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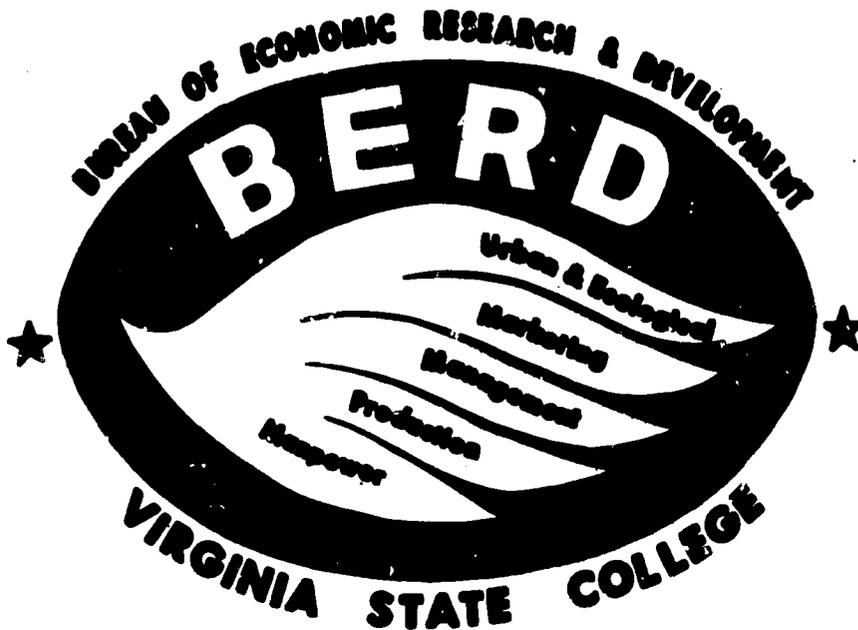
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**INDIVIDUAL EQUITY  
UNDER SOCIAL SECURITY:  
SOME BLACK-WHITE COMPARISONS**

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**INDIVIDUAL EQUITY UNDER SOCIAL SECURITY:  
SOME BLACK-WHITE COMPARISONS**

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**INDIVIDUAL EQUITY UNDER SOCIAL SECURITY:  
SOME BLACK-WHITE COMPARISONS**

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## FOREWORD

In this monograph the question of lifetime income redistribution under Social Security is examined from a novel approach. This is the intergenerational equity approach. Previous analyses have focused on such equity problems as how young workers fare under Social Security relative to older participants. The importance of such intergenerational equity problems should diminish as the Social Security system reaches maturity. As the size of the overall social insurance program grows, questions about the income redistributive impact of the system on different subgroups of the generation will come to the fore. In this monograph an initial attack is made on the problem by examining the treatment of black and white workers.

The ideas explored in this monograph (and much of the empirical analysis) were developed while I was at the University of Rochester, Rochester, New York. I acknowledge the advice and helpful suggestions of Professors Rudolph G. Penner, Sherwin Rosen, and Stanley L. Engerman of the University of Rochester.

The paper, on which this monograph is based, was written while the author held the position of Research Associate

and Assistant Professor at the Bureau of Economic Research and Development, Virginia State College, Petersburg, Virginia. The paper was also presented at the Eighty-sixth Annual Meeting of the American Economic Association held in New York City in December, 1973.

Research support is gratefully acknowledged from the United States Agency for International Development 211(d) institutional grant to the Bureau of Economic Research and Development. I am grateful to my colleagues, Dr. Huey J. Battle, Dr. Thomas J. Meeks, Dr. Seung Oh Park, and Dr. Victor A. Whittaker for detailed comments on an earlier draft. My thanks also go to Mrs. Ann M. Knight for typing the manuscript.

Lastly, errors of fact and opinion that remain are the sole property rights of the author. They should not be attributed to the individuals or institutions mentioned above.

December, 1973

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# INDIVIDUAL EQUITY UNDER SOCIAL SECURITY: SOME BLACK-WHITE COMPARISONS

By

Ubadigbo Okonkwo\*

## I. INTRODUCTION

The study of individual equity under social security is often based on a methodological presumption that the social security system<sup>1</sup> is a contributory program. As in private insurance, it is argued that social security taxes paid on behalf of a worker are used exclusively to finance his own retirement and other benefits. Although this "insurance analogy" has been advocated and defended by several writers,<sup>2</sup> it is in fact illusory. First, the social security program is not a fully funded reserve system. In practice it is more akin to a current tax benefit transfer program in which payroll taxes collected from today's workers are contemporaneously redistributed to the retired population. Second, from an individual participant's viewpoint, there is only a tenuous link between his tax payments and the benefit amounts he subsequently receives.

