety of products.

This manufacturing expansion is uneven, but Weiss found a few top countries dominating the statistics. The paths to industrialization are also variable. Government frequently attempts to control or influence different areas of economic activity including industrialization. Weiss summarized the literature on those policies, and especially important to this work are those governing the treatment of foreign investment and trade. Although it was not treated in Weiss's work, Puerto Rico clearly fosters an outwardlooking, dependent policy. The range of dependency depends on the portion of foreign ownership, but Weiss points out that the relationship between foreign involvement and industrial attainment results in initial economic growth with long-term domination by foreign investment leading to dependency and poor growth.

In the literature on development in Puerto Rico, the role of tax exemptions (Taylor 1957), population movements (Monk and Alexander 1979), and the development process itself (Stead 1958) are germane. Odell and Preston (1973 and 1978) use Puerto Rico as a case study of emerging themes in the economic geography of Latin America.

This paper emphasizes the dispersion of jobs from the core of development to less developed areas in Puerto Rico. It studies the possible effects of policy using centralization techniques and other tests of economic development and comparative industrialization. In the first section, the question is whether decentralization

of industrial jobs occurred at the municipio level. The second section uses employment data to analyze the pattern of growth using documentary sources.

### **THE UNIT OF STUDY**

*Municipios* are areal divisions that allow comparisons over space on the island. *Municipios* [end p. 80] are the primary data collection unit for census enumeration, and the Industrial Incentive Act No. 57, 1963, used the municipio as the unit for differentiation in tax exemption zoning. Using the municipio, one may contrast those municipios that are part of Standard Metropolitan Statistical Areas (SMSAs) with the non-metropolitan municipios. The San Juan metropolitan area, the dominant urban center, began the study period with four units but ended the period with nine municipios within its boundaries. Thus, it is possible to distinguish urban spillover growth from industrial dispersion using the municipios differentiated by SMSA status.

Data for the study are the U.S. Census reports on the population of Puerto Rico for 1950, 1960, 1970, and 1980 (U.S. Dept. of Commerce, Bureau of Census 1953, 1963, 1973, 1982). The baseline for the study, 1952, will compare 1950 census material with 1955 information on industrial jobs. This temporal compromise in terms of data sources results from the need to begin study of the FOMENTO period with the detail of the census. Data on employment in industries comes from the Department of Labor and Human Resources of the Commonwealth of Puerto Rico. That agency reports the total industrial employment for paid workers by municipios in mid-October of the study years 1955, 1960, 1970, and 1980. The count of industrial workers excludes home industries employing only the owner or unpaid family members, but the statistics do allow a comparison of paid industrial jobs to the total population. The total employment count of 1980 includes persons who worked during or received pay for all or part of the pay period ending nearest the 15th of October 1980 (Commonwealth of Puerto Rico 1955; 1960; 1970; 1980).

### **THE IMPACT OF THE PROGRAM: CENTRALIZATION VS. DECENTRALIZATION**

Evidence from the past suggests that as a nation industrializes, its industrial activities will concentrate in the core region. Such concentration would be especially typical of a nation without internal rail connections. In Puerto Rico, offsetting these centralizing tendencies was the goal of the FOMENTO programs aimed at decentralizing jobs first by municipio and later in comparison to the population. It is possible to employ measures of centralization to compare natural centralizing tendencies with the effects of policy aimed at encouraging industrial decentralization. .

In the literature, two measures of centralization are the Lorenz curve and the location quotient. In this paper the first technique is utilized to examine the concentration of employment for various years for making comparisons. The second technique, the location quotient, is utilized to calculate the relative concentration of employment for each study year by municipio.

### **LORENZ CURVE**

A Lorenz curve shows the comparative variation from an even distribution by plotting the cumulative percentage of industrial employment (in this case) against the cumulative percentage of land and population. Imposing study years on the same graph allows the comparison of the individual study years with the diagonal which represents a completely even distribution. The procedure begins with the rank ordering of data in descending order of magnitude. The accumulated percentages are then plotted on the graph with the x-axis representing the percentage of population in industrial activities by municipio and the y-axis representing the percentage of land area in one curve and the percentage of population in the second. The two curves (Figures 1 and 2) contrast the shift in FOMENTO policy from decentralization by municipio (area) to decentralization by population. The straight line diagonal shows a pattern of completely even distribution with each municipio having a proportion of manufacturing employment equal to its area or its population size.

