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Does the US individual income tax display systemic racism? Negative evidence from audited US federal tax return data for 1967–73

Robert P. Strauss[1] · **Miguel Gouveia**[2]

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Abstract
Official statistics from the US Bureau of Labor Statistics and the US Bureau of the Census have long documented differences by ethnicity in employment rates and incomes. Recently, it has been suggested that the structure of the US federal individual tax system is 'systemically racist' which we interpret to mean that the application of the Internal Revenue Code through collection of individual income taxes adversely affects African American compared to White individuals and households. This paper contributes to the public discussion of possible systemic racism in the US tax system issue by studying an unusual set of US individual income tax data. These data differ from those used in other studies in two important ways. First, race is not imputed but obtained from the administrative records of the Social Security Administration. Second, the income tax data are *audited* tax return data. Using these audited and administratively matched data, we estimate effective income tax functions with an explicit role for race. After accounting for the basic structure of the US tax system, we find no statistical evidence of systemic racism in the operation of the US federal individual income tax during the period under study. Our results show that once income and filing status are taken into account, the effective tax rate tax did not vary by race—a finding that remains robust across multiple checks.

Keywords Individual income taxes · Effective tax functions · Systemic discrimination

JEL Classification H24 · J15

✉ Robert P. Strauss
rpstrauss@gmail.com

[1] Heinz College, Carnegie Mellon University, and Rochester Center for Economic Research, University of Rochester, Rochester, USA

[2] Catolica Lisbon School of Business and Economics, Portuguese Catholic University, Lisbon, Portugal

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1 Introduction

In the US and elsewhere gender and ethnic differences in market outcomes and differential access to public services, especially public education, and the enforcement of civil and criminal law, are increasingly of widespread concern and cause for public protest. Awareness of such disparities, especially by race, has long attracted the attention of historians, sociologists, demographers, economists,[1] criminologists and the legal profession, and been the subject of numerous national commissions,[2] as well as corrective Supreme Court decisions and federal legislation. Official US statistics have long documented differences by the US Bureau of Labor Statistics[3] in employment rates by ethnicity. Differences in income by race have long been documented by the US Bureau of the Census.[4] The Federal Reserve has routinely issued reports documenting that both the income and wealth of African Americas are below that of Whites and other ethnicities through its Survey of Consumer Finances, while it and other federal lending agencies have documented routinely adverse differential access to housing finance. Two Nobel Laureates, Gunnar Myrdal and Gary Becker, made significant contributions to empirical and analytical discussions of race in the American economy through Myrdal's 1944 treatise, *An American Dilemma,* and Becker's 1957 *Economics of Discrimination.* Finaly, Moynihan's 1965 US Labor Department study,[5] while controversial, has also been quite influential in understanding the African American family.[6,7]

Using indirect methods, Summer and Sullivan (2018) examined the systematic racism complaint by using IRS zip code data on federal taxes paid and ethnicity by zip codes to ascertain if Blacks suffer higher effective *rates* of federal taxation than Whites, holding imputed taxable income constant. They did not find such adverse differences and finds to some extent evidence of the reverse. Earlier, Strauss and Strauss (2004) reported, using publicly available local property assessment data by census tract and Census ethnicity data census tract for four urban counties, that assessment ratios were much higher in predominantly Black census tracts than in White census tracts. This finding was also replicated in Strauss (2013) and *more recently by Avenancio-Leon and Howard (*2022*)*. Which are consistent with *United States vs. Nassau County(*1999*)*.

The analysis of racial disparities in the tax system can be seen as a specific case of the "economic stratification" literature surveyed in Darity (2022), which purports to investigate group-level inequalities such as on racial and other demographic lines. Some economists, including Gale (2021) and Slemrod (2022), have concerns about the adverse interactions of

[1] For a recent critical review of the economics literature dealing with matters of race, see Komlos (2021). For the observation that the academic, public finance research community should pay more attention to matters of race and public finance, see Gale (2021) and Slemrod (2022). For estimates on the valuation of reparations to redress the historical results of slavery, see Darity (2020). For labor market analyses of the effect of race, gender and educational attainment on wages by occupation and industry, see, for example, Strauss and Horvath (1976), and for analyses of occupational attainment by race, educational attainment, occupation and industry, see, for example, Schmidt and Strauss (1975a, 1975b, and 1979).

[2] See, for example, Kerner (1968).

[3] See, for example, US Bureau of Labor, Women's Bureau. *s* (2022).

[4] See, for example, US Bureau of the Census, *Historical Income Tables of Households* (2022).

[5] See Moynihan (1965).

[6] For a recent display of economic data by race arguing that the US federal individual income tax fails to reduce economic disparities, see Brookings-Urban Institute (2024).

[7] Also, see the political economy analysis of racism in Roback (1989).

the federal tax system and race. Legal scholars such as Moran and Whitford (1996), Brown (2021) and Strand and Mirkay (2020) claim that the income tax is 'systemically racist' given features that hurt Blacks in comparison to Whites. These features include itemization, the existence of tax-exempt incomes or the mortgage interest deductions that are larger for more valuable Whites´ houses, ideas studied in Cronin et al (2023), and also defended in a report from the Brookings Institute-Urban Institute Tax Policy Center.[8] Another possible reason for racial asymmetries is the favorable tax tables for joint filers, a marital status more frequent among Whites, with Holtzblatt et al. (2024) finding racial disparities in the taxation of married taxpayers. One potential problem with these analyses is that they focus on tax provisions that seem to disadvantage minorities, neglecting to take into account other tax characteristics, such as general tax progressivity and targeted tax provisions such as the federal refundable earned income tax credit and the more recent refundable childcare tax credit, that may have opposite effects.

With regard to this claim of 'systemic racism', we interpret it to mean that the application of the Internal Revenue Code through collection of individual income taxes adversely affects African American individuals and households compared to counterpart Caucasians through higher *rates* of effective taxation.[9] It is our view, however, that, once the systematically well-known lower incomes of African Americans are accounted for, outcome income tax differences are not due to the details, per se, of the Internal Revenue Code, but due to the predicate private sector economic positions of African Americans. That is, the working hypothesis that we investigate in this paper is that, once disparate and generally lower incomes of African Americans vs. Whites in the US are accounted for, are there are discernible differences in patterns of effective tax rates by race?

