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# POVERTY AND INCOME INEQUALITY IN PUERTO RICO, 1969–89: TRENDS AND SOURCES

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The paper examines Puerto Rican trends in income distribution during the 1970s and 1980s, then attempts to ascertain the source of the changes in income inequality through a decomposition of the Gini coefficient by factor income source. The study finds that poverty and inequality declined unambiguously during the twenty-year period. The source of the fall in income concentration was found to have been tied, not to changes in the distribution or share of earned income, but to that of unearned income, particularly transfers. These appear to have also accounted for the decline in poverty.

## 1. INTRODUCTION

Nineteen-ninety decennial census microdata files for Puerto Rico have recently been made available to the public. The appearance of such files allows a first look at what happened to poverty and income inequality in Puerto Rico during the decade of the 1980s as well as an investigation of the factors behind these changes. Did poverty decline during this period characterized by soaring output levels? Did the distribution of income become more or less equally distributed? More importantly, what was the source or origin of these trends? In a world where an increasing number of countries follow a development model very similar to that followed by Puerto Rico, responses to these questions are likely to yield information not only relevant to the case of the Island but also to that of other small, open developing economies.

The investigation will however not be concerned exclusively with the time period encompassed by the decade of the 1980s, but also with that of the 1970s. Though it has been established that poverty and inequality, as measured by the headcount and Gini indices declined during this time period, little else is known.[1] Are the same conclusions reached when the aforementioned conditions are measured differently? How do poverty and inequality alleviation estimates change when different definitions and measures are utilized? Again, what was the source of the downwards trends and what, if any, is the general relevance of results?

A search for answers to these important questions will be made through the use of statistical analysis applied to completely consistent and comparable data sets derived from U.S. Census of Population and Housing's Public Use Microdata Sample files for Puerto Rico 1970, 1980, and 1990. Specifically, the inquiry will

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[1]On the question of inequality in the Island during the period 1957 to 1977, see Mann (1985). On poverty as measured by the headcount ratio see U.S. Census Bureau (1973); (1984); (1993).

proceed as follows. Section 2 will start by providing a historical context and macroeconomic background to the trends in income distribution. Section 3 will establish the direction and character of the changes in poverty and income inequality, while Section 4 will utilize a Gini coefficient decomposition methodology for establishing the source of the trends. Section 5 will present a brief discussion of the likely forces behind the changes in poverty, and finally, Section 6 will summarize results; concluding with some thoughts on the relevance of results to the case of other developing economies.

## 2. Historical Context and Macroeconomic Trends

The Puerto Rican economy is, and has been for the past 45 years, based on an outward-oriented growth strategy. As a percentage of output, total exports regularly surpass the 50 percent mark. Capital flows in and out with few restrictions and labor is free to move to the U.S. mainland. Today, some 43 percent of the total Puerto Rican population resides in the U.S.; the result of major migration flows occurring most markedly during the decade of the 1950s. Capital, allured by adequate infrastructure, relatively low wages, and the virtual exemption from local and Federal taxes, flowed to the island in large quantities. A manufacturing sector composed almost entirely of outside capital employs today 17 percent of the island's labor force and produces some 38 percent of all output.

Table 1 presents statistics intended to provide a picture of trends in labor market conditions, changes in the sectoral and occupational structure of employment, and finally, of changes in output, employment and wages during the period under study. Examination of the first set of figures finds sharply different labor market conditions in effect during the decades of the 1970s and 1980s. During the former decade, unemployment rose sharply and participation rates fell from already low levels. In direct contrast, during the decade of the 1980s, employment to population and participation rates rose, and the unemployment rate fell to a fifteen-year low. This picture is entirely consistent with the overall macroeconomic performance characterizing each of the decades; the 1970s largely shaped by a deep recession first triggered by the 1973 oil shock; the 1980s by an economic expansion related to that occurring in the U.S.

