Review of Development Economics, 18(1), 73–92, 2014
DOI:10.1111/rode.12070

Race and Income Distribution: Evidence from the USA, Brazil and South Africa

*Carlos Gradín**

Abstract

The aim of this paper is to provide some empirical evidence about black–white differentials in the distribution of income and wellbeing in three different countries: Brazil, the USA and South Africa. In all cases, people of African descent are in a variety of ways socially disadvantaged compared with the relatively more affluent whites. We investigate the extent of these gaps in comparative perspective, and analyze to what degree they are associated with differences in the observed characteristics of races, such as where they live, the types of household they have, or their performance in the labor market. We undertake this analysis with the Oaxaca–Blinder decomposition at the means and with a propensity score approach at the entire distribution. Our results show how the factors underlying the racial divide vary across countries and income quantiles.

1. Introduction

Undoubtedly, in several countries in the world, a large and socially disadvantaged black population is found cohabitating with a more affluent group of whites. Historical reasons, however, and the magnitude of these socioeconomic gaps by race may differ in each context. The aim of this paper is, first, to document these current racial inequalities in the USA, Brazil and South Africa, in terms of equivalized household incomes in a comparative perspective, and then, to assess to what extent they are associated with the poor endowments of African descendants in each country in terms of their geographical location and demographic characteristics, such as the number of children or single mothers, their education attainment, or their labor market performance (characteristics effect). Alternatively, they might be the result of these characteristics making them less effective in providing earnings to their households (coefficients effect).

More specifically, we analyzed the magnitude of the average household income differential between races in each country and, after estimating household income regressions, we decomposed this gap into characteristics and coefficients effects following the well known Oaxaca (1973)–Blinder (1973) approach. This decomposition was undertaken at two different levels: at the *aggregate* level, we estimated the joint contribution of all characteristics for each country respectively; while at the *detailed* level we identified the individual contribution of each set of characteristics. We further analyzed how the racial differential by race in household incomes and its determinants vary across income quantiles of the distribution using a propensity-based reweighting DiNardo–Fortin–Lemieux approach. This latter approach also allowed us to identify the factors underlying the over-representation of blacks among

* Gradín: Facultade de CC. Económicas, Universidade de Vigo, Campus Lagoas-Marcosende s/n, 36.310 Vigo, Spain. Tel: +34-986813527; Fax: +34-986812401; E-mail: cgradin@uvigo.es. The author acknowledges financial support from the Spanish Ministerio de Educación y Ciencia (Grant ECO2010-21668-C03-03/ECON) and Xunta de Galicia (Grant 10SEC300023PR) as well as comments from an anonymous referee.

the poor, as well as their under-representation at middle and higher income levels. For that we analyzed the racial differential in poverty measures, as well as in densities along the income scale. Using these two approaches we identified those factors which are more strongly associated with lower income among blacks as compared with whites in each country, then showing what policies are expected to have a higher impact on reducing racial inequalities, an issue which is of undoubted interest for policymakers and analysts interested in the racial divide.

2. Data

In order to undertake the comparative analysis, we will use microdata from most representative household surveys in each country with national coverage of (mostly) non-institutionalized population, providing information on main households and individual characteristics, including income and self-reported race/ethnic group. In the case of Brazil, we use the 2007 release of the National Household Survey (*Pesquisa Nacional por Amostra de Domicílios*, PNAD) from Instituto Brasileiro de Geografia e Estatística. Respondents are asked to self-categorize their skin color or race into one of five groups: *indígena* (indigenous), *branca* (white), *preta* (black), *amarela* (Asian) and *parda* (of mixed race). For most of the analysis we pooled blacks and people of mixed race into a single group (African Brazilians), since people of African descent might choose either of these categories owing to the social stigma attached to blackness (Telles, 2002). The data used for the analysis in the case of the USA come from the "Current Population Survey" (CPS), Annual Social and Economic March Supplement, conducted by the US Census Bureau. In this survey, people are asked to answer questions about their race(s) from six distinct groups: white, black, American Indian or Alaskan Native, Asian, Native Hawaiin other Pacific Islander, and Other race. Further, this survey inquires whether or not the origin of each person is Spanish, Hispanic, or Latino. On the basis of these questions, we broke up the population into five non-overlapping groups: non-Hispanic whites (those who only declared this race), blacks or African Americans (identifying themselves as Black, either alone or in combination with other races, regardless of whether they identify or not as having Hispanic origin), non-black Hispanics or Latinos, Asian Americans (who further did not identify themselves as being Black or Hispanic), and others, even if we will focus the main analysis on the first two groups. Finally, for the case of South Africa, we use the 2005/06 release of the *Income and Expenditure Survey* (IES) conducted by Statistics South Africa (Stats SA) between September 2005 and August 2006. Respondents to this survey report their ethnic group choosing between white, black, colored (of mixed race), Indian or Asian, and other race. For the same reasons as in Brazil, in most of our analysis blacks and colored will be combined in the same group of African descents.

Individual income used throughout this paper was obtained by dividing the total amount for his/her household annualized disposable income measured in local currency (US dollars, South African Rands and Brazilian Reals) by the square root of the number of cohabiting members. In doing this, we take into account the existence of economies of scale derived from living together and sharing expenses in a standard and tractable way, allowing comparability across countries following Buhmann et al. (1988).[1] For the sake of comparability among income distributions across countries, income will be also measured relative to the corresponding median of the adjusted distribution in each country.

3. Race and Income Distribution

Blacks in both Brazil and the USA have lower income compared with whites (Table 1). The median equivalized household disposable income of blacks in the USA, US$20,192, amounts to only 62% of the median for whites, which is US$32,603. This differential is even larger among African Brazilians: R$5335 (blacks), which is only 58.5% of R$9120 (whites). It is however in South Africa where racial inequality goes beyond any imaginable limit: Africans get about 9% of the median income of whites (R10,554 compared with R117,249).

Blacks and whites not only differ in their average incomes, but also in their distribution across income categories. Figure 1 displays the corresponding density functions estimated by adaptive Gaussian kernels (optimal bandwidth), that is, the proportion of each race population at each income level, where income has been divided by the overall median of each country, in order to allow for comparability. These estimations show that the racial groups have different distributions in all countries, and that the proportion of blacks is higher than the corresponding percentage of whites below a certain income level, but lower than whites above that point: this cut-off point is 90% of the median in the USA, 110% of the corresponding median in Brazil, and 350% in South Africa. The degree of over-representation by blacks at the bottom of the distribution in South Africa is the largest among all three countries. Besides, it is larger in the USA compared with Brazil, because the corresponding *relative density* (defined by Handcock and Morris, 1998) of blacks is higher in the former country for those below 60% of the corresponding median income, but lower everywhere else.

