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Negative Evidence from Audited US Federal Tax Return Data for 1967-73

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Abstract

In the US and elsewhere, racial differences in private market outcomes, in access to public services, and in the regulatory treatment by public authorities are increasingly of widespread concern and cause for public protest. 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 Black compared to White individuals and households. Statistically testing this claim has been difficult because the usual databases associated with actual individual income tax returns lack information on the race of taxpayers.

This work contributes to the public discussion of possible systemic racism in the US tax system issue by studying US individual income tax data for 1967-1973 through the use of an anonymous panel of audited US federal individual income tax returns, due to the US Treasury Office of Tax Analysis and IRS Statistics of Income Division, and which were directly matched by Social Security Number to ethnicity from the federal administrative records of the Social Security Administration. Using these audited and administratively matched data, we estimate effective income tax functions (Gouveia and Strauss, 1994) with an explicit role for race.

After controlling for the basic structure of the US tax system, we do not find statistical evidence for the claim of systemic racism in the workings of the US individual income tax for the period under study. This finding, that the effective tax rate of the US federal individual income tax does not vary by race, once taking into account income and filing status, persists under various robustness checks.

Keywords: individual income taxes, effective tax functions, systemic discrimination

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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, have long attracted the attention of historians, sociologists, demographers, economists³, criminologists and the legal profession, and been the subject of numerous national commissions⁴, as well as corrective Supreme Court decisions and federal legislation. Official US statistics have long documented differences by the US Bureau of Labor Statistics⁵ in employment rates by ethnicity. Differences in income by race have long been documented by the US Bureau of the Census.⁶ The Federal Reserve has routinely issued reports documenting that both the income and wealth of African Americans is 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*. Moynihan's 1965 US Labor Department study⁷ has also been quite influential in understanding the American Black family.

Recently, using indirect methods, Sullivan(2021) 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. He does 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

3 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).

4 See, for example, Kerner(1968).

5 See, for example, US Bureau of Labor Statistics, Women's Bureau, *Unemployment Statistics* (2022).

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

7 See Moynihan(1965).

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) which are consistent with *United States vs. Nassau County*.^{8 9}

Dorthea A. Brown, a professor of tax law, details concerns about the adverse interactions of the federal tax system and race in her 2021 legal review of the Internal Revenue Code and suggests that:

- Whites itemize more [than Blacks];
- Whites have larger shares of tax-exempt income [than Blacks];
- Tax tables for joint filers benefit more couples with 1 income earner (a situation with higher prevalence in Whites than Blacks)
- Preferential tax treatment of family transfers benefits whites more, and
- Whites have larger mortgage interest deductions because their houses have higher value¹⁰

These observations, buttressed by anecdotes, lead her to conclude that the US tax system is 'systemically racist'.

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 people and households of color compared to counterpart Caucasians through higher *rates* of effective taxation.¹¹ It is our view, however, that, once the systematically well-known lower incomes of African Americans are accounted for, Brown's speculated differences about outcomes 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

⁸ See *United States v. County of Nassau*, 188 F.R.D. 187 (E.D.N.Y. 1999) Decided Sep 23, 1999.

⁹ See also Avenancio-León, Carlos F., and Troup Howard, (2022).

¹⁰ See Brown (2021).

¹¹ 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.

is that, once disparate and generally lower incomes of African Americans vs. whites in the US races 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. Better 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; these returns, which matched ethnicity from other federal administrative records by SSN, 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.¹²

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 Economic Income¹³, and add to this analysis 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

¹² The data utilized in this paper was originally obtained through Grant 10-P-98082-3-01 from the Office of Research and Statistics of the Social Security Administration in 1980. Under this 1980 grant, the Statistics Division of the Internal Revenue Service, Social Security Administration, and the Office of Tax Analysis, US Treasury, jointly provided a panel of anonymous, audited, matched individual income tax returns by SSN, under a non-disclosure and non-dissemination agreement. The authors benefited from computer assistance and comments on an earlier version of this paper by Marcus Berliant, and comments from participants at a virtual presentation to the Tax Economists Forum on February 21, 2022. Responsibility for the findings in this paper, and any errors, rests solely with the authors.

¹³ 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 than in the typical public use Statistics of Income Public Use Files. See Section 4.5 for a comparative analysis of the basic effective tax function using AGI and a feasible measure of Economic Income.

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 equals; 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.¹⁴ 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 data. It then presents the Gouveia-Strauss effective tax function and the logic

¹⁴ 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*.

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 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.¹⁵ 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.