More time-consistent trends are found when examining sectoral and occupational composition trends. Through the course of both decades, the share of service employment is found rising and that of agriculture declining to almost negligible levels. Also declining is the manufacturing sector's importance in total employment—its share decreasing from 19.8 percent in 1969 to 17.4 percent in 1989. Moreover, the decline is not just a matter of composition. When looking at absolute figures, one finds the ratio of manufacturing employment to total population declining from 0.051 in 1969 to 0.044 in 1989. In turn, within the manufacturing sector one detects a trend away from textile and apparel production to the higher valued-added sectors of chemical and electronics production. Perhaps related to this shift towards higher-technology production, or more generally, to the overall decline in manufacturing's share, are the trends characterizing the occupational structure of employment. These show a very marked shift away from blue-collar to white-collar employment. In terms of absolute numbers, the changes

TABLE 1

SELECTED MACROECONOMIC TRENDS PUERTO RICO, 1969–89

| | 1969 | 1979 | 1989 | 79–69(%) | 89–79(%) |
|---|---|---|---|---|---|
| Employment/population | 0.251 | 0.234 | 0.261 | −6.8 | 11.5 |
| Participation rate (%) | 48.1 | 43.4 | 45.4 | −9.8 | 4.6 |
| Unemployment rate (%) | 10.7 | 17.1 | 14.2 | 59.8 | −16.9 |
| Employment share of: | | | | | |
| Agriculture | 0.116 | 0.049 | 0.039 | −57.8 | −20.4 |
| Services | 0.170 | 0.179 | 0.211 | 5.3 | 17.9 |
| Manufacture† | 0.198 | 0.186 | 0.174 | −6.6 | −6.5 |
| Textile and apparel | 0.331 | 0.281 | 0.203 | −15.1 | −27.8 |
| Chemical and electronics | 0.095 | 0.208 | 0.269 | 118.9 | 29.3 |
| Employment share of: | | | | | |
| Blue-collar | 0.408 | 0.370 | 0.316 | −9.3 | −14.6 |
| White-collar | 0.363 | 0.443 | 0.505 | 22.0 | 14.0 |
| Other service | 0.229 | 0.187 | 0.179 | −18.3 | −4.3 |
| Per capita, ($1979): | | | | | |
| Gross Domestic Product | 3,003 | 4,059 | 5,612 | 35 | 38 |
| Personal income | 2,325 | 3,123 | 3,727 | 34 | 19 |
| Compensation | 1,949 | 2,076 | 2,529 | 6.5 | 21 |
| Transfers | 346 | 924 | 1,022 | 167 | 10 |
| Median wage rates, ($1979): | | | | | |
| Low-skilled workers | 2.19 | 2.50 | 2.49 | 14.2 | −0.4 |
| High-skilled workers | 3.53 | 3.56 | 3.68 | 0.9 | 3.4 |

*Sources*: Estado Libre Asociado de Puerto Rico, *Serie Histórica del Empleo, Desempleo y Grupo Trabajador*, Departamento del Trabajo y Recursos Humanos, San Juan, 1992. Estado Libre Asociado de Puerto Rico, *Informe Económico al Gobernador, 1989*, Junta de Planificación, San Juan, 1990. Estado Libre Asociado de Puerto Rico, *Ingreso y Producto, 1984*, Junta de Planificación, San Juan, 1985. U.S. Census Bureau, *1967 Census of Manufacturers, Puerto Rico*, U.S. Government Printing Office, Washington, DC, 1970. U.S. Census Bureau, *Census of Outlying Areas, Puerto Rico—Manufacturers, 1977*, U.S. Government Printing Office, Washington, DC, 1980. U.S. Census Bureau, *Census of Outlying Areas, Puerto Rico—Manufacturers, 1987*, U.S. Government Printing Office, Washington, DC, 1990.

†Textile and Chemical sector figures correspond to those for the years 1966, 1976 and 1986.

are even more striking. During the twenty-year time period in question, white-collar employment grew by 93 percent while blue-collar employment by a mere 10 percent.

Examining movements in income and output, one discerns similarly time-consistent trends. The figures attest to soaring output levels with smaller increases in personal income and compensation, implying rising profits accruing to outside capital owners (and transfer pricing practices). In turn, transfer payments, consisting primarily of Federal aid to local governments and income in the form of food stamps, Social Security and Public Assistance, also rose sharply during the decade of the 1970s; the increase tapering off during that of the 1980s. As a proportion of total income, their share rose from 14.9 percent in 1969; to 29.6 percent in 1979; declining to 27.4 percent in 1989.

Finally, in terms of wage levels, one finds disparate trends characterizing each of the decades in question. During the decade of the 1970s, the median wage rate of low-skilled workers, here defined as those with less than a high school degree, rose by a small but larger percentage than that of high-skilled workers, while the opposite is true for the decade of the 1980s. As to the reason behind

the trends, it should be noted that while the minimum wage was raised through the decade of the 1970s, its real value decreased during that of the 1980s. It comes then as no surprise that low and high-skilled wages seem to have slightly converged during the earlier decade and diverged during the decade with the less constraining minimum wage. Surprising, however, is the fact that the sharp economic expansion of the 1980s brought so little change in wage rates.