The contributory view of social security has always been taken seriously by the Social Security Administration, and is perhaps widely believed by the general public. The spread of public belief in this view was undoubtedly

aided by certain provisions of the original 1935 Social Security Act. These provisions include the establishment of social insurance trust funds, the assignment of a social security account number to each participant, and the choice of the term "contribution" for what is in reality an involuntary and regressive<sup>3</sup> payroll tax.

The analyst is really not required to take a position on any particular methodological view of social security. In studying individual equity, once it is recognized that a worker both pays taxes and receives benefits over his lifetime, it is quite meaningful to ask questions about possible lifetime income redistributions. The analyst's chief concern should be to develop appropriate measures and to assess the empirical importance of any such income redistribution. This approach is taken here.

It is suggested that individual equity under social security be viewed as comprising two conceptually distinct problems; an *intergenerational* equity problem, and an *intragenerational* equity problem. Much of the existing litera-

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<sup>1</sup>"Social Security" is a term popularly used to denote the Federal Old-Age, Survivors, Disability, and Health Insurance (OASDHI) Program. The literature on individual equity (and this paper is no exception) tends to single out the Old-Age retirement part of the OASDHI Program for analysis.

<sup>2</sup>For example, Brown (1972) complains that "Economists who attempt to dissect out the elements of a contributory social insurance program in terms of taxes and redistribution of funds lose sight of this vital principle of mutual contract which runs through the program as a whole. Like any living organism, a social insurance system is more than the sum of its parts," p. 84.

<sup>3</sup>The payroll tax is regressive because it is levied at a fixed proportional rate up to a legally specified maximum earnings base. In 1973, the combined employee and employer OASDHI tax rate was 11.7% on an earnings base of \$10,800. See Table A-5 in the appendix.

ture<sup>4</sup> has tended to overemphasize the former problem in its concern with such questions as whether or not young workers receive an equitable treatment under the system. An objective of this paper is to draw attention to the hitherto neglected problem of intragenerational equity. In this latter notion of equity, a particular cohort of workers is selected and an attempt is made to determine how different subgroups of that cohort fare under social security. The internal rate of return, which equates the total value of accumulated payroll taxes to the sum of discounted prospective benefits, is adopted as the measure of lifetime income redistribution. Using aggregate United States earnings data, internal rates of return are computed for white

male workers and couples and for black male workers and couples. It is found that black males and couples earn, on average, higher rates of return than corresponding white subgroups. Standardization by income categories leads, however, to a reverse conclusion; black males and couples earning a lower rate of return than white males and couples.

The outline of the paper is as follows: Section II presents a brief review of traditional approaches to individual equity. The model used to compute the internal rate of return and the simplifying assumptions necessary to make that model operational are spelled out in Section III. The empirical findings are discussed in Section IV. Some concluding remarks are presented in Section V.

## II. TRADITIONAL APPROACHES TO INDIVIDUAL EQUITY

Much of the literature on individual equity has dealt with the question of whether or not young workers, relative to past and present retirees, will get a fair deal under social security. This is an example of what I call an *intergenerational* equity problem. Concern over the treatment of young participants has been aroused by the windfall gains going to past retirees on account of the immaturity of the social security system. For example, compare the situation of a worker who retired on his sixty-fifth birthday in January 1967 to that of a young worker who was covered in the same year at an age of 18 years. Assuming that the older worker's occupation was covered in 1937 when payroll taxes were first collected, he would have paid taxes for a period of 30 years. If the younger worker retired on his sixty-fifth birthday, he will pay taxes for a

much longer period of 47 years, 17 more years of tax payments than the older worker. In addition, the burden of the payroll tax has grown over the years. In the above example, the maximum OASDI tax paid on behalf of the older worker in the first year of coverage (1937) was \$60. In 1967, the first year of coverage of the younger worker, the maximum OASDI tax paid on his behalf was \$508.20, over 8 times the initial tax paid by the older worker.<sup>5</sup> Thus if the benefit structure is static over time, it is apparent that older retirees may be gaining at the expense of younger workers. This conclusion has been noted by Friedman (1967), Campbell and Campbell (1967), and Deran (1967).

The weak link in the above chain of argument is the claim that the benefit structure has remained unchanged through time. Over the history of the so-

<sup>4</sup>For a sample of that literature, see Meyers and Oppal (1965), Deran (1966), Campbell and Campbell (1967), Chen (1967), Brittain (1967), Pechman, Aaron and Taussig (1967).