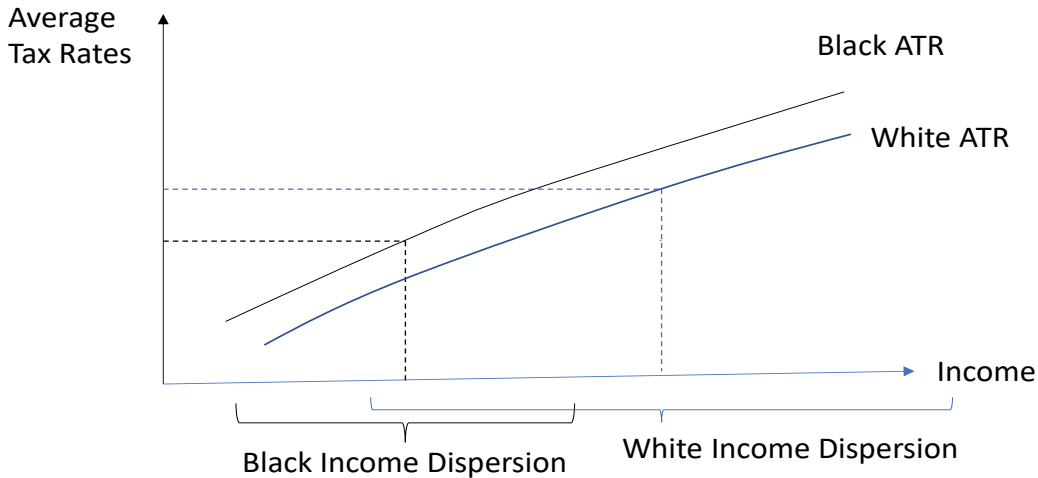
Since the average tax rate functions by race are concave and predicate private sector income of Whites are known to be higher than Blacks, one must be mindful of Jensen's inequality. That is, there is the possibility that the simple comparison of average tax rates by race may be misleading or biased. 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 Diagram 1. Diagram 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. 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' since for the same level of income, the effective tax rate of Blacks is higher in % than that of whites. Were we to find,

¹⁵ See, for example, Table A2 for 2020 of the Census Bureau's report on the distribution of household income by race; Census(2022).

empirically that this was not the case, that is, that the effective tax functions were indistinguishable by race, then we would reject the hypothesis that the tax system was ‘systemically racist.’

Diagram 1: Hypothetical Gouveia-Strauss Effective Tax Functions Displaying Systemic Racism



Gouveia and Strauss (1994) 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 tax function v_i relates the ratio of the i 'th individual's net income taxes, ATR, to his income, y , as a non-linear function:

$$(1) \text{ATR}_i = b - b(1+s y^p)^{-1/p} + \varepsilon_i$$

and 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 better than 400 published studies.¹⁶

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 \$ 1,000 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.

¹⁶ See, for example, Gorry and Oberfield (2012), Guner, Kaygusuz and Gustavo(2014), Guvenen, Burhanettin, and Ozkan (2014), Li (2015), and DeBacker, Evans, and Phillips (2019).

Table 1. Sample Composition

Taxpayers by Years in the panel			Returns by Tax Year	
Number of Years Present	Frequency	Percent	Tax Years	Frequency
1	2,935	14.85	1967	12.591
2	1,950	9.87	1968	13.055
3	1,531	7.75	1969	13.385
4	1,468	7.43	1970	13.598
5	1,503	7.61	1971	13.751
6	2,247	11.37	1972	14.211
7	8,125	41.12	1973	14.581
Average number of Years	4.82		Average	13.594

The SOI panel includes 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 ethnic 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: 87.5 percent Whites and 11.1 percent Blacks. The smaller representation of Black taxpayers in our data likely reflects the fact that the distribution of Black income is lower than White income, and therefore fewer Blacks must file tax returns. Table 2 summarizes the information available regarding mean effective tax rates using AGI as the denominator and mean Adjusted Gross Incomes per ethnicity.

Table 2. Sample Annual Averages, 1967-1973

Ethnicity	Freq.	Percent	Mean AGI*	Mean Effective Tax Rate*
White	11,806	86.8	9,376	0.096
Black	1,171	8.6	6,6709	0.073
Other	215	1.6	7,533	0.081
No Info	404	3.0	17,767	0.107
Total	13,596	100	9,362	0.094

*Mean of annual means, weighted by returns per year

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, in particular, 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-value 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.

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 Info	36.3	2.19	56.3	38.4	5.4
Total	45.1	2.84	31.5	60.2	8.3

Table 3 reports the mean of annual means, weighted by returns per year.

* Others: Married filing separately, Unmarried heads of household, Widow or Widower with dependent children

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 point higher in Whites compared to Blacks.

4.0 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 equation (1) for each year with the addition of dummy variables for three known measures of Race and an additional dummy variable for which no race data was located. The omitted group is Whites.

$$(2) \text{ATR}_i = b - b(1+s y^p)^{-1/p} + D_1 \text{Black} + D_2 \text{Other} + D_3 \text{Missing} \varepsilon_i$$

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.