The graphs compare the 1960, 1970, and 1980 data to the 1952 baseline. Over the study period the distribution has moved closer to the diagonal. The most concave, the most uneven distribution, appears in 1952, and later study years move progressively toward the diagonal. The move toward more even

distribution held, whether the basis for comparison to proportional industrial employment was to area or to population. The comparative Lorenz Curve indicates that proportional industrial employment has become more decentralized in the study period. The variation among the municipios has diminished as FOMENTO policies went into effect.

### LOCATION QUOTIENT

The location quotient, a second measure of deconcentration, is a ratio of ratios comparing the distribution by unit to a completely even distribution. In this paper, the location quotient compares a) the ratio of manufacturing employment to the population in each municipio, to b) the base ratio of the total manufacturing employment to the total population. If a municipio has a share proportional to its population, then the location quotient would register 1.0. Those municipios with quotients [end p. 81]

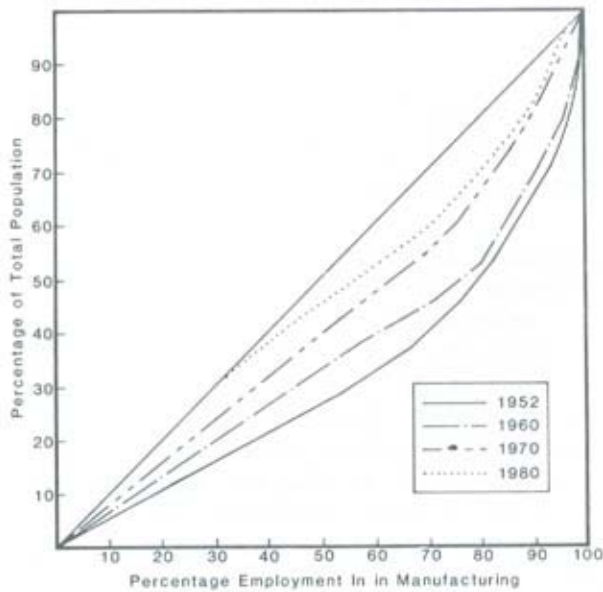


Fig. 1. Lorenz Curves—1952, 1960, 1970, 1980. Shows proportional share of manufacturing employment to municipio population.

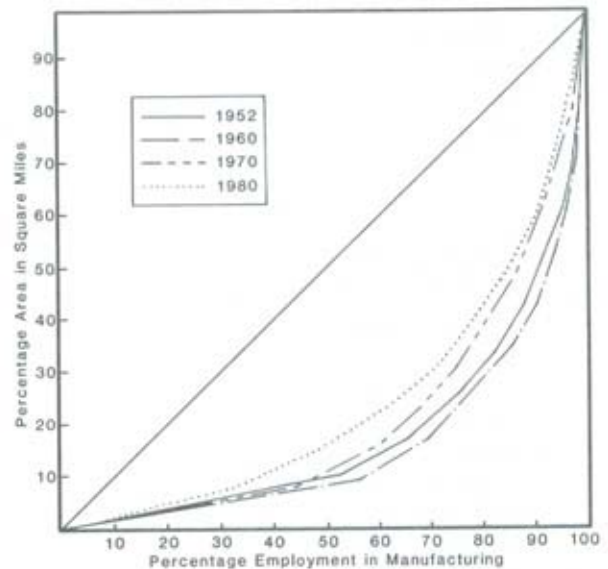


Fig. 2. Lorenz Curves—1952, 1960, 1970, 1980. Shows proportional share of manufacturing employment to municipio area.