Consequently, if we measure relative income poverty using the head count ratio or FGT(0) with the poverty line set at 60% of the national median income, poverty is substantially higher among African descents than among whites in all three countries: 41%, 37% and 32% of blacks lie below the poverty line in the USA, Brazil and South Africa, respectively, compared with around 17–18% of whites in both American countries and only 1% in South Africa (see Table 1). This means that there is a higher black–white poverty differential in South Africa (30 percentage points) and in the USA (24 percentage points) compared with Brazil (19 percentage points).[2] The same ranking in differentials in poverty by race is obtained when using other poverty indicators of the Foster, Greer and Thorbecke family such as the *poverty gap ratio* or FGT(1), and the FGT(2), which is sensitive to the level of inequality among the poor. In this last case, the racial gaps of Brazil and the USA resemble each other more closely owing to the high inequality among black poor people in Brazil. At the national level, poverty rates are 29 (South Africa), 27 (Brazil) and 24 (US)%. Multiplying the poverty measure for each racial group by its demographic weight in the overall population, we can measure the contribution of each ethnic group to overall poverty. Given the larger demographic weight of blacks in South Africa, and to a lesser extent in Brazil, it results that more than 99% of all poverty observed in the former country and 67% to 68% in the latter, is black poverty. In the USA this figure is only 22–24%, compared with 46–48% of whites.

Finally, we address the question of how the raw racial differential in income varies across income quantiles. Figure 2 shows that in all three cases the pattern for this differential by race is unambiguously increasing with income in absolute terms, even if in the case of South Africa we need to use a different scale owing to their higher magnitude. The pattern of income differentials expressed as a percentage of whites' income differs across countries, however. In South Africa absolute income differentials increase proportionally with the income of whites, so that the percentage they

Table 1. Population, Annual Equivalized Household Disposable Income, and Poverty by Race

	(%)	Mean		Median		Relative median whites = 100	FGT(0) Head-count		FGT(1)		FGT(2)	
US												
White (non-Hispanic)	66.12	40,423	(119)	32,603	(71)	100	17.25	(0.123)	5.95	(0.065)	3.77	(0.109)
African American	13.16	25,877	(189)	20,192	(130)	61.9	41.14	(0.370)	15.99	(0.193)	9.29	(0.181)
All	100	36,257	(89)	28,748	(59)	88.2	24.08	(0.113)	8.59	(0.057)	5.12	(0.080)
Brazil												
White (*branco*)	45.16	15,243	(57)	9,120	(18)	100	17.68	(0.100)	6.94	(0.048)	4	(0.037)
African Brazilian (black and mixed race)	54.01	7,770	(22)	5,335	(19)	58.5	36.63	(0.113)	15.15	(0.059)	8.76	(0.046)
All	100	11,505	(31)	6,870	(19)	75.3	27.23	(0.079)	11.07	(0.039)	6.39	(0.031)
South Africa												
White	9.20	173,380	(6,903)	117,249	(3,976)	100	1.05	(0.282)	0.49	(0.154)	0.29	(0.103)
African (African and Colored)	88.24	20,630	(378)	10,554	(125)	9.0	31.92	(0.568)	11.26	(0.242)	5.78	(0.152)
All	100	35,901	(889)	12,131	(180)	10.3	29.11	(0.53)	10.28	(0.223)	5.28	(0.139)

Notes: Amounts in local currencies, respectively, US$, R$ and R. Bias-corrected bootstrap standard errors in parenthesis (500 replications). FGT() = Foster-Greer–Thorbecke family of indices with poverty line fixed at 60% of median income in each country.
Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