Table 4. Basic Average Tax Rate Regressions

	1967	1968	1969	1970	1971	1972	1973
Basic parameters							
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 Info	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-squared	0.8663	0.8737	0.8797	0.8749	0.8875	0.8875	0.8926

Note: Standard errors in small print; * p<0.001 ** p<0.01 *** p< 0.05

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 effective 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 of in the neighborhood of 7 percent.

We now 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 Variables 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 results that these findings may suffer from misspecification as relevant variables are missing in the regression equation.

To that end, 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 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 coefficient on Black is 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 .95 or, on a relative basis, about 8 to 11% more accurate than the simple results displayed in Table 4.

Table 5. Average Tax Rate Regressions with Additional Controls

	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 Info	-0.0053*	-0.0037**	-0.0026***	0.0032**	0.0018	0.0021**	0.0032**
Additional Controls							
# 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*
Mar Fil Jointly	-0.0248*	-0.0303*	-0.0369*	-0.0245*	-0.0161*	-0.0150*	-0.0167*
Mar Fil Sep	-0.0043*	-0.0035**	-0.0067*	0.0052*	0.0131*	0.0150*	0.0152*
Unmarried Heads of H	-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
R²	0.9673	0.9687	0.9647	0.9567	0.9631	0.9621	0.9643

The results in Table 5 confirm that once we control for the additional variables, the coefficient for the Black indicator variable 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 1979 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.

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. In order 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.

Table 6. Black Coefficients in Regressions with Common Support

Year	Basic Regressions	p-value	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	10293

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 section 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 (2) is warranted by interacting AGI with the dummy variable for Black. That is, we form an interaction term between Black and AGI and estimate:

$$(3) ATR_i = (...) + D_B * Black + ID_B * (Black * AGI) + \varepsilon_i$$

Of interest in (3) is what the break-even threshold in terms of AGI when the separate, negative effect of being Black is equal to the interaction between Black and AGI. Table 7 reports the two coefficients of interest in (3) for each year, and indicates that in two years, 1971 and 1972, the Black-AGI interaction coefficient, ID_B , is not statistically different from zero. For other years the AGI breakeven level is between incomes corresponding to the 76 and 89 percentiles of the Black AGI distribution. That is, in 1967 at AGI levels below percentile 76 being Black entailed a lower effective tax rate than for whites, while at AGI levels greater than percentile 76 the effective tax rate for Blacks was higher than for Whites.

Table 7 Augmented Regression Model Black interacted with AGI

Year	D_B	ID_B	Breakeven AGI Threshold \$	AGI Percentile of Breakeven (Approx.) %
1967	-0.00357	5.08E-07	7,027	76
1968	-0.00336	4.33E-07	7,756	80
1969	-0.005821	5.50E-07	10,584	87
1970	-0.00625	5.09E-07	12,278	89
1971	-0.00178	NS	-	-
1972	NS	NS	-	-
1973	-0.00269	2.17E-07	12,428	83

NS- not statistically significant, $p > 0.05$

Breakeven Threshold - AGI level where difference in ATR is zero

NS- not statistically significant, $p > 0.05$

Breakeven Threshold - AGI level where difference in ATR is zero

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

4.5 AGI vs. Economic Income 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 miscellaneous gain/loss.

Table 8 compares for each year the ratio of AGI to Economic Income for various percentiles and indicates that for $\frac{3}{4}$ of the data in each year, the ratio of AGI to this measure of economic income is 1.0. As one examines the 95th percentiles, we find that economic income is between 11 and 16% greater than AGI.

Table 8 Ratio of AGI to Economic Income by Percentile of Ratio

Year	Ratio of AGI to Economic Income by Percentile of Ratio		
	75th percentile	90th percentile	95th percentile
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 9 displays the results of estimating the augmented GS effective tax function with economic income 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 As Measure of Ability to Pay

	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							
# 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*
Mar Fil Jointly	-0.0236*	-0.0291*	-0.0376*	-0.0252*	-0.0162*	-0.0148*	-0.0187*
Mar Fil Sep	-0.0050**	0.0038**	0.0067**	0.0047**	0.0117*	0.0121*	0.0134**
Unmarried Heads of H	-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

5.0 Discussion and 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 take into account *why* the predicate incomes of Blacks were lower than for Whites during the period 1967-73: explanations for that fact takes 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, it is possible that compliance costs for minorities could be higher than for Whites or that monitoring, 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.

6.0 References

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7.0 Appendix 1: 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 Public Use and Panel Study Mean AGI and Mean Average Tax Rate Data

	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	7,868	0.088	7,791	0.089
1968	8,391	0.098	8,305	0.104
1969	8,831	0.112	8,803	0.113
1970	9,268	0.096	9,174	0.096
1971	9,786	0.086	9,736	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	(PUF/Audited) Mean ATR
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