<sup>5</sup>Data for the tax payments are from Table A-5 in the appendix. The tax contributions assume that the worker bears the combined employee and employer OASDI tax amounts.

cial security system, coverage has been extended to nearly all occupations, eligibility conditions have been liberalized, and Congress has repeatedly voted for increases in the benefit amounts. An analysis based on a secular growth of benefits was modeled by Brittain (1967). His empirical results cast serious doubts on the validity of the raw-deal-for-the-young hypothesis.

Let me postpone further discussion of this hypothesis until I have examined some indices used to gauge the extent of possible lifetime income redistributions. Three such indices or measures of income redistribution can be identified in the literature. Deran (1967), Campbell and Campbell (1967) and Pechman, Aaron, and Taussig (1968) used a percentage measure of taxes to benefits. Under this measure, a worker gains if his total accumulated taxes falls short of 100 percent of his total discounted benefits. A second alternative index, similar to the first measure and used by Chen (1967), is the tax-benefit ratio. A tax-benefit ratio is obtained by dividing total accumulated taxes by the discounted sum of benefits, both calculated as of a given year. A worker is a gainer if he has a tax-benefit ratio less than unity. One can easily derive the first measure from the second by multiplying the tax-benefit ratio by a factor of 100.

The two measures, however, suffer from a common defect. The defect is the arbitrariness of assumed rates of interest with which to compound taxes and discount benefits. It is extremely difficult, in an empirical analysis, to choose the rate of interest since market rates of interest vary widely (and wildly) over assets by degrees of risk and term structures. Recognizing this fact, Brittain (1967) adopted a third measure, the in-

ternal rate of return. An internal rate of return is that rate which equates the total value of accumulated payroll taxes to the sum of discounted benefits.

Whichever measure of lifetime income redistribution is chosen, the question of who gains or loses under social security depends on assumptions made about certain strategic variables. These variables include the starting age of coverage by social security, family composition, when the worker's occupation was first covered, the assumed incidence of the employer tax, and the level and growth of earnings.

Of all these variables, the level and growth of earnings are perhaps the most important. Both the tax and benefit structures critically depend on them. For example, the payroll tax is levied on annual earnings from covered occupations up to a maximum earnings base. In a like manner, some average of the taxable earnings stream (the Average Monthly Wage or AMW) is used to determine benefit amounts. The benefit formula is in general an increasing function of the Average Monthly Wage. Also the benefit structure pays a higher benefit per tax dollar to low income workers than to high income workers.<sup>6</sup>

The impact of the assumed level and growth of earnings on the question of individual equity is amply illustrated by the controversy over the question of how young workers fare under social security. Those writers, such as Deran (1967) and Campbell and Campbell (1967), whose findings support the hypothesis that young workers are getting a raw deal based their analysis on a zero growth rate of earnings assumption. Although a zero growth rate of earnings is also assumed by the Social Security Administration in the preparation of

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<sup>6</sup>This progressive feature of the payroll tax must be weighted against the regressivity of the payroll tax. The heavy burden of the payroll tax on the working poor has been recently analyzed by Brittain (1972a).

long-range cost estimates of the Social Security System,<sup>7</sup> such an assumption is contrary to past historical experience. In response to the growth of technological innovation, often embodied in the supply of human and physical resources, the economy has undergone a secular growth in national production and income. The analysis by Brittain (1967) took account of this historical fact in his assumption of a constant growth rate of earnings. Under a pay-as-you-go method of financing, which Brittain also assumed, a growth in earnings leads to a growth in benefits amounts. It is thus not surprising that his empirical results refute earlier findings that young workers are getting a raw deal under social security.

An inherent weakness in the litera-

ture on individual equity is the lack of attempts to explain, and to take account of, some major determinants of the level and growth of individual earnings. To be sure, individual earnings grow because the economy experiences a secular growth in income. Individual earnings also grow (and this is the point I wish to emphasize) because of investments in job training and work experience. Furthermore, the level of earnings somewhat depends on activities undertaken prior to labor market entry, activities such as education and job search. This paper represents a first attempt to take account of these important, and hitherto neglected, determinants of individual earnings. Another novel feature of this paper is its emphasis on the intragenerational equity problem.

### III. THE MODEL

#### Intragenerational Equity

The question of individual equity under social security can be conceptually viewed as comprising two distinct notions of equity; intergenerational equity and intragenerational equity.<sup>8</sup> The controversy over the question of the treatment of young workers is an intergenerational problem. In this paper, attention is focused on how different subgroups a particular cohort of workers fare under social security. This is what I refer to as an intragenerational equity problem.