that exceed 1.0 have more than their share, and those with less than 1.0 have less than their share compared to an even spread of this employment. Thus, the location quotients as mapped show the comparative share of manufacturing employment by municipio for the study period (Figures 3 and 4). For ease of comparison, the quotients appear in three categories: high is defined as those with quotients at 1.0 or more, those in the moderate range with scores between .50 and .99, and those in the lowest group with quotients in the range of .0 to .49. The spatial dimensions of the increase appear on the map displaying the municipios that increased in the study period. Those with increasing ratios lie for the most part outside the boundaries of the metropolitan areas. However, it is apparent that ten of the municipios with increased quotients lie adjacent to the metropolitan area and another four are within its boundaries. Comparisons suggest, therefore, that the municipios with increasing quotients are often adjacent to metropolitan areas or to rural areas with substantial industrial activity. As this occurs, the gap between the industrialized areas and the rest of the municipios is narrowing. Past inequalities are diminishing.

Extreme concentration in the San Juan area was one indication of past inequality. During the FOMENTO period, the urban population increased. The concentration of population in San Juan SMSA increased during the study period. Also substantial were the growth rates of the smaller SMSAs Ponce, Mayaguez, Arecibo, and Caguas together, increasing their portion to more than 20 percent of the population.

## **THE NATURE OF THE INDUSTRIAL GROWTH**

At the start of the FOMENTO period, industries using localized raw materials dominated the industrial base; these included the manufacture of sugar, rum, tobacco, and needlework. Non-durable manufacturing activities dominated in the first decade when 60 percent of the workers were in food, tobacco, textiles, and apparel industries (Pico 1974). FOMENTO's policies made an effort to expand the capital intensive sectors in manufacturing. The shift in the configuration of durable-non-durable plants from 30-70 percent to 50-50 percent in 1980 indicates that manufacturing expansion also occurred in the durable sectors. Both metropolitan and rural counties had an increased share of factories producing durable goods (Table 1).

## **SHIFT-SHARE ANALYSIS**

The major remaining question is whether the growth was actually as much of a shift from the core to the periphery as the measures of centralization seem to suggest. Would the growth have happened the way it did without governmental intervention? Insofar as this is a unique area with a distinctive set of circumstances, it is possible only to estimate the efficacy of the FOMENTO strategy using established methods.

According to Fothergill and Gudgin (1979), shift-share analysis has been widely used and highly criticized, yet they strongly advocate its use in the study of industrial growth. A number of critics are especially concerned about its use [**end p. 82**]