As is generally known, the Internal Revenue Code does not require the reporting of ethnicity on Federal Form 1040. More than 40 years ago, at the request of the first author of this paper, the Office of Research and Statistics of the Social Security Administration, Statistics of Income Division of the IRS and the Office of Tax Analysis of the US Treasury did construct an anonymous panel of *audited* federal individual income tax returns for the period 1967–1973[10]; these returns, which matched ethnicity from other federal administrative records by SSN, do not have the uncertainties of having to impute race by making assumptions about raw IRS data with no racial identifiers. These uncertainties have been recently scrutinized by Derby et al. (2024), which, for a specific inputting methodology, find biases that lead to underestimates of the differences in outcomes between White and non-White taxpayers. The panel enables us to apply our earlier methodology, the Gouveia-Strauss effective tax function, to these data to examine the proposition of racial differences in effective income tax rates.

The counterfactual that we organize our analysis around is the statistical estimation of the original effective tax function in which the ratio of net taxes to Adjusted Gross Income is explained by Adjusted Gross Income or by Economic Income,[11] and add to this analysis

[8] Cf. https://apps.urban.org/features/federal-income-tax-system-can-worsen-racial-disparities/.

[9] Should one determine the presence of 'systemic racism', this finding raises a subsequent question of whether or not such a result is intentional or unintentional by those who design and vote for such tax institutions.

[10] See Appendix which shows that the 1967–73 panel and the annual 1967–73 Statistics of Income Public Use Files have very similar annual means for AGI and effective tax rates.

[11] For the majority of our empirical analysis below, we will use Adjusted Gross Income as our measure of pre-tax, pre-transfer ability to pay, as a consequence of our core data containing fewer economic variables

categorical variables for ethnicity, itemization or not, and marital status. That is, we take as given both the distribution of private income and basic tax filing characteristics and examine the additive effect of race or ethnicity.

Because of data limitations, we do not examine the demographic effects of age and gender. In our statistical analysis below, we examine whether or not the addition of ethnicity to the Gouveia-Strauss effective tax function results in coefficient estimates statistically different from zero, and through a series of subsequent robustness checks, double check whether or not one can discern differences in effective tax functions by ethnicity.

By way of summary, expected differences in the distribution of explanatory variables in the Gouveia-Strauss effective tax function by ethnicity are observed and are statistically significant. So, mean AGIs of African Americans are considerably lower than whites, use of itemization of African Americans is considerably lower than whites, and family size of African Americans is slightly larger, as reflected in personal exemptions, than that of whites in the tax return data. These findings are consistent with the findings of the Census Bureau's long-standing Current Population Survey program, although the CPS measures cash income rather than Adjusted Gross Income.

On the other hand, our estimates of the augmented Gouveia-Strauss effective tax function, which explain between 85 to 89% of the variation in effective average income tax rates, display very small differences, most of them statistically insignificant, in the effect of ethnicity which sometimes are *lower* for African American taxpayers, depending on the year in question, than that of whites. With regard to horizontal equity, we find no evidence of unequal treatment of persons or households with similar incomes; that is, tax returns within the same income interval do *not* display differences in effective tax rates by ethnicity.

The fact that the data refers to 1967–1973 does not diminish its interest. First, to date, there are not many alternative sources of federal income tax information available on the topic.[12] Second, the years under study follow historical changes in policies and legislation regarding discrimination such as the Civil Rights Act of 1964 or the Voting Rights Act of 1965 as well as the struggle against discrimination lead by Martin Luther King and others. Whatever results are found, they will be relevant in terms of examining the historical presence or absence of racial discrimination in the effects of the federal individual income tax.

The paper is organized as follows. Section 2 presents an explanatory graph of what a pattern of effective tax rates and income by income might look like to reach the conclusion that systemic racism is found in the data. It then presents the Gouveia-Strauss effective tax function and the logic of using it to estimate the well-known non-linear and concave relationship between effective tax *rates* and income. Section 3 presents summary statistical information about the tax return information by ethnicity. Section 4 reports first our baseline estimation results for the Gouveia-Strauss effective tax function, then results from an augmented tax function taking into account filing status and finally reports a series of five robustness tests to the major finding of no material differences in the effect of race on effective tax rates

than in the typical public use Statistics of Income Public Use Files. See Sect. 4.5 for a comparative analysis of the basic effective tax function using AGI and a feasible measure of a broader income concept designated as Economic Income.

[12] Further, it is well known, for example, that income and tax data collected and reported by the Internal Revenue Service are much more accurate, in terms of both variables, income and federal taxes paid, than sample surveys conducted by the US Bureau of the Census, through its *Current Population Survey* and *American Community Survey*, and the Board of Governors of the Federal Reserve System through its *Survey of Consumer Finances.*

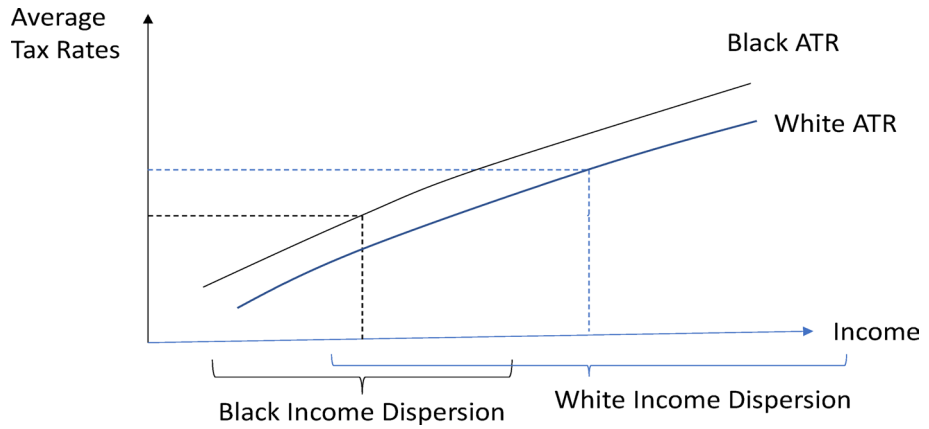

Fig. 1 Hypothetical Gouveia-Strauss effective average tax rate functions displaying systemic racism

upon holding constant private sector outcomes and filing status. Section 5 concludes and discusses some implications for future work.