## 3. Trends in Poverty and Income Inequality

To obtain an understanding of the manner in which the fruits of growth were distributed among the different sectors of the population, Table 2 presents a decomposition of total income by decile shares, where the particular unit of observation is total cash household income. Also shown are estimates of income inequality, as measured by the Gini and Theil indices; and poverty tallies as estimated by the headcount ratio, the Sen index, and the FGT measure with parameter values set at two and three. The particular measures have been selected for they are widely held to be "good" measures of the conditions of poverty and inequality; the inequality measures respecting the axioms of *scale* and *population irrelevance*, *symmetry*, and the *Pigou–Dalton transfer* condition, the poverty indices respecting the *focus*, *monotonicity* and *transfer* properties. The headcount ratio, while it certainly cannot be viewed as a "good" measure of poverty since it violates monotonicity and transfer properties, is nevertheless included as a point of reference or comparison.

TABLE 2

Total Household Income by Decile Shares, Poverty and Inequality Estimates; Puerto Rico, 1969–89

| (%) | 1969 | 1979 | 1989 | 79-69Δ (%) | 89-79Δ (%) |
|---|---|---|---|---|---|
| 10 | 0.01 | 0.10 | 0.53 | 900 | 430 |
| 20 | 0.92 | 1.52 | 1.95 | 65.2 | 28.3 |
| 30 | 2.13 | 2.86 | 3.11 | 34.3 | 8.7 |
| 40 | 3.72 | 4.33 | 4.40 | 16.4 | 1.6 |
| 50 | 5.56 | 6.00 | 5.83 | 7.9 | −2.8 |
| 60 | 7.44 | 7.85 | 7.57 | 5.5 | −3.6 |
| 70 | 9.95 | 10.16 | 9.79 | 2.1 | −3.6 |
| 80 | 13.46 | 13.50 | 12.95 | 0.3 | −4.1 |
| 90 | 19.07 | 18.84 | 18.15 | −1.2 | −3.7 |
| 100 | 37.74 | 34.85 | 35.73 | −7.7 | 2.5 |
| Inequality estimates | | | | | |
| Gini | 0.565 | 0.522 | 0.505 | −7.6 | −3.3 |
| Theil | 0.237 | 0.203 | 0.199 | −14.3 | −2.0 |
| Poverty estimates | | | | | |
| Headcount† | 0.628 | 0.598 | 0.573 | −4.8 | −4.2 |
| Sen | 0.500 | 0.451 | 0.407 | −9.8 | −9.8 |
| FGT(2) | 0.291 | 0.240 | 0.202 | −17.5 | −15.8 |
| FGT(3) | 0.241 | 0.194 | 0.152 | −19.5 | −21.6 |

†Headcount ratio estimates have been checked against official figures and discrepancies are minimal.

An examination of decile share figures finds income in the Island to be highly unequally distributed. Taking top and bottom quintiles as reference, in 1969 the upper group received 56.8 percent of all income while the bottom one a mere 0.93 percent. Yet, despite disappointing initial levels, very positive trends are evident. During the decade of the 1970s, the share of the lowest quintile increased by the largest percentage margin, while that of the second quintile by the largest absolute amount. In contrast, the share of the highest quintile decreased significantly due mostly to a drop at the top decile. During the decade of the 1980s, the improvement in the position of the lowest quintile was even more pronounced; its income share increasing by the largest percentage as well as absolute amounts. However, contrary to the events of the earlier decade, the increase was not achieved at the "expense" of the share of the highest quintile, but at that of the third and fourth ones. The share of the highest quintile actually increased, its rise largely driven by an accumulation at the very top decile of the distribution.

Using the aforementioned indices as estimators of the degree of inequality, one finds that both register very high levels of income dispersion. Yet, as the picture painted by the trends in distribution by shares may suggest, both indices estimate inequality to have decreased during both decades in question, with the stronger decline in the earlier decade. However, a comparison of Lorenz curves shows that the fall in inequality cannot be said to have been unambiguous for the decade of the 1980s: the 1979 and 1989 curves cross at about the eighth decile (Figure 1).