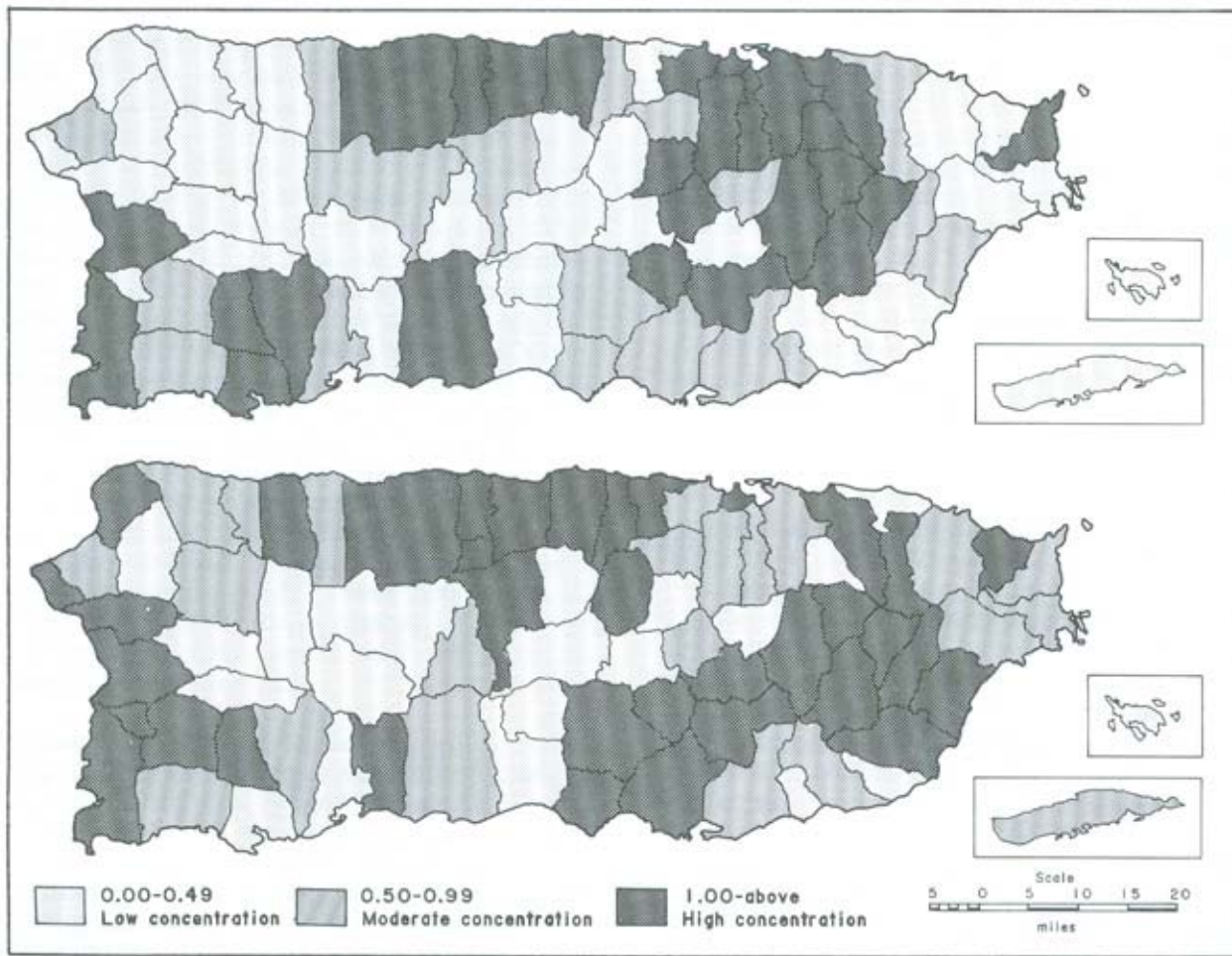


Fig. 3. Location quotients based on manufacturing employment for 1952 and 1980.