2 About the analysis of income, effective tax rates, and the Gouveia-Strauss effective tax function

Because the US individual income tax is progressive, a simple comparison of overall mean effective tax rates by race can be misleading because it is well known that the mean income of Whites is higher than for Blacks, and that the distribution of White incomes is shifted to the right of that for Blacks.[13] This means that Blacks could be discriminated by the tax system in the sense that, for the same level of income, Blacks could be paying more taxes than taxpayers with similar incomes from other ethnicities, and yet the average tax rates for Blacks could still be smaller than for other ethnicities.

Since the average tax rate functions are concave and predicate private sector income of Whites are known to be higher than Blacks, one must be mindful of Jensen's inequality. That is, there is the possibility that the simple comparison of average tax rates by race may be misleading or biased. This problem can be overcome by explicitly taking into account the joint distribution of effective tax *rates* and income *across* all levels of income.

A graphical example makes this point more clearly. Consider the hypothetical relationship between average tax rates and income by race in Fig. 1. Figure 1 is drawn to remind us that there is general agreement from students of individual income tax data that the effective tax function is concave to the origin.[14] We draw the effective tax rate function of Blacks above that of Whites to display what we infer a circumstance of 'systemic racism in the tax system' to be, since for the same level of income, the effective tax rate of Blacks is higher than that of whites. Were we to find, empirically that this was not the case, that is, that the

[13] See, for example, Table A2 for 2020 of the Census Bureau's report on the distribution of household income by race; (Census 2022).

[14] As our ethnicity data was coded by the Social Security Administration as "White", "Black", "Other", we refer below to African Americans as Black, and Caucasians as White.

effective tax functions were indistinguishable by race, then we would reject the hypothesis that the tax system was 'systemically racist.' Fig. 2 reports the results of examining actual data, (see Table 4 for details), and shows that the empirically estimated effective tax function for Blacks is not above the function for Whites.[15]

Gouveia and Strauss (1994, 1999) specify an empirical tax function relating income to the individual income tax inspired by the classical literature on equal sacrifice and its revival by Young (1988, 1990) and Berliant and Gouveia (1993). The empirical Gouveia-Strauss effective average tax rate function relates the ratio of the i'th individual's net income taxes, to his income, y, as a non-linear function:

$$\mathrm{ATR_i} = \mathrm{b} - \mathrm{b}\left(1 + \mathrm{s}\ \mathrm{y}^{\mathrm{p}}\right)^{-1/\mathrm{p}} + \mathrm{e_i} \tag{1}$$

where b, p, and s are parameters and ε is an additive statistical disturbance. Note that (1) can be estimated by non-linear least squares. Gouveia and Strauss (1994) report estimates of (1) for annual cross sections for the period 1979 through 1989. This specification explained between 26 and 56% of the variation in effective tax rates, ATR, while a fourth order polynomial version of (1) explained between 7 and 41% of the variation in ATR. Generally, the GS effective tax function explained nearly three times *more* of the variation than the polynomial with a higher number of coefficients. The GS effective tax function has been widely used by other researchers, for example for calibrating non-linear taxes in general equilibrium and macroeconomic models in more than 400 published studies.[16]

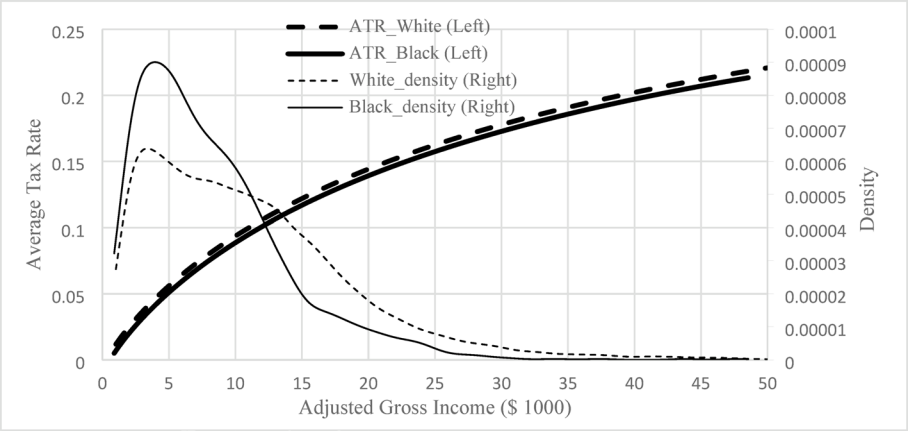

Fig. 2 Kernal density of average tax rate and adjusted gross income and empirical Gouveia-Strauss effective tax function for 1973 by ethnicity, simple case. Figure uses the 1973 data and considers Adjusted Gross Income up to fifty thousand dollars. It shows the average tax rate as an increasing and concave function for Blacks and Whites (left axis). It also displays the density functions of the Black and the White Adjusted Gross Income distributions (right axis)

[15] Figure 2 also displays kernel density estimates of the distribution of AGI by race, showing the higher incomes of Whites.

[16] See, for example, Conesa and Krueger (2005), Gorry and Oberfield (2012), Guner et al. (2014), Guvenen et al. (2014), Li and Ma (2017), Nezih et al. (2014), Nishiyama (2015), Sarte (1997), and DeBacker, Evans, and Phillips (2019).

In this paper, to explore the issue of possible systemic racism in the US individual income tax, we use the structure in (1) above to characterize empirically the observed average effective income tax rates of different ethnic groups. That is, we add to (1), the basic equation, dummy variables for measures of race or ethnicity. Further, we explore more deeply the GS equation with race indicators by adding in tax characteristic variables such as the number of exemptions, marital status of the taxpaying unit, and whether the tax return is itemized, and also compare and contrast results based on income measured by adjusted gross income and a broader concept of economic income.