Finally, focusing on the condition of poverty, one finds close to 2/3 of all households living under the official poverty line in 1969. Nevertheless, once again, very encouraging trends are discerned. Not only did the proportion of households in poverty decline respectably during both decades, but poverty as measured by all other "superior" indices, fell by even larger margins. For the decade of the 1970s, poverty declined by a factor up to four times as great as the official headcount change estimate shows; up to five times as great for the decade of the 1980s. Moreover, analysis comparing headcount ratios with thresholds set at every level of income from 0 to 1.75 times the official poverty line—a range perhaps accommodating most opinions about where the poverty line should be set—establishes declining trends in all instances during both decades. The result is important; for as proved by Atkinson (1987) it implies that poverty, as measured by *all* continuous and non-decreasing in income poverty indices, can be said to have declined unambiguously during the two decades in question. Also important is the fact that the new estimates suggest that poverty seems to have been most greatly alleviated among the poorer of the impoverished population. As the FGT's parameter value—roughly a measure of the index's poverty "aversion"—is increased, poverty alleviation estimates increase alongside the higher value.[2] Given the spectacular rise in transfer payments the result does not come unexpectedly.

A question that may arise after a reading of results is that of how well actual income is captured by Census figures, or in more verifiable terms, how much of National Account income is reflected in Census numbers. A check finds that the

[2]Regarding "the poverty aversion properties of the FGT index," see Foster, J., J. Greer, and E. Thorbecke (1984), p. 763.

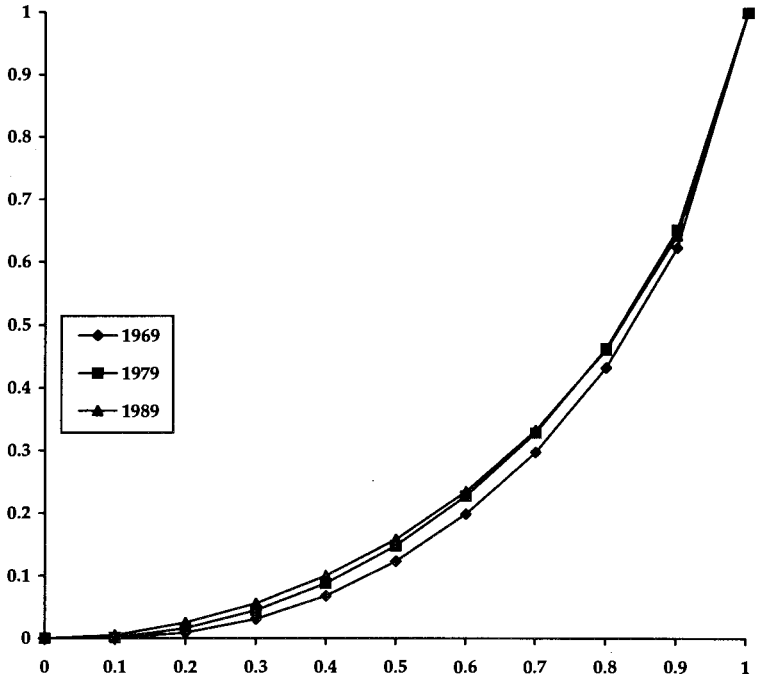


Figure 1. Lorenz curves, Puerto Rico, 1969, 1979, 1989

bulk of all income, wages, is well accounted by the Census, coming on average within 10 percent of the National Account figures. Transfer income is however understated, with 26 percent of National Account transfer income not reflected in 1969 Census income; 68 percent in 1979; and 58 percent in 1989 when food stamps were first included as part of census income.[3] In real absolute terms, $599m of National Account income do not appear as part of census income in 1969; $1,929m in 1979; and $1,927m in 1989. The incorporation of such unaccounted income would most likely push inequality and poverty estimates down, increase the estimates of the role played by transfers in the alleviation of poverty and inequality during the decade of the 1970s, and slightly decrease those for the decade of the 1980s. Over the longer term—the twenty-year period—the effects of transfers on income distribution would be underestimated.

## 4. Decomposition of Income Inequality by Functional Income Source

In an attempt to ascertain the source of the changes in income distribution, total inequality, as measured by the Gini index, will be decomposed by functional

[3]The Food Stamp program was implemented in the mid-seventies in the form of coupons, but was "cashed-out" in the early-eighties. A comparison of capital incomes is not possible due to the fact that Census and National Account income definitions differ considerably.

income source. The particular decomposition procedure is chosen for two related reasons. First, the presence of zero income observations severely limits the list of reasonable inequality indices. The only measure capable of accommodating zero incomes while being source decomposable is the Gini index. Second, given the large and increasing importance of transfers in the composition of total Puerto Rican household income, a methodology capable of separating their effects on overall inequality from those coming from other sources such as wage or capital income, may not just be more instructive, but actually *essential* for obtaining an accurate understanding of the source of the changes in income distribution.