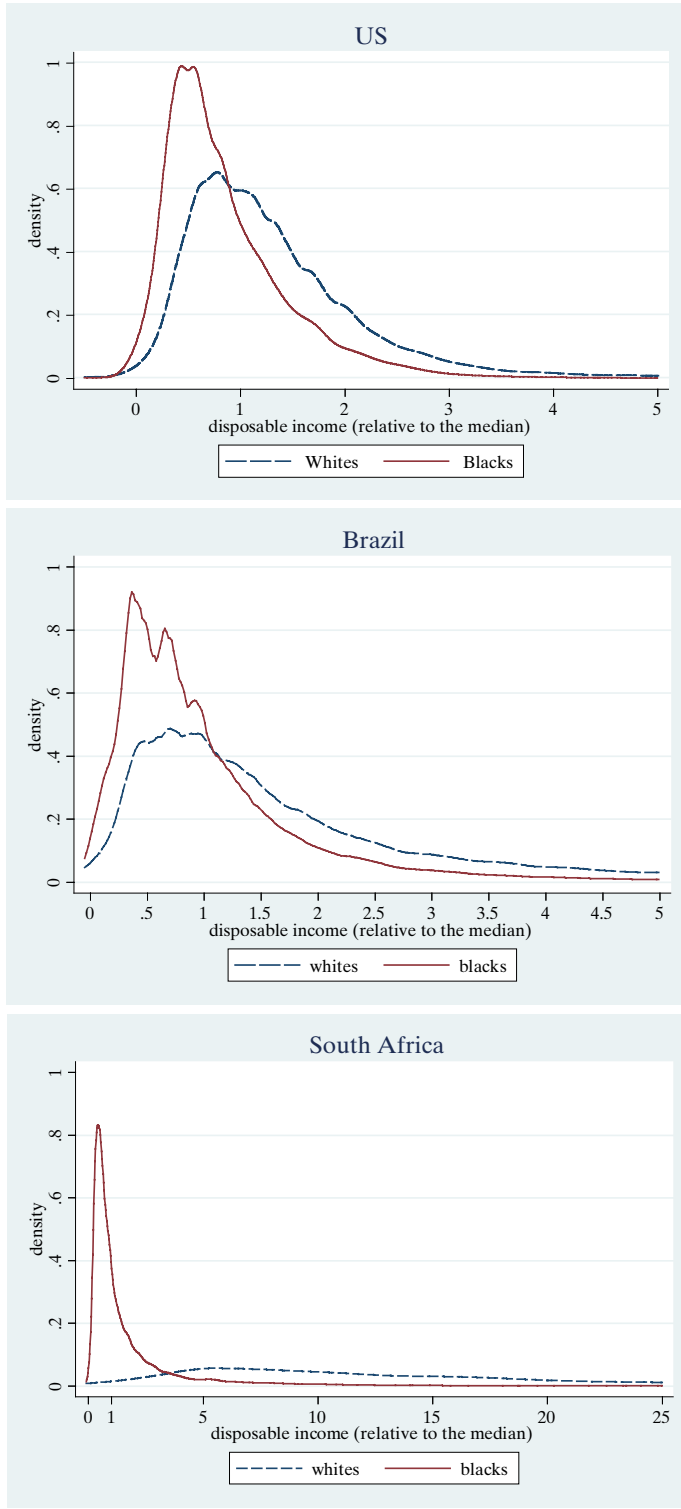

Figure 1. Equivalized Disposable Income Densities by Race

Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

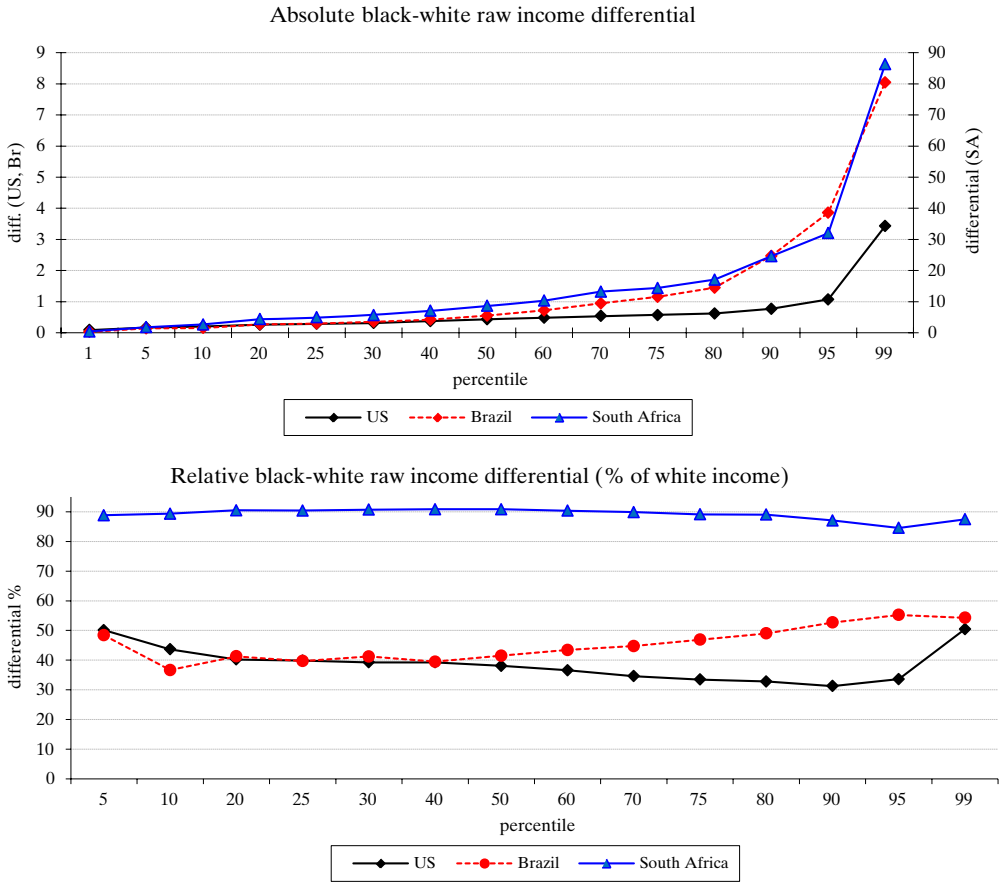

Figure 2. Absolute and Relative Black–White Raw Income Differentials

Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

represent of whites' income is approximately constant along the income scale, as it can be appreciated in the second graph in Figure 2. In the other countries, it is noteworthy that the global pattern of absolute differentials is similar in the USA and in Brazil below the 40 percentile, but above that level, the absolute differential in Brazil increases faster than in the USA, for reasons that will become clear later. As a consequence, the pattern of relative differentials across income quantiles expressed as a percentage of whites' median income is increasing in Brazil but decreasing in the USA, except at the very top.

4. Methodology

The Oaxaca–Blinder Approach

We examined the contribution of a number of household characteristics to the differential in average household income among racial groups in the USA, Brazil and South Africa by applying the well-known regression-based Oaxaca (1973) and Blinder (1973) decomposition approach (OB, hereafter). In our framework, the *i*th person in

each group $g = w$ (whites) or $g = b$ (blacks) in each country has an adjusted household income y_i^g that can be estimated as a function of a vector x_i^g of characteristics of his or her household:

$$\hat{y}_i^g = x_i^g \hat{\beta}^g, \tag{1}$$

where $\hat{\beta}^g$ is the associated ordinary least squares (OLS) vector of coefficient estimates.

We included among the explanatory variables a number of characteristics of the household reference person that can be considered likely to influence his or her ability to earn income (i.e. those usual in the classical Mincerian model explaining individual earnings). For example, in the case of the USA, we consider demographic variables such as household type, as this may also affect the ability of the household head to get a job: we distinguished among households composed of a married couple, with additional distinction according to the sex of the head, and those composed by a male or a female without a spouse present. In the case of female heads, we additionally distinguished whether or not the household included children in order to identify single mothers. We also included the number of children and the number of adults in the household, reference person's age (below 25, 25–55, and above 55 years old), attained education (primary, some secondary, secondary, some college, and college) and citizenship (native with/without foreign born parents, foreign born naturalized, and not naturalized), as well as head's labor force participation (a dummy indicating whether the head is employed plus the number of weeks and hours worked), and a dummy indicating whether the head is not employed but receives any non labor income. Given that household income can also be provided by other household members different from the reference person, we included three variables referring to other adults in the household not enrolled in further education: the share who achieved secondary and tertiary education, the share who are employed, and the share receiving non labor income.[3] Other variables included were the geographic region of residence and the size of the metropolitan area, in order to take into account potential differences in economic opportunities as well as possible variation of prices across geographical locations.

Similar variables were considered in the case of Brazil and in South Africa, even if with a few peculiarities based on available information. In Brazil, for example, attained education by the household head was expressed in years of schooling (none, 1–3, 4–7, 8–10, 11–14 and 15 or more), immigrant status of the head differentiated immigrants from the same and from different State and variables informing about the area of residence are adapted to Brazilian context (urbanized village, non-urbanized village, isolated urban area, rural agglomerate and others). In South Africa, the survey does not provide information either about the type of household, except for the sex of the reference person, or for immigration status of the household head. Variables for participation in the labor market for this country had been constructed using information of income sources.

Since we estimated the probability of a person being poor with all explanatory variables collected at the family level, our estimated robust standard errors took into account individuals being "clustered" across families.

This simple econometric specification allows us to identify the statistical association between equivalized disposable income and each household attribute, when the other characteristics are controlled for. However, we should be cautious in interpreting the results. No control for possible endogenous explanatory variable was made, for

example regarding decisions on labor supply, even if the fact these variables were collected at the household level helps to reduce the risk of unobservables being correlated with household decisions. Furthermore, no causal relationship should be assessed because the direction of causality could also go in the other way, for example poor household having more children.

Given that the income average in group g is equal to the average predicted probability for this group, $\overline{y}^g = \overline{\hat{y}}^g$, taking the characteristics of whites as reference, we break up the observed differential among whites and blacks into two distinct terms:

$$\overline{y}^w - \overline{y}^b = \overline{x}^w\hat{\beta}^w - \overline{x}^b\hat{\beta}^b = \overline{x}^w\left(\hat{\beta}^w - \hat{\beta}^b\right) + \left(\overline{x}^w - \overline{x}^b\right)\hat{\beta}^b, \tag{2}$$

where $\overline{x}^w\hat{\beta}^b$ is the underlying counterfactual distribution in which blacks are given whites' characteristics but keep their own coefficients. Thus, the first term in the right-hand side in (2) evaluates the expected change in the average income owing to the shift in coefficients (*aggregate coefficients effect*), and the second one results from the shift in characteristics (*aggregate characteristics effect*). To evaluate the individual contribution of each variable (or set of variables) to the racial differential (*detailed* decomposition), we estimate a set of weights $w^k_{\Delta\overline{x}}$ that measure the individual contributions of characteristic k ($k = 1, \ldots, K$) to the raw differential, such that:

$$W^k_{\Delta\overline{x}} = \left(\overline{x}^b_k - \overline{x}^w_k\right)\hat{\beta}^b_k, \qquad \sum_{k=1}^{K} W^k_{\Delta\overline{x}} = \left(\overline{x}^b - \overline{x}^w\right)\hat{\beta}^b. \tag{3}$$