3 About the 1967–73 panel of US federal individual income tax returns

The SOI dataset is an unweighted panel for 1967–1973. It includes annual tax returns for 21,379 taxpaying units. Only 43% of the taxpaying units are present in all 7 years of the panel: the average number of observation years per taxpaying unit is 4.88, resulting in 104,244 observation years. Even though we report below aggregate descriptive statistics for simplicity, the analyses were carried out year by year to accommodate annual changes in tax statutes.

As in Gouveia and Strauss (1994), the analysis to be presented is based on an average income tax rate equation: it excludes observations with negative and very low positive incomes since average tax rates in those cases may not have the usual meaning. The nominal Adjusted Gross Income (AGI) threshold used for inclusion in the analysis was set at $ 1000 for the years in the SOI panel. All statistics henceforth will come from the sample used in the analysis. The total number of observation years is 95,159, the average number of returns per year is 13,594 and the average number of years in the panel for all taxpaying units is 4.82.

The descriptive statistics of tax returns per number of years in the analysis panel and the average number of taxpaying units per tax year can be seen in Table 1.

The SOI panel includes Social Security Administration data characterizing the taxpaying unit as White, Black or Other Ethnicity. Some observations miss information on ethnicity. In order to minimize potential biases, the analysis will treat the observations with missing ethnicity data as an additional ethnic group. Over the entire analysis sample, Whites are 86.8 percent of the annual returns, Blacks are 8.6 percent, Others are 1.6 percent and returns with no ethnic information are 3.0 percent. These figures can be compared to the composition of the US population in 1970, according to the U.S. Census Bureau of: 87.5 percent Whites and 11.1 percent Blacks. The smaller representation of Black taxpayers in our data likely

Table 1 Sample composition

Table presents some descriptive statistics of the sample used for the analysis, including the distribution of households by the number of years present in the panel (1–7), and the sample total number of taxpayers per tax year

Taxpayers by years in the panel			Returns by tax year	
Number of years present	Frequency	Percent	Tax years	Frequency
1	2935	14.85	1967	12.591
2	1950	9.87	1968	13.055
3	1531	7.75	1969	13.385
4	1468	7.43	1970	13.598
5	1503	7.61	1971	13.751
6	2247	11.37	1972	14.211
7	8125	41.12	1973	14.581
Average number of years	4.82		Average	13.594

Table 2 Sample annual averages, 1967–1973

Table presents the samples' ethnic composition, mean adjusted gross income and mean effective tax rate by ethnic group

Ethnicity	Freq	Percent	Mean AGI	Mean effective tax rate
White	11,806	86.8	9,374	0.096
Black	1171	8.6	6,669	0.073
Other	215	1.6	7,533	0.081
No Information	404	3.0	17,767	0.107
Total	13,596	100	9,362	0.094

Table 3 Tax return characteristics in study dataset

Ethnicity	Percent itemizers	Mean number of exemptions	Percent singles	Percent married filing jointly	Percent other marital statuses*
White	46.5	2.85	30.5	62.7	6.8
Black	35.8	3.00	32.5	44.0	23.6
Other	32.9	2.92	36.3	53.8	10.0
No information	36.3	2.19	56.3	38.4	5.4
Total	45.1	2.84	31.5	60.2	8.3

Table reports the mean of annual means (weighted by returns per year) for proportion of itemizers, number of exemptions, and proportions by marital status

*Other marital status: married filing separately, unmarried heads of household, widow or widower with dependent children

reflects the fact that the distribution of Black income is lower than for White income, and therefore fewer Blacks must file tax returns. Table 2 summarizes the information available regarding mean effective tax rates using Adjusted Gross Incomes as the denominator and mean AGI per ethnicity.

Table 2 shows that AGI and mean effective tax rates are higher for Whites compared to Blacks or Others. It also reveals that the group with no information on ethnicity has the highest mean AGI and highest mean tax rates, reinforcing the need to include explicitly that group in the analysis. The AGI differences across ethnic groups are statistically significant and the *p*-value for the difference between Blacks and Whites is less than 0.001 for all years. The results for the mean tax rates are qualitatively similar, with mean effective tax rates being higher for Whites compared to Blacks or Others. Again, the differences are statistically significant with a p-valie less than 0.001 for the difference between Blacks and Whites for every year.

A second stage of the analysis will include additional variables: the number of exemptions, itemization of tax returns, and marital status. Table 3 presents some descriptive statistics for these variables.

The proportion of returns itemizing exhibits a negative trend from 1967 through 1973, but the trend is present across all ethnicities. The proportion itemizing is higher among whites and the difference in the itemization rate between Whites and Blacks is statistically significant with a p-value < 0.001 for every year in the panel.

Total exemptions include exemptions for the taxpayers and dependents, and exemptions for age and blindness. Blacks have a higher number of total exemptions than Whites. The

difference is statistically significant for the years 1967–1971, with annual *p*-values under 0.03. However, the difference is not significant for 1972 and 1973.

The distribution of annual tax returns across marital status categories also significantly differs across ethnic groups for all years, with Chi-Square p-values all under 0.001. For example, Whites have a significantly higher proportion of returns by Married Filing Jointly than all the other groups. The Black and White difference in the proportion of returns from Married Filing Jointly is significant with annual *p*-values below 0.001. On average the proportion of returns by Married Filing Jointly is 18.6 percentage points higher for Whites compared to Blacks.

4 Empirical results for Gouveia-Strauss effective tax function regression

4.1 Basic Gouveia-Strauss effective tax function with race

The regression analysis entails the estimates of Eq. (1) for each year with AGI as the income measure, the addition of dummy variables for three known measures of Race and an additional dummy variable for observations for which no race data was located. The omitted group is Whites.

$$\mathrm{ATR_i} = \mathrm{b} - \mathrm{b}\,(1 + \mathrm{s}\ \mathrm{AGI^p})^{-1/\mathrm{p}} + \mathrm{D_1Black} + \mathrm{D_2Other} + \mathrm{D_3Missing} + \mathrm{e_i} \quad (2)$$

The parameters were estimated by non-linear least squares using STATA 14.0 nl command. We assume ε is uncorrelated with the regressors and present our first results in Table 4.