Though the particular decomposition methodology has received wide use and has been explained in detail in a number of other works exploring the structure of inequality in a variety of countries, a brief review of its specifics seems nevertheless to be in order.[4] In what follows $G_y$ will correspond to the overall income Gini, $G_i$ to the Gini coefficient of the $i$-th income source, $\phi_i$ to the distributive share of income source $i$, and $\rho(\cdot)$ a function returning a ranking by increasing income size.

$$G_y = \Sigma_i \, \phi_i^* \, G_i^* \, R_i ;$$

$$R_i = [\text{Cor}\,(y_i, \rho(y))/\text{Cor}\,(y_i, \rho(y_i))].$$

Due to the fact that the calculation of Gini coefficients involves the ranking of incomes by size, the seemingly intuitive sum of factor Ginis weighted by population shares only equals the overall Gini in the exceptional case where all factor income rankings correspond to the overall income rank. For all other cases, a procedure capable of accommodating disparate positions is necessary. Such a formula is presented in Fei, Ranis, and Kuo (1978) where in their derivation the "modification" is a term composed of a ratio of income rank correlations ($R_i$). Specifically, the term equals a correlation between factor income amount and total income rank [Cor $(y_i, \rho(y))$] divided by another correlation between factor income amount and factor income rank [Cor $(y_i, \rho(y_i))$]. Intuitively, the term gives a representation of a factor income's importance in the determination of overall income dispersion. The higher the ratio of correlations, the greater the income source's influence in the determination of total income ranking and thus on overall inequality. Correspondingly, a negative ratio implies that the receipt of the income source is negatively correlated with the recipient's overall income rank and hence that the income source contributes not to total inequality but to equality. Such would be the case of transfer incomes where the larger absolute amounts are received by the poorer families.

In all, the methodology decomposes total inequality by separating a factor income's contribution to overall inequality into components depending on: the degree of inequality in the distribution of the income source ($G_i$), the factor source's importance in the determination of overall income ($\phi_i$), and finally the factor's influence in the determination of overall income dispersion ($R_i$). The product of the first and last components ($G_i^* R_i$) equals the income source's

[4]See Fei, Ranis, and Kuo (1978) for a decomposition of inequality for Taiwan, Fields (1979) for one for urban Colombia, Glewwe (1986) for Sri Lanka.

TABLE 3

GINI DECOMPOSITION OF INEQUALITY BY FACTOR INCOME SOURCE; PUERTO RICO, 1969

| | Total | Wage | Self-Empl. | Farm Empl. | Social Secty. | Public Asstce. | Other |
|---|---|---|---|---|---|---|---|
| Factor income share ($\phi_i$) | 1.0 | 0.780 | 0.123 | 0.011 | 0.043 | 0.006 | 0.037 |
| Gini coefficient ($G_i$) | | 0.630 | 0.935 | 0.997 | 0.882 | 0.964 | 0.966 |
| Relative correlation coefficient ($R_i$) | | 0.926 | 0.730 | 0.558 | 0.076 | −0.324 | 0.526 |
| Pseudo-Gini coefficient | | 0.583 | 0.682 | 0.556 | 0.067 | −0.312 | 0.508 |
| Factor Inequality Weight ($FIW_i$) | 1.0 | 0.805 | 0.149 | 0.011 | 0.005 | −0.003 | 0.034 |

Pseudo-Gini coefficient, or the Gini that would result if incomes within the particular source were not ordered in monotonically increasing order. In turn, the product of all three components normalized by the overall Gini coefficient ($G_i^* R_i^* \phi_i / G_y$) produces Factor Inequality Weights (FIWs): ratios signaling each of the factors' percentage contribution to overall inequality.

As to the specific definition of the $i$'s, the investigation disaggregates total household income for the years 1969, 1979, and 1989 into: (i) wage or salary income, tips, (ii) net income from self-employment, (iii) net income from farm self-employment, (iv) interest, dividend, estate and net rental income,[5] (v), social security, (vi) public assistance, (vii) "other" income comprising private or government employee retirement pensions, child support and regular contributions from persons outside the household. Income in the form of employer-provided fringe benefits, in-kind government transfers, subsidized housing or of health care, is not included due to lack of available cash-income equivalences.