The DiNardo–Fortin–Lemieux Approach

The DiNardo, Fortin and Lemieux (1996, DFL hereafter) approach allows us to extend the analysis of differentials to the entire distribution instead of focusing at the mean. Each individual observation is drawn from some joint density function f over (y, x, g). The marginal distribution of income for each group g is:

$$f^g(y) \equiv f(y|g) = \int_x f(y, x|g)\,dx = \int_x f(y|x, g)\cdot f_x(x|g)dx, \tag{4}$$

that is, it is obtained as the product of two conditional distributions, where:

$$f_x(x|g) \equiv \int_y f(y, x|g). \tag{5}$$

Then, we can define the counterfactual distribution $f^x(y)$ as the distribution that would prevail if blacks kept their own conditional income distribution (coefficients), but had the same characteristics (marginal distribution of x) of whites. This counterfactual distribution for blacks can be produced by properly reweighting its own income distribution:

$$\begin{aligned} f^x(y) &= \int_x f(y \mid x, g = b)\cdot f_x(x \mid g = w)dx \\ &= \int_x f(y \mid x, g = b)\cdot \psi_x \cdot f_x(x \mid g = b)dz \\ &= \int_x \psi_x f(y, x \mid g = b)dx. \end{aligned} \tag{6}$$

Following DiNardo et al. (1996), the reweighting scheme ψ_x is expressed as the product of two ratios:

$$\psi_x = \frac{f_x(x|g=w)}{f_x(x|g=b)} = \frac{P(g=b)}{P(g=w)} \frac{P(g=w|x)}{P(g=b|x)}. \tag{7}$$

The first ratio is just the weighted share of the pooled sample that belongs to each race and can be ignored because it is a constant. The second one can be obtained pooling white and black samples and estimating a logit model for the probability of being white conditional on x.

Now, in parallel to the previous OB procedure, we use the counterfactual distribution for the following decomposition of the differential between both groups for densities f:

$$f^b(y) - f^w(y) = [f^b(y) - f^x(y)] + [f^x(y) - f^w(y)]. \tag{8}$$

The first term in the previous equation is the part of the difference accounted by characteristics or characteristics effect, while the second one is the coefficients effect (or unexplained part) with superscript b, w or x indicating whether it refers, respectively, to black, white or the reweighted counterfactual income distribution (for characteristics x). Similarly we can decompose the income differential at any quantile Q, as well as the differential by race for any other summary measure P, like a poverty index:

$$\begin{aligned} Q^b(p) - Q^w(p) &= [Q^b(p) - Q^x(p)] + [Q^x(p) - Q^w(p)], \quad p \in (0,1) \\ P^b(y) - P^w(y) &= [P^b(y) - P^x(y)] + [P^x(y) - P^w(y)]. \end{aligned} \tag{9}$$

In order to obtain the detailed decomposition, we want to look at the impact of changes in a single covariate (or set of covariates) x_j instead of the whole vector of coefficients, by computing a new counterfactual distribution $f^{x_j}(y)$ in which the reweighting factor ψ_{xj} is obtained setting all the other logit coefficients but this one to zero (Lemieux, 2002). Then, the contribution of characteristics x_j is given by $[f^b(y) - f^x/(y)]$. Alternatively, we can shift all the coefficients in a specific sequence, computing the contribution of each factor as the result of changing its associated coefficients. This recalls the well known path-dependency problem in inequality decomposition, because the contribution of a factor to the overall differential in income will depend on the order in which we consider them. This difficulty can be overcome by computing the Shapley decomposition that results from averaging over all possible sequences—see Chantreuil and Trannoy (1999) and Shorrocks (1999).

5. Racial Differentials in Equivalized Household Income in Brazil, the USA and South Africa

Once we have documented the differentials in income distribution across racial groups, we will investigate what kinds of factors are more strongly associated with these gaps. We start applying the well-known OB decomposition to differentials in average income by race, after which we will undertake the decomposition for differentials across income quantiles, densities and poverty indices using the DFL approach.

Difference in Income Distribution at the Means

The black–white differential in adjusted households' income for 2007 is 51% of the country median in the USA, 109% in Brazil and a huge 1240% in South Africa (Table 2). Observed characteristics are related to about a half of this differential in the first two countries, 48% in the USA and 50% in Brazil, but the reasons substantially differ from one another. In Brazil the primary explanatory factors are related to the education of household members, accounting for 36% of the gap. In the USA, however, the main factors turn out to be demographic, associated with 20% of the differential, while education is related to about 14%, and labor participation of households members, especially of those other than household head, is associated with a similar amount, 13%. The characteristics effect is much lower in South Africa, 24%, and most of that is related to the educational gap (17.5% of the overall differential). Note that this relative contribution of education is similar to the contribution reported for the USA and about half of that in Brazil, but in absolute terms is much higher than in both countries, education in South Africa is associated with a gap in income which is 2.2 times the national median, compared with 0.4 times in Brazil and 0.07 in the USA. In fact, all absolute effects tend to be larger in South Africa than in any other country.

The divergence between explanatory factors in the USA and Brazil is due to the fact that the education levels of household heads is associated with 31% of the overall gap in the latter instance, compared with only 10% in the former. Education of other members in the household appears to be associated with about 4% in both countries. It is well-documented that Brazil exhibits one of the most unequal distributions of years of education in the world (De Ferranti et al., 2003). Although great progress has been made in this indicator, the Gini index for years of schooling among those aged between 25 and 65 years was still 41% in 2001, which is the highest level in Latin America after Bolivia (43.4), and a few Central American countries, and substantially different from the other main economies in the region (36.6 in Mexico and 22.2 in Argentina). This fact is reflected in the racial distribution, given that blacks drop out of the educational system at a younger age. The adult illiteracy rate is 15% among Afro-Brazilians, in contrast to 7% for the white population. Additionally, the proportion of black people aged at least 25 years who had no education is about 19%, and the proportion with 15 or more years of studies is lower than 4%, while the corresponding percentages are 9 and 13 for whites. Differences in the quality of education have often been stressed as important reasons for inequality of opportunity in Brazil (Leite, 2005), because students from the poorest families are over-represented in public schools, which typically provide education of lower quality. Indeed, according to our own estimates, the proportion of students aged 16 years or less attending a private school is 22% for whites, but only 11% for Afro-Brazilians. This difference increases for those aged over 18 years: 48% of whites, compared with 21% of Afro-Brazilians attend a private institution. There is also evidence that Afro-Brazilians attending university are underrepresented in those degrees that lead to higher earnings (UNDP, 2005). The educational gap is even larger in South Africa. About 14% of blacks but less than 1% of whites over 25 years old have no education at all. Only 24% of blacks have completed at least 12th grade, compared with 77% of whites; and less than 2% of blacks, compared with 14% of whites, have attained a university degree.