The results show that Black taxpayers have small, negative coefficients, statistically significant for all the years. This means that Blacks tend to have slightly *smaller* average effec-

Table 4 Basic average tax rate (ATR) regressions

	1967	1968	1969	1970	1971	1972	1973
Basic parameters of Gouveia-Strauss effective tax function							
B	0.5408	0.7131	0.6567	0.3792	0.3317	0.4032	0.3717
	0.0444***	0.0610***	0.0496***	0.0142***	0.0087***	0.0114***	0.0100***
S	0.0006	0.0006	0.0006	0.0002	0.0001	0.0001	0.0001
	0.00003***	0.00003***	0.00003***	0.00002***	0.00001***	0.00001***	0.00001***
P	0.5976	0.5741	0.5710	0.7759	0.9097	0.8807	0.8675
	0.0142***	0.0121***	0.0118***	0.0165***	0.0169***	0.0141***	0.0146***
Analysis parameters							
Black	−0.0060	−0.0061	−0.0075	−0.0083	−0.0060	−0.0047	−0.0051
	0.0012***	0.0013***	0.0013***	0.0012***	0.0011***	0.0010***	0.001***
Other	0.0021	−0.0004	0.0008	−0.0011	−0.0037	−0.0066	−0.0067
	0.0031	0.0031	0.0031	0.0026	0.0023	0.0022***	0.0021**
No information	0.0046	0.0051	0.0074	0.0082	0.0083	0.0070	0.0099
	0.0021*	0.0021*	0.0022**	0.0021***	0.0018***	0.0017***	0.0017***
N	12,591	13,055	13,385	13,598	13,751	14,211	14,581
R^2	0.8663	0.8737	0.8797	0.8749	0.8875	0.8875	0.8926

Regressions of ATR on AGI using individual taxpayer data and specification (2) above. Standard errors in small print; *$p<0.05$,**$p<0.01$, ***$p<0.001$

tive income tax rates relative to Whites with the same AGI, with a difference in the average tax rate of roughly 0.6 percent, implying a proportional reduction in the neighborhood of 7 percent.

We next examine how robust our findings are when additional variables are added to the basic model, as well as examine the effects of limiting the sample and range of the data by ethnicity to ascertain if the generally higher level of White incomes affects our inferences, whether or not ethnicity interacts with regressor variables, and whether or not extending the definition from AGI to Economic Income, taking into account preferential treatment of certain incomes, especially long-term capital gains, materially affects our inferences about the effect of ethnicity and average effective tax rates.

4.2 Augmented Gouveia-Strauss effective tax function: adding controls for exemptions, itemization and filing status

The above econometric results may not be robust in the sense that other tax relevant characteristics may differ systematically across ethnic groups with the possible result that these findings may suffer from misspecification as relevant variables are missing in the regression equation.

To address this possibility, we first extend our econometric analysis of the average effective tax rate regressions by considering the effects of three basic characteristics of the individual income tax: (i) the number of personal exemptions, (ii) whether the tax return is itemized or not, and (iii) by including a set of dummy variables which reflect the marital status of the tax filing unit. As we shall see, adding these three characteristics materially improves the overall fit of the Gouveia-Strauss effective tax function, and materially reduces the previous statistically significant effects of race on the pattern of audited effective tax rates.

Table 5 contains the results of the augmented effective tax function. Note that with the addition of the various control variables, the highlighted Black coefficient is now statistically significant and negative, compared to the omitted category of White, in only 2 of the 7 cross section regressions, and the effect is now considerably *smaller*. Note further that the goodness of fit in each of the 7 years is at least 0.95 or, on a relative basis, about 8 to 11% more accurate than the simple results displayed in Table 4.

The results in Table 5 confirm that once we control for the additional variables, the coefficient for the Black indicator becomes non-statistically significant for all the years except 1969 and 1970. The Black coefficients are negative for all the years, but the point estimates are much smaller than in the case without controls shown in Table 4: even in 1969 and 1970 the coefficients tell us that Blacks have an average tax rate that is about 0.2% lower than otherwise similar Whites, a number that probably deserves to be given very little economic significance.

The results in Tables 2, 4 and 5 show that the estimates of the Black coefficients in the effective tax functions depend on the controls used. Figure 3 uses 1973 data to display the evolution of the Black coefficients in a waterfall diagram as we add additional controls.[17]

Figure 3 begins with a raw Black-White difference in ATR of -2%. This difference decreases to −0.5% when we take AGI and the non-linearity of the tax function into account. If we further control for the number of exemptions and for itemizing, the Black-White

[17] Results for other years in the panel are qualitatively similar.

Table 5 Average tax rate (atr) regressions with additional controls by filing year

	1967	1968	1969	1970	1971	1972	1973
Basic parameters of Gouveia-Strauss effective tax function							
B	0.4553***	0.5661***	0.5488***	0.3776***	0.3655***	0.4010***	0.3902***
S	0.0008***	0.0007***	0.0006***	0.00009***	0.00006***	0.00006***	0.00006***
P	0.6981***	0.6900***	0.7242***	1.0329***	1.0420***	0.9987***	1.0239***
Ethnicity analysis parameters (white is dropped category)							
Black	**−0.0007**	**−0.0009**	**−0.0026****	**−0.0025****	**−0.0010**	**−0.0002**	**−0.0008**
Other	0.0019	0.0007	−0.0006	0.0016	−0.0007	−0.0010	−0.0015
No information	−0.0053***	−0.0037**	−0.0026*	0.0032**	0.0018	0.0021**	0.0032**
Additional controls (single is dropped category for marital status)							
# Exemptions	−0.0145***	−0.0163***	−0.0145***	−0.0144***	−0.0132***	−0.0134***	−0.0135***
Itemizing (1 = Yes)	−0.0199***	−0.0237***	−0.0279***	−0.0243***	−0.0217***	−0.0208***	−0.0228***
Married filing jointly	−0.0248***	−0.0303***	−0.0369***	−0.0245***	−0.0161***	−0.0150***	−0.0167***
Married filing separately	−0.0043***	−0.0035**	−0.0067***	0.0052***	0.0131***	0.0150***	0.0152***
Unmarried heads of household	−0.0149***	−0.0196***	−0.0221***	−0.0118***	−0.0059***	−0.0061***	−0.0072***
Widows	−0.0279***	−0.0354***	−0.0384***	−0.0200***	−0.0131***	−0.0123***	−0.0146***
N	12,591	13,055	13,385	13,598	13,751	14,211	14,581
R^2	**0.9673**	**0.9687**	**0.9647**	**0.9567**	**0.9631**	**0.9621**	**0.9643**