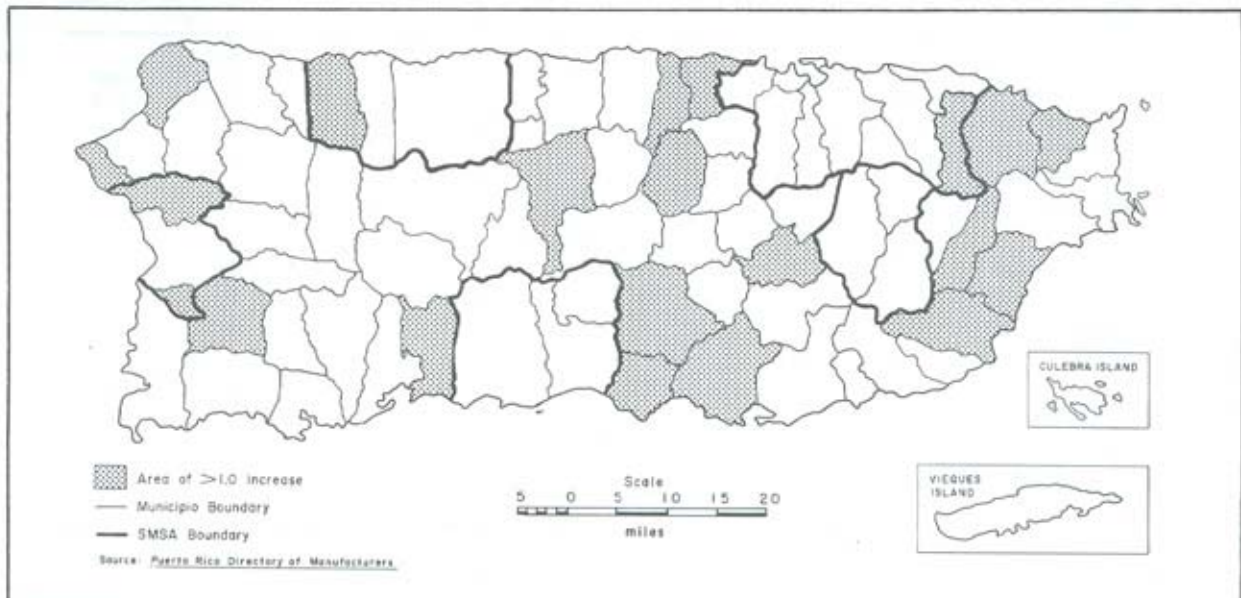


Fig. 4. Municipios with location quotients based on manufacturing increasing to 1.0 or more between 1952 and 1980.

[end p. 83] as a projection technique, the scale of inquiry, and the study period. In this paper, it is a technique that measures or makes allowances for the degree of structural difference between categories in employment by industrial group over time. It estimates employment changes occurring in the local economy (planning area) in relation to the reference economy (the Commonwealth) (Landis 1985, 216-217). There are three statistics. The national component measures the rate of change at the aggregated level; the structural (proportional) component indicates relative growth or decline based on industrial mix; and the differential shift compares actual and expected rates for each industry allowing the defection of slower development in rapid growth industries or faster growth in stagnating sectors.

This paper uses shift-share to detect the patterns of growth between 1950 and 1980 using census materials on employment aggregated into FOMENTO planning districts. The shares calculation assumes that industries in each planning unit grow at the rate of all twelve areas accumulated. The shift calculation displays the regional position and allows explanations including changes in supply, demand, technology, and location. The sectors are expected to change at the same rate as the total rate for the sector, and the difference between the expected and the actual change is taken to be the result of the policy. The actual program was a microcomputer program using BASIC modified from one presented in Ottensmann (1985, 69-73). A similar program is also available for spreadsheet users (Landis 1985).

Table 1. Relative Distribution of Population, Jobs, and Factories by Growth Area (Percentages)

	1952			1980			1984	
	Popu- lation	Indus- trial	Fact- ories	Popu- lation	Indus- trial	Fact- ories	Share FOMENTO Factories	Asst. Jobs
1. San Juan	23	30	34	30	21	34	35	17
2. Ponce	9	11	13	9	8	8	8	7
3. Cagues-Humancao	9	14	7	9	13	12	14	14
4. Mayaguez	8	11	16	8	13	10	7	16
5. Manati-Vega Baja	6	7	5	9	13	9	10	13
6. Aquadilla	6	2	3	5	5	8	3	5
7. Guayama	4	3	3	3	2	2	2	2
8. Arecibo	3	4	2	3	3	3	2	3
9. Fajardo	3	2	1	4	4	4	6	5
10. Yuaco	3	3	4	2	2	2	1	1
11. Cayay	2	3	2	1	1	1	1	1
12. Local Industrial Center	24	12	11	16	16	10	10	16
Total	100	102	101	99	101	103	100	100

Source: Puerto Rico. Office of Economic Research, 1984.

Note: Some column totals do not equal 100 percent because of rounding.

The initial use of shift-share is summarized on Figure 5. This plots the proportional and differential scores against each other to show the nature of the employment change by growth planning areas. The area above the x-axis is occupied by those units with summary statistics in the growth industries, while those below the axis are those with aggregated statistics in the declining sectors. All growth planning areas are above the line except San Juan and the northeast and several southwestern areas plus Cayey. The y-axis separates those planning areas growing faster than the aggregated pattern from the rest. Those in the upper right quadrant are the Caguas and Manati growth areas; these have both a favorable mix and faster growth attributes. In the upper left are those with comparatively more growth in lagging sectors, and these include the Ponce,

Aguadilla, Guayama, Arecibo, and local centers growth areas. The remaining areas did not grow as rapidly as the total (lower right) including San Juan, Cayey, Yauco, and Fajardo. Only Mayaguez falls in the lower left, stagnating area.