Lower participation in the labor market by members other than the household head is responsible for most of the larger association of this factor in the USA

Table 2. OB Decomposition of Differentials in Average Household Income by Race

	USA				*Brazil*				*South Africa*			
	Estimate	*% diff.*	*S.E.*	*P > |z|*	*Estimate*	*% diff.*	*S.E.*	*P > |z|*	*Estimate*	*% diff.*	*S.E.*	*P > |z|*
Income (relative to the median)												
Whites	1.41		0.006	0.00	2.22		0.015	0.00	14.08		0.603	0.00
African	0.90		0.011	0.00	1.13		0.006	0.00	1.68		0.030	0.00
White–black differential	0.51	100	0.013	0.00	1.09	100	0.015	0.00	12.40	100	0.604	0.00
Characteristics effect	0.24	47.6	0.014	0.00	0.55	50.4	0.010	0.00	3.03	24.4	0.158	0.00
Geographical factors	–0.01	–1.6	0.008	0.34	0.08	7.7	0.004	0.00	0.16	1.3	0.023	0.00
Region	0.02	3.0	0.006	0.02	0.07	6.6	0.004	0.00	0.09	0.7	0.027	0.00
Urban/rural	–0.02	–4.6	0.004	0.00	0.01	1.1	0.001	0.00	0.07	0.6	0.018	0.00
Demographics	0.10	20.2	0.009	0.00	0.06	5.5	0.003	0.00	0.12	0.9	0.022	0.00
Household type	0.05	9.9	0.007	0.00	0.00	0.1	0.001	0.02	0.09	0.7	0.014	0.00
N. of children	0.03	4.9	0.003	0.00	0.06	5.7	0.002	0.00	0.11	0.9	0.016	0.00
N. of adults	0.00	0.0	0.000	0.99	–0.02	–1.4	0.001	0.00	–0.07	–0.5	0.012	0.00
Immigration (ref. person)	0.01	1.2	0.003	0.07	0.00	0.0	0.000	0.62	–	–	–	–
Age (ref. person)	0.02	4.2	0.003	0.00	0.01	1.1	0.001	0.00	–0.02	–0.1	0.008	0.06
Education	0.07	14.3	0.007	0.00	0.39	36.0	0.009	0.00	2.18	17.5	0.146	0.00
Reference person	0.05	10.3	0.004	0.00	0.34	31.7	0.009	0.00	1.59	12.8	0.127	0.00
Other adults	0.02	4.0	0.006	0.00	0.05	4.3	0.003	0.00	0.58	4.7	0.055	0.00
Labor participation	0.07	13.2	0.006	0.00	0.01	0.8	0.002	0.00	0.62	5.0	0.042	0.00
Reference person	0.02	3.5	0.003	0.00	0.01	0.8	0.002	0.00	–0.02	–0.1	0.026	0.53
Adults	0.05	9.7	0.004	0.00	0.00	–0.1	0.000	0.01	0.64	5.1	0.050	0.00
Nonlabor income	0.01	1.5	0.002	0.00	0.00	0.4	0.001	0.00	–0.04	–0.3	0.013	0.00
Conditional black–white differential (Coefficients effect)	0.26	52.4	0.000	0.00	0.54	49.6	0.000	0.00	9.37	75.6	0.000	0.00

Notes: Regression estimates in which these decompositions are based, are available upon request. S.E. = standard error.
Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

compared with the other countries: 10% vs 3% and virtually 0%, respectively. This is driven by the low employment rates of poorly educated young black males in the USA compared with other groups, a fact for which several explanations have been offered, such as its being the direct and indirect consequence of large and increasing incarceration rates (even in a context of decreasing criminality), or of the migration of jobs from inner cities to suburbs.[4] Again, the lower relative contribution of this factor in South Africa hides the fact that the absolute contribution is actually larger in this country.

The larger relevance of demographic factors in the USA compared with the other two countries is related to the larger number of unmarried female heads and single mothers (household type); these are associated with 10% of the differential in the USA, but nothing in Brazil. In fact, almost 70% of all black children in the USA are born to unmarried mothers (US DHHS, 2004) and, consequently, about half of all black children live with a single mother. Blacks are less likely to live in married-couple families (40% compared with 68% of whites), and more likely to live in a female-headed family without a spouse present (45%, compared with 20%); 26.5% of blacks live in single-mother families, compared with only 6.6% among whites.[5] Furthermore, blacks tend to have more children than whites in all three countries, accounting for a similar proportion of the racial differential in the USA and Brazil (5% and 6%, respectively) which again is lower in relative terms in South Africa (0.9%), but larger in absolute terms. The relatively younger age of black household heads compared with whites is also a greater disadvantage in the USA (almost 4%, compared with 1% in Brazil and nothing in South Africa). The number of adults in the household is not related with the racial differential in the USA, has an association below 1% in South Africa, but is negatively associated in Brazil, indicating that this is an "advantage" of blacks in that country, in fact the only one.

Finally, geography also plays quite a different role in these countries. In Brazil, the fact that African descendants are over-represented in the poorest regions (mainly in the North and Northeast of the country) is associated with 7% of the racial differential in average income, with their over-representation in more rural areas playing a more marginal role (1%). However, the over-representation of blacks in certain US regions with lower income (such as the South Atlantic and Eastern South Central areas) has a lesser effect, 3% of the gap, while the concentration of this race in the largest metropolitan areas has a compensating negative characteristic effect of almost 5%, that is, it would justify a higher income for blacks. This is, in fact, the only "advantage" of African American endowments in the USA. In South Africa, blacks are over-represented in rural areas (where they are 99% of the population compared with 85% in urban areas) and under-represented in the two richest regions (Western Cape, 80%, and Gauteng, 83%, compared with 90% or more in the rest). This is associated with about 1.3% of the income differential by race.[6]

The fact that observed characteristics were associated with a half of the gap in average household incomes in Brazil and in the USA, implies that another half remains unclear. If we observed a differential of 51% and 109% of the median income between races in the USA and Brazil, respectively, then the coefficient effect indicates the *conditional* gap, that is: the differential that would prevail if blacks shared the same characteristics as whites in their countries. This conditional gap is, respectively, still 26% and 54% of the corresponding national median. In the case of South Africa, still most of the differential remains after controlling for characteristics, 75.6%, which is about nine times the country median income.

Difference in Income Distribution along the Whole Distribution

The OB and DFL methods are compared in their decomposition of the average differential in Table 3. Results show that in Brazil both methods are equivalent, while in the case of the USA the DFL method increases the contribution of demographic factors and education, and reduces the effect associated with labor participation compared with the OB approach, thus increasing the total proportion associated with characteristics. Similarly, in South Africa, the share associated with characteristics, especially with education, substantially increase with DFL approach. Note, however, that the qualitative results of the comparative analysis among all three countries previously discussed using the OB approach are kept under the DFL method. The DFL method has the advantage of allowing the analysis to go beyond the difference at sample means, but we need to restrict the number of explicative factors for the sake of tractability, reason for what we will center the discussion below in the main five aggregate domains shown in Table 3.

The first question we can answer is how the overrepresentation of blacks below a certain cut-off point in each country is associated with our set of characteristics. In Figure 3 we respectively display in each row: the actual and counterfactual densities; the raw differential and the characteristics effect; and the differential associated with the main explanatory factors. From the graphs in the first two rows, we can infer that in all three countries, more clearly in Brazil, the differential in densities is fully accounted by observed household characteristics at the bottom and top income levels, but only to a lesser extent at the middle. That is, characteristics are strongly associated with why relative poverty is so high among people of African descent, and why there are less rich people from this race, but less with the weaker black middle class, for which unobserved factors turn to play a more active role.