Regressions of ATR on AGI using individual taxpayer data with additional control variables (exemptions, itemizing, marital status). Standard errors in small print; *$p<0.05$, **$p<0.01$, ***$p<0.001$

difference becomes a positive 0.2%. Finally, as we further add marital status controls, the Black-White difference becomes -0.08%, negative again but statistically and economically insignificant.

4.3 Basic and augmented Gouveia-Strauss effective tax function across ethnicity observations with common support

The analysis presented so far uses all observations with AGI above a positive minimum value. This means that there are White AGIs above the Black AGI upper limit. If the GS function models the non-linearity of the effective tax function accurately the fact that there is no matching support in the AGI distribution should not be a problem. However, if the GS function is not a good model for the joint increase in incomes and effective average tax rates, it could be the case that the coefficient for Black taxpayers is picking up effects due to their lower AGIs rather than differential treatment. To assess the robustness of the findings, we conducted an analysis restricting annual AGI observations to a common AGI support across groups. Accordingly, in each year we find the AGI thresholds that correspond to the percentiles 10 and 90 for the Black AGI distribution and re-estimate the GS tax functions using only observations with AGI within those limits. Table 6 summarizes the results obtained for the Black coefficient, both for the basic model and for the augmented model with controls for exemptions, marital status, and itemization.

Comparing the Black coefficients in Tables 4 and 5 with those reported in Table 6, we find that they tend to have similar magnitudes. Point estimates are all negative, except for the augmented model in 1972. The introduction of additional controls leads to statistically insignificant Black coefficients except for 1969 and 1970. However, as pointed out in Sect. 4.2 even in these two years the size of the coefficients is considerably smaller in absolute value, leading to differences in average tax rates that could hardly be seen as having economic relevance.

4.4 Basic and augmented Gouveia-Strauss effective tax function: race and AGI interaction

Here we consider whether or not the assumption about the independence of the error term in the specification $\mathrm{ATR_i = b - b(1+s\ AGI}^{\mathrm{p}})^{-1/\mathrm{p}} + \mathrm{D_1\ Black} + \mathrm{D_2\ Other} + \mathrm{D_3\ Missing} + \varepsilon_{\mathrm{I}}$ is warranted by interacting AGI with the dummy variable for Black. That is, we form an interaction term between Black and AGI and estimate:

$$\begin{aligned} ATR_i = {} & \mathrm{b} - \mathrm{b}(1 + \mathrm{s}\ AGI^{p})^{-1/\mathrm{p}} + \mathrm{D1\ Black} \\ & + \mathrm{D2\ Other} + \mathrm{D3\ Missing} + ID_B * (Black * AGI) + \varepsilon_i \end{aligned} \tag{3}$$

Of interest in the regression is the break-even threshold in terms of AGI when the separate, negative effect of being Black is modified by the interaction between Black and AGI. Table 7 reports the two coefficients of interest in the regression above for each year, and indicates that in two years, 1971 and 1972, the Black-AGI interaction coefficient, $\mathrm{ID_B}$, is not statistically different from zero. For other years the AGI breakeven level is between incomes corresponding to the 76th and 89th percentiles of the Black AGI distribution. That is, in 1967 at AGI levels below percentile 76 of the Black distribution entailed a lower effective tax rate than for whites, while

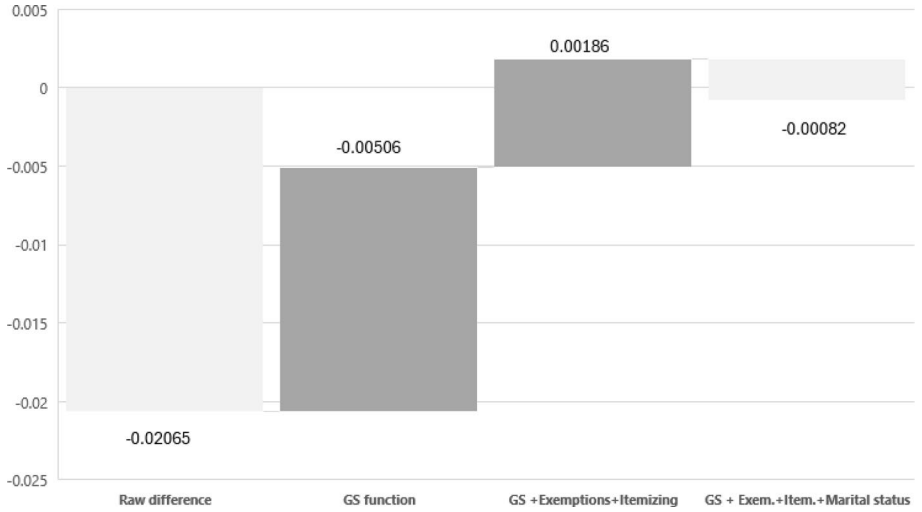

Fig. 3 Values of the Black coefficient with increasing set of controls, 1973. The waterfall diagram shows the evolution of the estimates of the Black coefficient as we add additional control variables to the statistical analysis

Table 6 Black coefficients in regressions with common support

Table shows Black coefficients and *p*-values from basic and augmented ATR regressions using observations from all ethnicities with AGI in a range between percentiles 10 and 90 of the Black AGI distributions for each year

Year	Black coefficient from basic regressions	*p* value	Black coefficient from augmented regressions	*p* value	N
1967	−0.0073	0.000	−0.0004	0.513	8337
1968	−0.0091	0.000	−0.0011	0.102	8794
1969	−0.0106	0.000	−0.0039	0.000	8558
1970	−0.0105	0.000	−0.0027	0.000	9555
1971	−0.0063	0.000	−0.0008	0.132	9464
1972	−0.0040	0.000	0.0003	0.546	9866
1973	−0.0050	0.000	−0.0005	0.262	10,293

at AGI levels greater than percentile 76 the effective average tax rate for Blacks was higher than for Whites.