A preliminary look at the shift-share between planning sections by sectors in Puerto Rico appears in Figure 6. It shows only the differential shift on a stacked bar graph that gives sectoral contributions to the growth and decline over time. Some large shifts occurred in the less urbanized planning districts. For durable goods, the growth was even more widely distributed than might have been expected in a developing economy. [end p. 84]

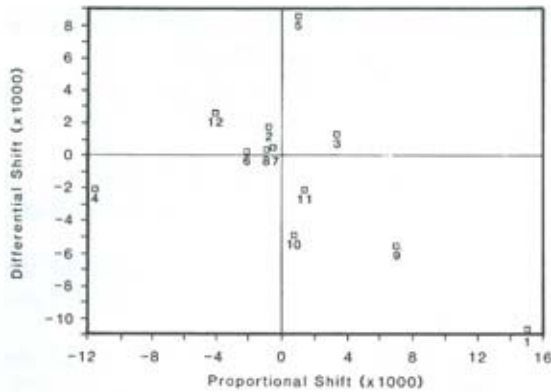


Fig. 5. Differential and proportional shift of employment by growth areas, 1950-1980. Numbered growth areas are identified in table 1.

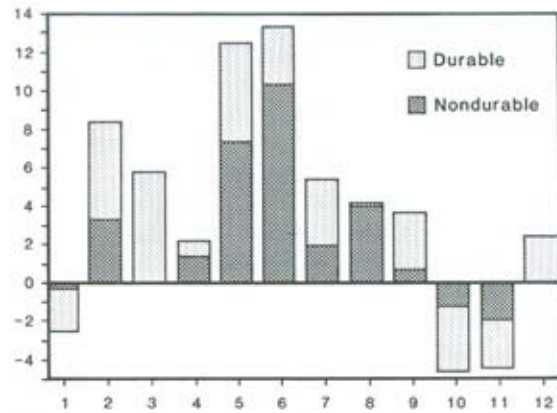


Fig. 6. Differential shift by growth areas for durable and nondurable manufacturing, 1950-1980. Numbered growth areas are identified in table 1.

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## CONCLUSIONS

Although there is widespread agreement on the principles and goals of regional development policy, the implementation and evaluation of such policies remains a problem. Using the variety of FOMENTO procedures noted above, Puerto Rico experienced decentralization of industrial jobs both by area and population. The Lorenz curve showed movement of the distribution toward the hypothetical even distribution along the diagonal. The location quotients showed that municipalities that increased to at least 1.0 were not only urbanizing edges but also remoter ones away from the centers of industry.

During the study period, the durable sector grew to be roughly equal to the non-durable sector. The non-durable sector had been the dominant one at the beginning of the FOMENTO period. Such a shift is uncommon in developing economies, and decentralization and expansion of the durable sector is unusual. FOMENTO programs certainly deserve a portion of the credit for these developments.

Shift-share analysis confirms that the extraordinary growth in durable and non-food-textile products sectors occurred outside the wealthier planning districts. Growth in the well-established food textile non-durable sectors occurred both in the past growth areas and targeted development areas. This, too, demonstrates the success of the FOMENTO programs. In summary, that industrial developments became more decentralized indicates not only that the program was successful and but also that the definition of semi periphery introduced by Gereffi and Evans (1981) might be expanded to include programs for smaller units based on explicitly dependent relationships.