Application of the procedure to the data in question produces results shown in Tables 3 through 5. Examination of those for the first time period (1969) finds that with the relative exception of wage income, incomes are highly unequally distributed; the factor Ginis ranging from 0.882 to 0.997 for these income components. In comparison, the factor Gini for the wage component stands at a much lower 0.630. In terms of the relative correlation coefficients, the distribution of wage income is found to be quite closely associated with overall income ranking

TABLE 4

GINI DECOMPOSITION OF INEQUALITY BY FACTOR INCOME SOURCE; PUERTO RICO, 1979

| | Total | Wage | Self-Empl. | Farm Empl. | Interest | Social Secty. | Public Asstce. | Other |
|---|---|---|---|---|---|---|---|---|
| Factor income share ($\phi_i$) | 1.0 | 0.708 | 0.065 | 0.004 | 0.010 | 0.106 | 0.029 | 0.077 |
| Gini coefficient ($G_i$) | | 0.667 | 0.984 | 1.000 | 0.999 | 0.806 | 0.922 | 0.923 |
| Relative correlation coefficient ($R_i$) | | 0.899 | 0.686 | 0.594 | 0.790 | 0.116 | −0.047 | 0.484 |
| Pseudo-Gini coefficient | | 0.599 | 0.675 | 0.599 | 0.789 | 0.094 | −0.043 | 0.446 |
| Factor Inequality Weight ($FIW_i$) | 1.0 | 0.813 | 0.085 | 0.005 | 0.016 | 0.019 | −0.002 | 0.065 |

[5]In 1969 however, interest and dividends appear as part of "other" income.

TABLE 5

GINI DECOMPOSITION OF INEQUALITY BY FACTOR INCOME SOURCE PUERTO RICO, 1989

| | Total | Wage | Self-Empl. | Farm Empl. | Interest | Social Secty. | Public Asstce. | Other |
|---|---|---|---|---|---|---|---|---|
| Factor income share ($\phi_i$) | 1.0 | 0.715 | 0.054 | 0.002 | 0.010 | 0.115 | 0.051 | 0.053 |
| Gini coefficient ($G_i$) | | 0.665 | 0.978 | 0.998 | 0.999 | 0.803 | 0.811 | 0.928 |
| Relative correlation coefficient ($R_i$) | | 0.913 | 0.721 | 0.569 | 0.759 | 0.143 | −0.277 | 0.448 |
| Pseudo-Gini coefficient | | 0.608 | 0.705 | 0.568 | 0.758 | 0.115 | −0.225 | 0.416 |
| Factor Inequality Weight ($FIW_i$) | 1.0 | 0.861 | 0.075 | 0.002 | 0.015 | 0.026 | −0.023 | 0.044 |

($R_w = 0.926$) while a very different relationship obtains for the transfer income sources. That is, the ranking in the distribution of Social Security income is found to have very little relationship with overall rank ($R_{ss} = 0.076$), while that of Public Assistance income is found to be negatively correlated with overall income positions ($R_{pa} = -0.324$); hence contributing, as expected, to income equality rather than inequality. Thus, given these findings and the fact that it is wage income which largely determines total household income ($\phi_w = 0.780$), it is not surprising to find that a reading of the FIWs places the distribution of wage income as contributing to the bulk (80.5 percent) of total inequality in Puerto Rico during 1969. Simply put, income inequality during this year—and all others as it will soon be seen—arose from the fact that some households received more wage income than others, or as the low participation rates alluded to in Section 2 may suggest, that some households benefited from the receipt of wage income while a good number of others did not.[6]

Moving then to the determination of the source of the changes in inequality, examined are the results of the decomposition for 1979. A comparison with figures obtained for the earlier time period finds inequality in the distribution of earned incomes rising through the decade. Specifically, the Gini for wage income rose from 0.630 in 1969 to 0.667 in 1979; that for total earned income from 0.611 to 0.652. The result is consistent with the fact that, as discussed in Section 2, not only did unemployment rise markedly, but participation and employment to population ratios declined during the decade.