This crossing ATR result had been suggested in the analysis in Sommer and Sullivan (2021).

4.5 Economic income vs. AGI results

As noted above, the set of variables in the 1967–73 panel dataset which is the focus of this study is considerably smaller in number than those generally available in the anonymous public use files which we have used in our earlier research, and for that reason we were not able to develop a complete measure of pre-tax, pre-transfer economic income. Our Economic Income measure here is the sum of salaries and wages, dividends before exclusion, interest received, other property gain/loss, pensions and annuities in AGI, Schedule C Gain/Loss, rents/royalties gain/loss, partnership/small business gain/loss, farm income/loss and

Table 7 Augmented regression model with black interacted with AGI

Year	D_B	ID_B (10^{-7})	Breakeven AGI threshold ($)	Black AGI percentile of breakeven (Approx.) %
1967	−0.00357	5.08	7027	76
1968	−0.00336	4.33	7756	80
1969	−0.005821	5.50	10,584	87
1970	−0.00625	5.09	12,278	89
1971	−0.00178	NS	–	–
1972	NS	NS	–	–
1973	−0.00269	2.17	12,428	83

NS, not statistically significant, $p>0.05$. D_B is the estimate of the simple Black coefficient and ID_B is the AGI interaction coefficient, reported in 10^{-7} units. The last two columns display the breakeven threshold – the AGI level where the Black and White difference in tax rates is zero and the percentile of the Black AGI distribution that corresponds to the breakeven in each year. For AGI levels below the threshold Black taxpayers have lower ATR than Whites and the opposite occurs above the threshold

Table 8 Ratio of economic income to AGI by percentile of the ratio

Year	Ratio of economic income to AGI by percentile of ratio		
	75th percentile of ratio	90th percentile of ratio	95th percentile of ratio
1967	1.000	1.036	1.113
1968	1.000	1.061	1.163
1969	1.000	1.042	1.130
1970	1.000	1.040	1.125
1971	1.000	1.048	1.135
1972	1.000	1.041	1.128
1973	1.000	1.036	1.116

Table examines the distribution of the individual ratios for each year and reports the value of that ratio for three upper percentiles

miscellaneous gain/loss. Note that our concept of economic income imposes no limits on various sources of income losses.

Table 8 compares, for each year, the ratio of audited Economic Income to audited AGI for various percentiles of the ratio and indicates that for 3/4 of the ratios in the data each year, the ratio of economic income to AGI is 1.0. The 90'th percentile of the ratio of Economic Income to AGI is 3.6% larger than 1.0, and at the 95th percentile of the ratio, we find that Economic Income to AGI is between 11 and 16% greater than 1.0. Note that the annual correlation between the two dollar measures of ability to pay averages 0.963.

Table 9 displays the results of estimating the augmented GS effective tax function with Economic Income in place of AGI and indicates that, while being Black entails a lower effective tax rate than the omitted category, White, in no year is this effect statistically different from zero at any reasonable confidence level. From Table 9 we infer that our reliance on AGI compared with a broader measure of income does not alter our conclusions about the insignificant statistical effect of race on the pattern of effective tax rates once additional controls are introduced.

Table 9 Basic and augmented models using economic income instead of AGI

	1967	1968	1969	1970	1971	1972	1973
Basic parameters of Gouveia-Strauss effective tax function							
B	0.3679***	0.4229***	0.4375***	0.3372***	0.3195***	0.3307***	0.3447***
S	0.0007***	0.0005***	0.0004***	0.0001***	0.00004***	0.00005***	0.00004***
P	0.7593***	0.7901***	0.8213***	1.1220***	1.1254***	1.0722***	1.0944***
Ethnicity analysis parameters (white is dropped category)							
Black	−4.40E−05	2.28E−05	−0.002	−0.00223	−0.0005	−0.0002	−0.0007
Other	0.0018	0.0008	0.0006	0.0017	0.0006	−0.0018	−0.0019
No Info	0.0073***	0.0008	0.0023	0.0173	0.0114	0.0073*	0.0089***
Additional controls (single is dropped category for marital status)							
# Exemptions	−0.0140***	−0.0156***	−0.0139***	−0.0138***	−0.0126***	−0.0129***	−0.0128***
Itemizing (1 = Yes, 0 = No)	−0.0191***	−0.0235***	−0.0267***	−0.0224***	−0.0192***	−0.0160***	−0.0205***
Married filing jointly	−0.0236***	−0.0291***	−0.0376***	−0.0252***	−0.0162***	−0.0148***	−0.0187***
Married filing separately	−0.0050**	−0.0038**	−0.0067**	0.0047**	0.0117***	0.0121***	0.0134**
Unmarried heads of household	−0.0144***	−0.0188***	−0.0233***	−0.0105**	−0.0051***	−0.0075***	−0.0083***
Widows	−0.0311***	−0.0350***	−0.0279***	−0.0182**	−0.0146**	−0.0139**	-0.0177**
N	12,605	13,087	13,400	13,587	13,748	14,165	14,586
R^2	0.8799	0.9297	0.8938	0.885	0.893	0.9065	0.9048

Regressions use taxpayer level data. Standard errors in small print; *$p<0.05$,**$p<0.01$, ***$p<0.001$. The table shows the results of estimating the augmented GS effective tax function with economic income in place of AGI

5 Discussion

Despite the results being relevant in themselves, how likely is it that the contemporaneous personal income tax system is still not displaying "systemic racism"? We obviously do not have direct evidence, but some arguments can be presented. The first is that if we do not find racism in the tax system in the late sixties and early seventies, it is unlikely it appeared in the tax system at the same time racism is declining in society at large. This decline can be seen both in attitudes and outcomes. For example, according to Gallup, the U.S. rate of approval of marriage between black people and white people, has increased from 5% in 1958 to 94% in 2021.[18] Other reasons to suspect racism has been declining is the evolution of the Black to White ratios of median incomes, that have been slowly trending upwards, and the evolution of the Black to White ratios of unemployment rates, trending downwards, with both time series shown in Fig. 4.