## REFERENCES CITED

- Commonwealth of Puerto Rico, Department of Labor and Human Resources. 1955. *Census of manufacturing industries of Puerto Rico, October 1955*. San Juan, PR: Bureau of Labor Statistics.
- Commonwealth of Puerto Rico, Department of Labor and Human Resources. 1960. *Census of manufacturing industries of Puerto Rico, October 1960*. San Juan, PR: Bureau of Labor Statistics.
- Commonwealth of Puerto Rico, Department of Labor and Human Resources. 1970. *Census of manufacturing industries of Puerto Rico, October 1970*. San Juan, PR: Bureau of Labor Statistics.
- Commonwealth of Puerto Rico, Department of Labor and Human Resources. 1980. *Census of manufacturing industries of Puerto Rico, October 1980*. San Juan, PR: Bureau of Labor Statistics.
- Commonwealth of Puerto Rico, Office of Economic Research. 1984. *Directory of plants promoted by the economic development administration as of January 1984*.
- Dicken, Peter. 1986. *Global shift: Industrial change in a turbulent world*. New York, NY: Harper and Row.
- Fothergill, Stephen, and Graham Gudgin. 1979. In defense of shiftshare. *Urban Studies* 16(3): 309-319.
- Gereffi, Gary, and Peter Evans. 1981. Transnational corporations, dependent development, and state policy in the semiperiphery: A comparison of Brazil and Mexico. *Latin American Research Review* 16 (3):31-64.
- Gwynne, Robert. 1982. Location theory [end p. 85] and the centralization of industry in Latin America. *Tijdschrift voor Economische en Sociale Geografie* 13(2): 70-83.
- Gwynne, Robert. 1986. *Industrialization and urbanization in Latin America*. Baltimore, MD: The Johns Hopkins University Press.
- Gwynne, Robert. 1987. Modern manufacturing growth in Latin America. In *Latin American development: Geographical perspectives*, ed. David Preston, 102-140. New York, NY: Longman Scientific and Technical.
- Landis, John D. 1985. Electronic spreadsheets in planning, the case of shift-share analysis. *Journal of the American Planning Association* 51(2): 216-224.
- Monk, Janice L., and Charles S. Alexander. 1979. Modernization and rural population movements, western Puerto Rico. *Journal of Inter-American Studies and World Affairs* 21(4): 523-550.
- Odell, Peter R, and David A. Preston. 1973. *Economies and societies in Latin America: A geographical interpretation*. New York, NY: John Wiley and Sons.
- Odell, Peter R, and David A. Preston. 1978. *Economies and societies in Latin America: A geographical interpretation*. 2nd edition. New York, NY: John Wiley and Sons.
- Ottensmann, John R 1985. *Basic microcomputer programs for urban analysis and planning*. New York, NY: Chapman and Hall.
- Pico, R 1974. *The geography of Puerto Rico*. Chicago, IL: Aldine Publishing Co.
- PRIDCO (Puerto Rico Industrial Development Company). 1956. *Master plan: Physical facilities for industrialization*. San Juan: Economic Development Administration.
- Stead, W. H. 1958. *Fomento: The economic development of Puerto Rico*. Washington, D.C.: National

Planning Association.

Tata, R, and D. Lee. 1977. Puerto Rico: Dilemmas of growth. *Focus* 28:1-19.

Taylor, M. 1957. *Industrial tax exemption in Puerto Rico*. Madison, WI: The University of Wisconsin Press.

U.S. Department of Commerce, Bureau of the Census. 1953. *Census of population, 1950*. Washington, D.C.: GPO.

U.S. Department of Commerce, Bureau of the Census. 1963. *Census of population, 1960*. Washington, D.C.: GPO.

U.S. Department of Commerce, Bureau of the Census. 1973. *Census of population, 1970*. Washington, D.C.: GPO.

U.S. Department of Commerce, Bureau of the Census. 1982. *Census of population, 1980*. Washington, D.C.: GPO.

Weiss, John. 1988. *Industry in developing countries: Theory, policy, and evidence*. London: Croom Helm.

Weisskoff, Richard. 1985. *Factories and food stamps: The Puerto Rican model of development*. Baltimore, MD: The Johns Hopkins University Press.

## **RESUMEN**

Crear trabajos industriales es una estrategia común en los planes de desarrollo de la economía Latinoamericana. Puerto Rico promueve la industrialización con FOMENTO mediante incentivos para animar a los inversionistas ajenos y para estimular la inversión en áreas remotas en vez de localidades urbanas principales. Un análisis de cambios en ubicación entre 1952 y 1980 muestran que la política de descentralización ha sido exitosa. El análisis revela cambios en la ubicación de empleo tanto para la manufactura de productos duraderos como no-duraderos. Esta experiencia de descentralización industrial es especialmente sorprendente cuando los resultados son comparados con aquellos publicados por Gwynne y otros. [end p. 86]