The previous conclusion implies more specifically, as it is shown in Table 4, that 65% of the racial gap in poverty rates is associated with household characteristics in the USA, 75% in Brazil and 82% in South Africa. These percentages increase in the first two countries to around 80% if we measure the FGT(2). In all cases, characteristics are more strongly associated with the gap in poverty indices than they were with the mean income differential. Regarding which factors are more important, it turns out that demographics were associated with more than 40% of the differential in the head-count ratios in the USA, more than 10 percentage points out of a total 15.6% gap, with education explaining an additional 20% of the differential (or 4.7 percentage points), and labor participation 9% (2.1 percentage points). Geographic variables in the USA have a negative contribution to the racial poverty gap of near 7% (1.6 percentage points). In Brazil, geographic and education appear to be associated with a similar share, 30% and 28% which means more than 5 percentage points out of the 19% differential, with demographic factors explaining much less, 17% (around 3 percentage points), and with labor participation playing no significant role. It is in South Africa, however, where education stands out the most, explaining 41% of the differential, which means 13 percentage points out of 31, with labor participation explaining an additional 19%, demographics 14% and geographic area of residence about 12% (that is, respectively about 6, 4.3 and 3.6 percentage points of the racial poverty gap). Indeed, the last row of graphs in Figure 3 illustrates how the explanatory factors for differentials in the relative proportion of people of each race vary along the income scale. It is clear that geographic factors are as important as education for explaining the higher proportion of blacks at lowest income levels in Brazil, while at middle and higher incomes education becomes undistinguishable the most important factor. In

Table 3. OB vs DFL Decomposition of Differentials in Average Household Income by Race

	USA				*Brazil*				*South Africa*			
	Estimate		*% diff*		*Estimate*		*% diff*		*Estimate*		*% diff*	
	OB	*DFL*	*OB*	*DFL*	*OB*	*DFL*	*OB*	*DFL*	*OB*	*DFL*	*OB*	*DFL*
White–black differential (relative to the country's median)	0.51 (0.013)	0.51	100	100	1.09 (0.015)	1.09	100	100	12.40 (0.604)	12.40	100	100
Characteristics effect	0.24 (0.014)	0.29 (0.022)	47.6	57.5	0.55 (0.010)	0.54 (0.014)	50.4	49.7	3.03 (0.158)	3.94 (0.270)	24.4	31.8
Geographic	–0.01 (0.009)	–0.01 (0.012)	–1.6	–2.4	0.08 (0.004)	0.07 (0.007)	7.7	6.9	0.16 (0.023)	0.36 (0.050)	0.9	2.9
Demographic	0.10 (0.009)	0.18 (0.012)	20.2	35.0	0.06 (0.003)	0.09 (0.005)	5.5	7.8	0.12 (0.022)	0.39 (0.101)	0.9	3.1
Education	0.07 (0.006)	0.09 (0.010)	14.3	18.5	0.39 (0.009)	0.38 (0.010)	36.0	35.0	2.18 (0.146)	2.74 (0.211)	17.5	22.1
Labor participation	0.07 (0.003)	0.03 (0.009)	13.2	6.7	0.01 (0.002)	0.00 (0.002)	0.8	–0.1	0.62 (0.042)	0.78 (0.142)	5.0	6.3
Non-labor	0.01 (0.002)	0.00 (0.003)	1.5	–0.4	0.00 (0.001)	0.00 (0.001)	0.4	0.1	–0.04 (0.013)	–0.33 (0.005)	–0.3	–2.7

Notes: Standard errors in parenthesis. DFL Shapley estimates: biased-corrected standard errors (200 replications) in parenthesis. Regression estimates in which these decompositions are based, are available upon request.
Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

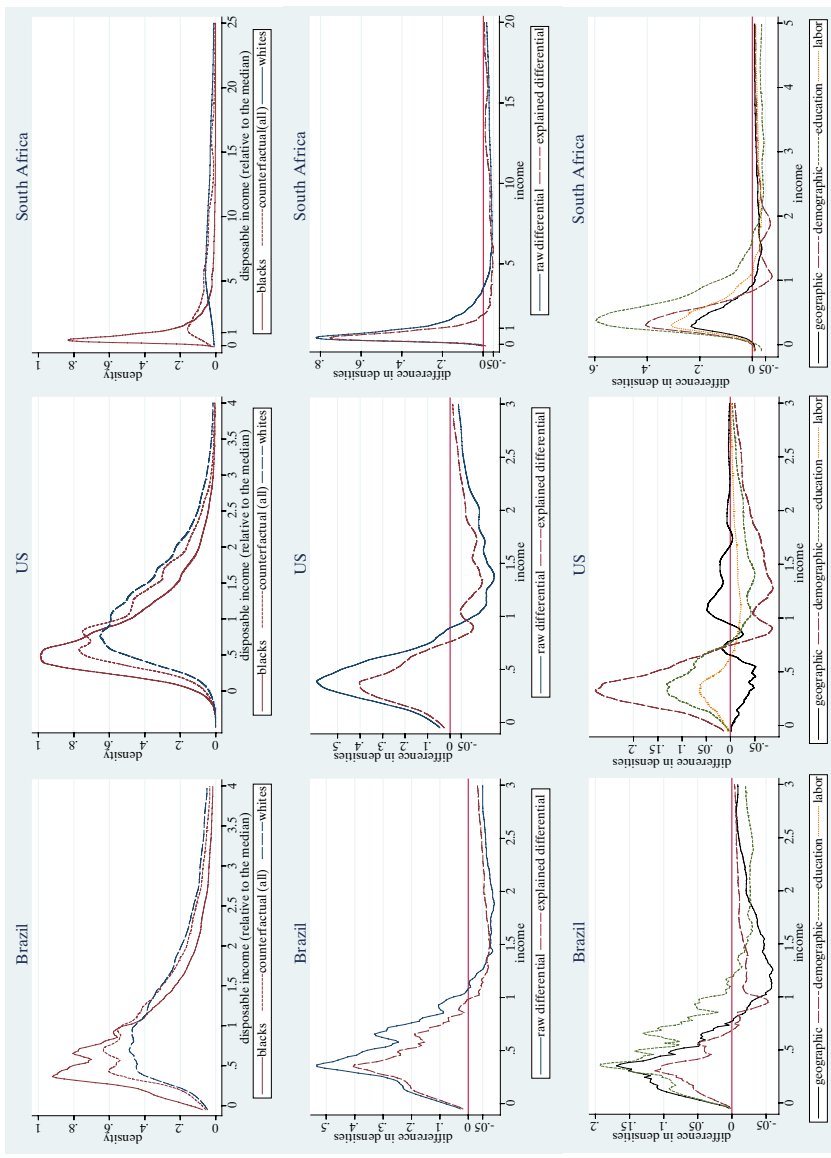

Figure 3. Black–White Differential in Densities by Race

Notes: DFL decomposition for each factor being the only one to change. Regression estimated values in which these decompositions are based, are available upon request.
Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