Some of the changes that have been occurring in the income tax may also have worked against the appearance of "systemic racism". The Earned Income Tax Credit (EITC) was introduced in 1975, as a temporary provision, changing to a permanent program in 1978. Over the years the EITC has expanded in terms of being refundable and in terms of coverage as discussed in Cronin et al (2023) the EITC has particularly benefited minorities. Another important trend, highlighted by IRS statistics,[19] is the increasing concentration of the tax burden among the highest earners. The share of total tax liabilities borne by the top 1% of taxpayers by AGI has grown substantially, particularly since the 1980s. In 1979, the top 1% paid 19.8% of all federal taxes. By 2021, their share had risen to 45.8%. This trend has reduced the relative burden on lower-income groups—a segment that disproportionately includes African Americans.

6 Conclusions

In this paper we have tested statistically the hypothesis that effective tax rates—net income taxes divided by income– of Black and White US federal individual income taxpayers are statistically different from each other, with those of Blacks being higher than Whites, when each group's income is held constant through the use of the Gouveia-Strauss effective tax function. Based on the application of this econometric model to samples of audited federal individual income tax returns matched to other federal administrative records containing race for tax years 1967 through 1973, our econometric analysis has shown that there is no reason to believe that, given their incomes, Blacks paid higher income taxes than other ethnicities. In the course of statistically testing this hypothesis, we performed a series of robustness checks to ascertain how stable this finding is including using a slightly broader measure of ability to pay than AGI.

The evidence presented in this paper is relevant, but it certainly has some limitations to addressing the conjecture that the US federal individual income tax system is 'systemically racist'. The analysis obviously does not consider *why* the predicate incomes of Blacks were

[18] Cf. https://news.gallup.com/poll/354638/approval-interracial-marriage-new-high.aspx

[19] IRS publicly available files include www.irs.gov/pub/irs-soi/22in41ts.xls and www.irs.gov/pub/irs-soi/04asastr.xls. Magness (2021, p. 194) estimates the evolution of the top 1% and 10% tax liability shares since 1913, The share of the top 1% has been rising steeply since the 1980s.

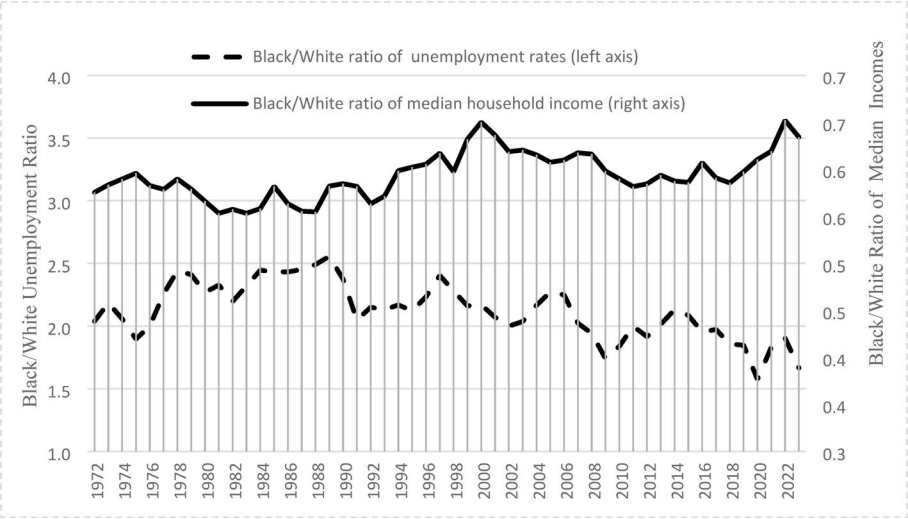

Fig. 4 Black/white ratios of unemployment rate and median household incomes.
Source: authors' tabulations of US Bureau of the Census (2021) median incomes by race and US Department of Labor, Bureau of Labor Statistics (2022), unemployment rates by race

lower than for Whites during the period 1967–73: explanations for that fact take us well beyond the operation of the tax system to frequently discussed matters of discrimination by race in various markets. However, other areas more specific to the tax system might still show discrimination. For example, compliance costs for minorities could be higher than for Whites. Elzayn et al. (2025) find that auditing efforts and penalties for noncompliance could be disproportionately allocated to minorities. Hopefully, future research including that with more recent data will be able to shed light into these matters.

Appendix: Comparison of descriptive statistics of 1967–73 panel of audited tax returns with descriptive statistics of annual 1967–73 statistics of income public use files

Panel A

	IRS statistics of income public use annual unaudited cross sections		1967–73 audited panel used in study	
Year	Mean AGI $	Mean average tax rate	Mean AGI $	Mean average tax rate
1967	7868	0.088	7791	0.089
1968	8391	0.098	8305	0.104
1969	8831	0.112	8803	0.113
1970	9268	0.096	9174	0.096
1971	9786	0.086	9736	0.086
1972	10,482	0.084	10,370	0.083
1973	11,071	0.087	11,021	0.088

Panel B: Ratio of public use AGI and mean effective rate rates by year (from Panel A)

Year	(PUF/audited) mean AGI ratio	(PUF/audited) mean ATR ratio
1967	1.010	0.989
1968	1.010	0.942
1969	1.003	0.991
1970	1.010	1.000
1971	1.005	1.000
1972	1.011	1.012
1973	1.005	0.989

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