So, given such negative trends in wage income distribution, or more generally, in the distribution of earned incomes, what was then the source of the decline in overall inequality evident during the decade of the 1970s? The answer to this crucial question can be found in the trends in the composition of total household income. These show a marked shift away from earned towards unearned income sources; the share of unearned cash income rising from a total equivalent to 8.6 percent of all income in 1969 to one equivalent to 22.2 percent a decade later! Specifically, of the 13.6 percentage point increase in the share of earned income, 8.6 points can be attributed to an increase in the share of Social Security and

[6]An analysis of census data reveals that, in 1969, 40 percent of all households had non-working householders, while 24 percent of all households had *no* working members at all.

Public Assistance incomes. As these sources contribute much less to inequality—the Public Assistance source actually contributing to equality—the shift had the effect of lowering overall income dispersion. Hence, during the 1970s inequality declined in Puerto Rico *despite* rising wage or earned income dispersion, through a shift to income sources contributing relatively less to overall inequality.

With respect to the investigation of the source of the change in inequality evident during the decade of the 1980s, decomposition results for 1989 are presented in Table 5. Examining first the factor Ginis, one finds that no drastic changes in either the distribution of wage income, or more generally, in the distribution of earned income occurred during the decade. The wage income Gini remained fairly constant at a level of around 0.66, that for total earned income at a level of 0.65. In terms of factor income shares, no significant trends can be found. The share of wage income increased by only 0.7 percentage points, that of earned income decreased by 0.6 points.

So, given that the shares of earned and unearned income remained at relatively constant levels and that the distribution of earned income cannot be said to have become more equal, what was then the source of the decline in inequality evident during the decade of the 1980s? The answer can be found through an examination of the trends in the components of unearned income. Inspection of their changes finds a shift away from the "other" income category into the Public Assistance one; the shares of interest income and Social Security remaining fairly stable. As can be expected from a shift away from an income component contributing to inequality towards one not just contributing less to inequality, but to equality, the shift had the effect of reducing overall income dispersion. Reinforcing the trend was also the fact that at a time when all other factor incomes' relative correlation coefficients were remaining at constant levels, that of Public Assistance income became significantly more negative. That is, in the end, not just did the factor share of the aforementioned source increase, but the source's effectiveness in offsetting the inequality of the other incomes rose markedly during the decade. Hence, in a context where earned income was *not* becoming more equally distributed and where the unearned income share was *not* increasing by a significant margin, the only trends effectively capable of producing a decline in overall inequality were those associated with the Public Assistance income category. Not only did this source's income share increase during this time period, but so did its effectiveness in neutralizing the inequality of other sources.[7]

## 5. Transfer Income and Poverty Trends

How effective were transfer payments in reducing poverty? A rough idea of the role these played may be obtained through a comparison of poverty rates calculated with and without the inclusion of transfer income. The "rough" is emphasized since transfer income may have had more than a marginal effect on the supply of labor. If so, the difference between pre and post-transfer poverty

[7]Some 60 percent of the income showing up in the Public Assistance category is not new income but rather newly reported income-food stamps. Hence, the more accurate statement would be that during the *twenty*-year period, inequality decreased as a result of the income source's rise in importance and effectiveness in offsetting the inequality of other incomes.

rates will be exaggerated, due to the fact that work disincentive effects are likely to have induced a lower supply of labor than would have otherwise resulted in the absence of transfers.

TABLE 6
PRE-TRANSFER AND POST-TRANSFER POVERTY RATE COMPARISON; PUERTO RICO, 1969–89

| Poverty Index | 1969 | 1979 | 1989 | 79–69 (%) | 89–79(%) |
|---|---|---|---|---|---|
| *Post-Transfer* | | | | | |
| Headcount | 0.628 | 0.598 | 0.573 | −4.8 | −4.2 |
| Sen | 0.500 | 0.451 | 0.407 | −9.8 | −9.8 |
| FGT(2) | 0.291 | 0.240 | 0.202 | −17.5 | −15.8 |
| FGT(3) | 0.241 | 0.194 | 0.152 | −19.5 | −21.6 |
| *Pre-Transfer* | | | | | |
| Headcount | 0.644 | 0.651 | 0.649 | 1.1 | −0.3 |
| Sen | 0.559 | 0.593 | 0.593 | 6.1 | 0.0 |
| FGT(2) | 0.357 | 0.399 | 0.405 | 11.8 | 1.5 |
| FGT(3) | 0.317 | 0.365 | 0.373 | 15.1 | 2.2 |

Pre and post-transfer rates are presented in Table 6. As can be seen, rate discrepancies are quite significant. For the decade of the 1970s, the removal of Social Security and Public Assistance from total household income produces not just reduced poverty alleviation estimates, but actually a reversal of directions for all indices—the more poverty "sensitive" of the FGT measures used in this study estimating the largest poverty increase. For the decade of the 1980s, though no reversal is found, the difference in estimates is still quite important. That is, after the exclusion of transfers, the very respectable poverty alleviation estimates disappear and are replaced by marginal increases in poverty levels.