Table 4. DFL decomposition of race differentials in poverty indicators

	FGT(0)		*% diff.*	*FGT(1)*		*% diff.*	*FGT(2)*		*% diff.*
USA									
Blacks	41.1			16.0			9.3		
Whites	17.2			6.0			3.8		
Differential	23.9	(0.690)	100	10.0	(0.393)	100	5.5	(0.369)	100
Characteristics effect	15.6	(0.733)	65.3	7.1	(0.374)	70.6	4.3	(0.288)	78.0
Geographic	–1.6	(0.332)	–6.6	–0.5	(0.175)	–4.9	–0.1	(0.152)	–2.2
Demographic	10.4	(0.528)	43.7	4.6	(0.266)	46.0	2.7	(0.207)	48.2
Education	4.7	(0.515)	19.8	1.9	(0.228)	19.2	1.1	(0.145)	19.9
Labor participation	2.1	(0.613)	8.9	1.1	(0.309)	10.5	0.7	(0.201)	12.0
Non-labor	–0.1	(0.001)	–0.5	–0.0	(0.001)	–0.2	0.0	(0.001)	0.1
Brazil									
Blacks	36.6			15.2			8.8		
Whites	17.7			6.9			4.0		
Differential	19.0	(0.261)	100	8.2	(0.138)	100	4.8	(0.099)	100
Characteristics effect	14.2	(0.243)	75.1	6.6	(0.121)	80.0	3.9	(0.084)	82.4
Geographic	5.3	(0.187)	28.2	2.6	(0.091)	31.8	1.6	(0.062)	33.6
Demographic	3.1	(0.148)	16.6	1.5	(0.069)	18.2	0.9	(0.043)	19.0
Education	5.6	(0.107)	29.7	2.4	(0.047)	29.0	1.4	(0.031)	28.6
Labor participation	–0.0	(0.043)	–0.1	0.0	(0.030)	0.4	0.0	(0.028)	0.7
Non-labor	0.1	(0.001)	0.5	0.0	(0.000)	0.5	0.0	(0.000)	0.5
South Africa									
Blacks	31.9			11.3			5.8		
Whites	1.0			0.5			0.3		
Differential	30.9	(0.623)		10.8	(0.284)		5.5	(0.186)	
Characteristics effect	25.5	(0.821)	82.5	9.0	(0.301)	84.0	4.6	(0.204)	83.1
Geographic	3.6	(0.376)	11.8	1.1	(0.140)	9.8	0.4	(0.088)	8.0
Demographic	4.3	(0.488)	13.9	1.5	(0.204)	13.7	0.7	(0.136)	12.3
Education	12.7	(0.712)	41.0	4.4	(0.309)	40.4	2.2	(0.214	39.6
Labor participation	5.9	(0.870)	19.2	2.2	(0.325)	20.3	1.2	(0.195)	22.0
Non-labor	–1.1	(0.150)	–3.4	–0.0	(0.035)	–0.3	0.1	(0.011)	1.1

Notes: DFL Shapley decomposition estimates. Regression estimates in which these decompositions are based, are available upon request. Biased-corrected standard errors (200 replications) in parenthesis.
Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

the case of the USA and South Africa, it seems that the role of all factors are more similar along the income scale.

Second, the same type of results are found when instead of looking at differentials in densities at each income level we look at the problem in a different perspective, addressing the question of how the explanatory factors of black–white income differentials in each country varies across quantiles of the distribution, which is done in Figure 4. The pattern of explanatory factors in the USA is roughly stable along the income distribution, that is, the contribution of each factor, and so the sum of all of them, raise parallel to the observed differential such that the former is associated with a constant percentage of the later. The main exception is the slightly increasing role played by education in detriment of labor participation.[7] In Brazil, the factors explaining racial differential change along income quantiles, however. Globally, the share of income differentials which are associated with characteristics decreases with higher

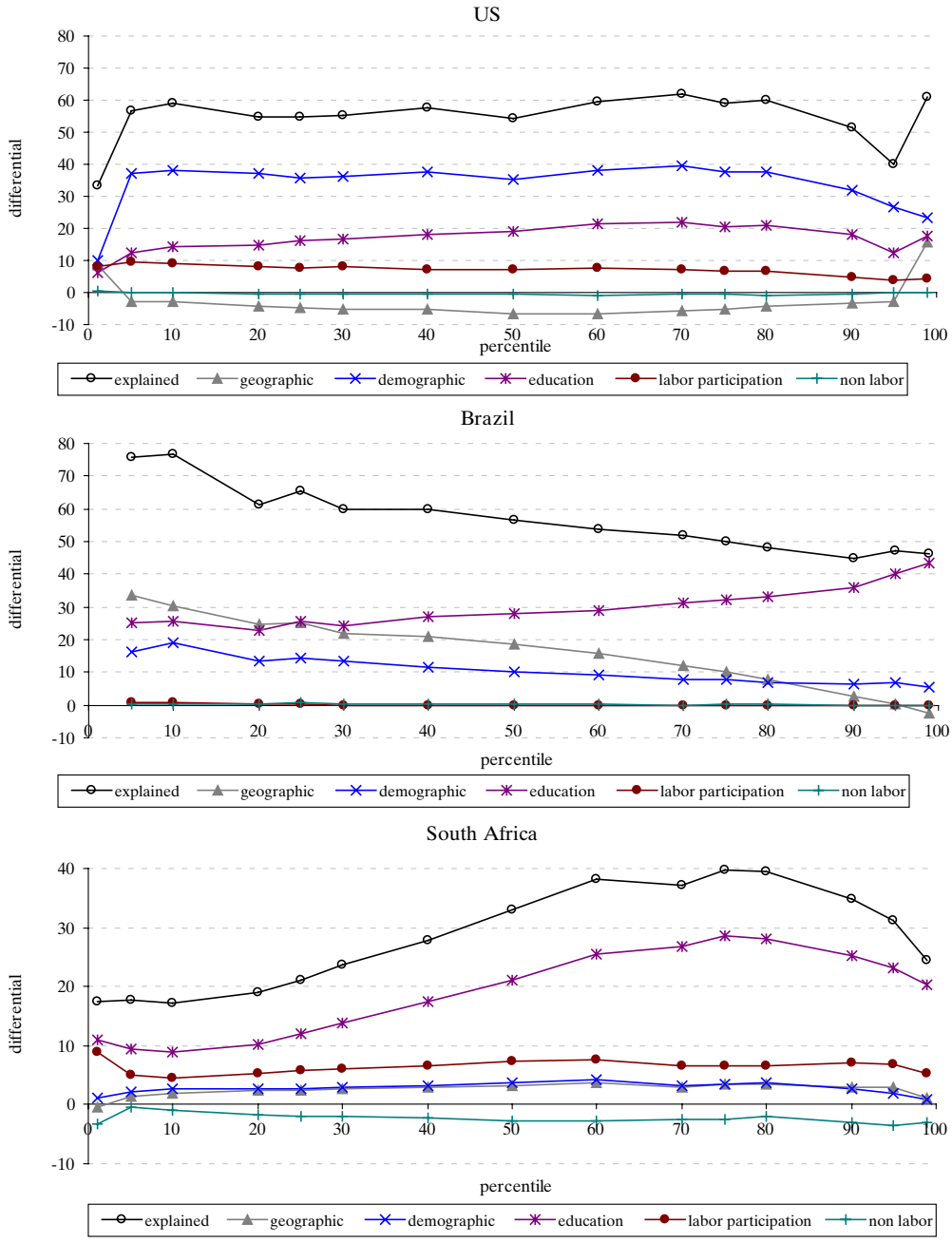

Figure 4. Black–White Differential by Income Quantiles by Race

Notes: DFL Shapley decomposition estimates. Estimate values, standard errors and regression estimates in which these decompositions are available upon request.
Source: Own construction based on CPS, 2007; PNAD, 2007; IES, 2005/06.

income quantiles, but also the individual contributions differ. While at lower quantiles geographic factors are at least as important as education, the latter becomes the most outstanding explicative factor for income differentials at middle and top quantiles. Indeed, education is associated with an increasing share of the raw differential as we move up in the income distribution, while demographic and geographic factors follow the opposite trend. Thus, the reason of why the racial income differential is increasing with whites' income in Brazil after the 40 percentile, while decreasing in the USA, is related to a higher race inequity in the access to education in the former country, especially to higher studies. In the case of South Africa, the share of the differential related with characteristics increases with higher income quantiles until the 75 percentile, declining above that level. Contrary to Brazil, demographic factors become increasingly important while the other factors remain more or less stable.

6. Conclusions

In this paper we have analyzed the differential in average household income between African and European descendants in three countries at different levels of human and economic development, and with different patterns of racial interaction. In all countries, but more intensely in South Africa, African descents are more likely than whites to be confined to the bottom of the income distribution, which is reflected in higher relative poverty rates, especially in the USA, and lower average income than whites, with a larger gap in South Africa and Brazil. The differentials in income are increasing in absolute terms along the income scale in all three countries, while the pattern of gaps as a percentage of the income of whites varies across countries: it is roughly flat in South Africa, increasing in Brazil and decreasing in the USA.

Using an OB approach, we have analyzed the racial gap in average equivalized household income in these countries. Around a half of this differential is associated with the observed characteristics in the USA and Brazil, with demographic factors appearing more relevant in the USA, especially the type of household and the number of children, and the large educational gap being the most single factor explaining Brazilian racial inequality. The performance of household members in the labor market is important in the USA but not in Brazil, especially because of the lower employment rates of young unskilled black males in the former country. The contrary occurs with geographical area of residence, which is important in Brazil, but not in the USA. South Africa turns out to have the strongest degree of association between their absolute gaps and household characteristics. The relative contribution of educational gap between blacks and whites appears to be the main factor in South Africa. Despite that, characteristics are jointly associated with less than a quarter of the differential in incomes, the lowest among all countries. Even if blacks had the same observed characteristics as whites in these three countries, a substantial (conditional) differential would still persist in average incomes.

The distributional DFL analysis shows that in general observed characteristics in all three countries are more strongly associated with higher poverty and lower affluence among blacks, than with the weakness of the black middle class. It further shows that in all countries, but especially in Brazil, education becomes more strongly associated with the racial income differentials at higher incomes, while other factors like geography in Brazil or labor participation in the USA are relatively more important when it comes to differentials at the bottom of the distribution and to the racial poverty gap.

References

Blinder, Alan S., "Wage Discrimination: Reduced Form and Structural Estimates," *Journal of Human Resources* 8 (1973):436–55.

Buhmann, Brigitte, Lee Rainwater, Guenther Schmaus, and Timothy M. Smeeding, "Equivalence Scales, Well-being, Inequality and Poverty," *Review of Income and Wealth* 34 (1988):115–42.

Chantreuil, Frederic and Alain Trannoy, "Inequality Decomposition Values: The Trade-off Between Marginality and Consistency," THEMA working paper 99-24, THEMA, Université de Cergy-Pontoise (1999).

De Ferranti, David, Guillermo E. Perry, Francisco H. G. Ferreira, and Michael Walton, *Inequality in Latin America and the Caribbean: Breaking with History?* Mexico City: The World Bank (2003).

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux, "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach," *Econometrica* 64 (1996):1001–44.

Foster-Bey, John A. Jr, "Did Spatial Mismatch Affect Male Labor Force Participation During the 1990s Expansion?," in Ronald B. Mincy (ed.), *Black Males Left Behind*, Washington DC: The Urban Institute Press (2006):121–46.

Gradín, Carlos, "Why is Poverty so High among Afro-Brazilians? A Decomposition Analysis of the Racial Poverty Gap," *Journal of Development Studies* 45 (2009):1–38.

———, "Poverty among Minorities in the United States: Explaining the Racial Poverty Gap for Blacks and Latinos," *Applied Economics* 44 (2012):3793–804.

Handcock, Mark S. and Martina Morris, "Relative Distribution Methods," *Sociological Methodology* 28 (1998):53–97.

Holzer, Harry J., Steven Raphael, and Michael A. Stoll, "How do Employer Perceptions of Crime and Incarceration Affect the Employment Prospect of Less-educated Young Black Men?," in Ronald B. Mincy (ed.), *Black Males Left Behind*, Washington DC: The Urban Institute Press (2006):67–85.

Leite, Philippe. G., "Race Discrimination or Inequality of Opportunities: The Brazilian Case," discussion paper 118, Ibero-America Institute for Economic Research, Georg-August-Universität Göttingen (2005).

Lemieux, Thomas, "Decomposing Wage Distributions: a Unified Approach," *Canadian Journal of Economics* 35 (2002):646–88.

McLanahan, Sara S., "Single Mothers, Fragile Families," in John Edwards, Marion Crain and Arne L. Kalleberg (eds), *Ending Poverty in America*, New York: The New Press (2007):77–87.

Oaxaca, Ronald L., "Male–female Wage Differentials in Urban Labor Markets," *International Economic Review* 14 (1973):693–709.

Shorrocks, Anthony, "Decomposition Procedures for Distributional Analysis: A Unified Framework Based on the Shapley Value," manuscript, University of Essex (1999).

Telles, Edward E., "Racial Ambiguity among the Brazilian Population," *Ethnic and Racial Studies* 25 (2002):415–41.

UNDP (United Nations Development Program), *Relatorio de Desenvolvimento Humano—Brasil 2005: Racismo, Pobreza e Violência*, Brasília: UNDP-Brazil (2005).

US DHHS (United States Department of Health and Human Services), *Trends in the Well-being of America's Children and Youth 2003*, Washington, DC: US Government Printing Office, Office of the Assistant Secretary for Planning and Evaluation (2004).

Notes

1. We also undertook a robustness analysis for the per capita income case.
2. See Gradín (2009, 2012) for a deep analysis of decomposition of the differential in poverty rates among racial groups in, respectively, Brazil and the USA.

3. In these cases the variables take the value 0 in households without any of such adults.
4. High incarceration rates among young black males in the USA limit the employment opportunities not only of those directly engaged in such behavior, but also of those not engaged in crime owing to statistical discrimination by employers (Holzer et al., 2006). Further, spatial mismatch in the blue-collar sector affected labor participation of young males residing in the urban core of metropolitan areas (Foster-Bey, 2006).
5. There is no consensus about the causes of changes in marriage, divorce and nonmarital childbearing in the USA leading to this situation. Changes in social norms, declining wages among low-skilled men, and the unintended incentives of the welfare system have been pointed out among the possible explanations (McLanahan, 2007).
6. Results for per-capita income are roughly similar to those using adjusted income. The main exception is that the degree of association between the black-white average income differential and the number of children is larger (4.7 percentage points in the USA, 2.7 in Brazil and 0.9 in South Africa), mainly at the expense of education (between 2.5 and 2.7 percentage points lower in all three countries) and labor participation of other adults in the USA (2.3 percentage points). This is due to the fact that with per-capita income (mostly African) larger families are made poorer.
7. Another exception is found at the extremes, first and last percentile, where geographic factors tend to be more explicative of the differential in income by race, in contrast with the negative contribution in the rest of the distribution.