So, given the aforementioned limitations, how likely is it that these results paint an accurate picture of the effects of transfers on poverty levels? Or, alternatively, how likely is it that the effects of transfers on the supply of labor were rather small? Though microeconomic-level evidence does not exist for Puerto Rico, Santiago (1992) has investigated the determinants of labor supply at the macroeconomic level. Working within the period 1947–78 and defining labor supply as the labor participation ratio, the author finds that the transfer variable's coefficient is negative and significant for men in all age groups for which the model is estimated, and negative and significant for older women. Yet, for both men and women the influence of transfers on labor participation is very small. That is, even in the case where the variable exerts the largest influence—among men in the 55–64 age bracket—the average elasticity between labor force participation and transfers' share of personal income is estimated at a mere 0.025. Hence, from this evidence it does not seem unreasonable to conclude that while transfers affected negatively the supply of labor, their degree of influence appears to have been low. Thus, results presented in this and the previous section can be restated with greater confidence.

Tempering the disincentive effects of transfers is the fact that these do not constitute mere redistributions, but also injections of money into the local economy since the Island receives far more from these programs than what it contributes. Pre-transfer poverty rates are hence *underestimated* in this respect due to the

fact that they already reflect income additions resulting from Federal government-funded employment programs, or more generally, from a greater demand for labor arising from a net money injection into the local economy. In the absence of dynamic effects, unemployment and hence poverty would have been considerably greater without these programs.

## 6. Summary and Discussion

Poverty and income inequality declined unambiguously during the decade of the 1970s. The share of the lowest income quintile increased at the "expense" of that of the highest one, while poverty was alleviated most markedly among the poorer population. Furthermore, the use of superior poverty indices established that the degree of poverty alleviation was up to four times greater than that recorded by official headcount ratios. The source of the fall in both conditions was tied to a rise in the importance of unearned income sources, particularly transfers. Since an increasing share of transfer income became excluded from Census income during that decade, the assessment of their effects on income distribution represents only a lower bound estimate.

During the decade of the 1980s poverty declined unambiguously, with superior indices' estimates up to five times larger than official headcount tallies. The income share of the lowest quintile increased, but now at the "expense" of that of the upper middle ones. While inequality measures show a fall in income concentration, a Lorenz curve comparison establishes that the decline was not unambiguous. As to the source of the improvements in both phenomena, the rise in the importance of transfer payments figures most prominently. However, due to the fact that the share of unaccounted transfers decreased slightly during the decade, the estimates of their effects on income distribution may be slightly overestimated. Yet, the basic facts remain. Through both decades in question, pre-transfer poverty and earned income inequality increased; the positive movements in income distribution were associated with the increase in the share of transfers. Moreover, the paper's results are unambiguous and understated when the twenty-year period is taken as the reference.

In terms of the general relevance of the results, the events of the decade of the 1970s seem to suggest a strong positive relationship between employment conditions, but not necessarily output growth, and poverty and income inequality. That is, the very unfavorable employment picture evident throughout the decade seems to have been associated with rising levels of earned income inequality as well as rising pre-transfer poverty rates. However, the events of the decade of the 1980s seem to indicate a weakening of the relationship between employment and household income distribution. Instead of declining, earned income inequality and pre-transfer poverty rates remained at levels very close to those evident at the beginning of the decade. In a context of very favorable employment conditions, the fall in poverty and inequality seems to have been related, not to a rise in employment or compensation, but to the system of transfer payments.

To what type of forces might one then attribute the weakening of such a relationship? It is proposed as a concluding thought that such a phenomenon may be entirely consistent with a world of increased economic integration where greater

competitive forces are found at the lower end of the labor skill continuum. In a middle income economy, where job and wage growth is biased towards the higher end of the skill scale, *less* poverty alleviation and *more* inequality may be expected from growth in employment and compensation. In such circumstances, an "industry-inviting" strategy would do little for poverty and income inequality without a large and effective system of transfers. Such seems to have been the case for Puerto Rico, but proof of the premise remains a topic for further research.

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