The group of workers chosen for study

are those who were born in 1919 and who gained coverage under social security in 1937,<sup>9</sup> at the age of 18 years. They are to remain active members of the labor force, uninterrupted neither by death nor disability, until their sixty-fifth birthday when they retire. Their last active year will be 1983 when they will be 64 years old. In retirement, each subgroup has an age specific probability of surviving past its sixty-fifth year. The probability of surviving varies between subgroups, and within each subgroup is observed to fall monotonically as the subgroup advances in age.<sup>10</sup>

<sup>7</sup>The Social Security Administration call the zero earnings growth assumption the "level-earnings" assumption. Alternative cost estimates based on some growth in average earnings has recently been recommended. See, U. S. Advisory Council on Social Security, Reports of the 1971 Advisory Council on Social Security (92nd Cong., 1st. sess. H. Doc. 92-80).

<sup>8</sup>The conceptual distinction between intergenerational and intragenerational notions of equity is made only for analytical convenience. The notions are not mutually exclusive and, in practice, certain provisions of the social security program are common to both. For instance, a couple eligible for the wife's benefit receives higher benefits than a single worker irrespective of the notion under consideration.

<sup>9</sup>1937 was also the year when the first payroll taxes were collected.

<sup>10</sup>The estimated probabilities were computed from 1959-61 cross-section of the United States population. See Table A-9 and Table A-10 for the appendix. Some adjustments are called for if the cross-sectional data change drastically through time.

A critical step in the empirical analysis was the estimation of cohort age-earnings profiles. The age-earnings profiles served as the basis for computing the tax and benefit schedules. These tax and benefit schedules were direct inputs in the calculation of internal rates of return. A description of the method used to estimate internal rates of return now follows:

#### Internal Rates of Return

An internal rate of return is defined as that rate of return which equates the total value of accumulated payroll taxes to the sum of discounted benefit amounts. I list below the notations used in computing an internal rate of return.

$R$  = internal rate of return

$E = \{E_k\}$  = stream of annual earnings received over the working years,  $18 \leq k < 65$ .

$K$  = age of worker in  $k$  years.

$T$  = total value of accumulated payroll taxes at retirement.

$B$  = total value of discounted benefit amount expected at retirement.

$t_k(E)$  = average monthly payroll tax amount at age  $k$ , which is a function of the earnings stream.

$b_n(E)$  = average monthly Primary Insurance Amount (PIA) for year  $n$ , which is a function of the earnings stream.

$n$  = years after retirement at age 65. (for example,  $n = 0$  at 65 years,  $n = 1$  at 66 years, and so on.  $0 \leq n \leq 35$ )

$p_n^M$  ( $p_n^F$ ) = probability that a male (female) aged 65 will survive through age  $n$ .

The total value of accumulated taxes at retirement, assuming that the worker was covered at age 18 years, is given by

$$(1) \quad T = \sum_{k=18}^{64} 12t_k(E)(1+R)^{64-k}$$

The discounted sum of monthly benefits for a single male worker at retirement ( $B_S$ ) is

$$(2) \quad B_S = \sum_{n=0}^{35} \frac{12b_n(E)p_n^M}{(1+R)^n}$$

For the purpose of making comparisons, it is useful to determine the value of a couple's benefits. A couple is defined as a two-member (male-woman) family eligible for the wife's benefit. Two factors make for differences in the prospective benefits to couples and single workers. First, according to the 1972 Amendments of the Social Security Act,<sup>11</sup> a retired couple is entitled to 150 percent of the husband's Primary Insurance Amount (PIA). In the event of the death of either partner, the remaining spouse is entitled to 100 percent of the PIA. Second, an adjustment must be made for the female probability of surviving past age 65 years ( $p_n^F$ ). Taking account of these additional factors, and writing  $b_n$  for  $b_n(E)$ , the discounted sum of monthly benefits for a couple ( $B_C$ ) becomes

$$(3) \quad B_C = \sum_{n=0}^{35} \frac{12(1.5b_n p_n^M p_n^F + b_n p_n^M (1-p_n^F) + b_n p_n^F (1-p_n^M))}{(1+R)^n}$$

<sup>11</sup> Other important provisions of the 1972 Amendments of the Social Security Act can be found in the March 1973 issue of the *Social Security Bulletin*, pp. 3-25.

The right hand side of the equation (3) can be further simplified to give,

$$(4) \quad E_c = \sum_{n=0}^{35} \frac{12b_n(p_n^M + p_n^F - 0.5p_n^M p_n^F)}{(1+R)^n}$$

The internal rate of return to a single worker ( $R_S$ ) is estimated from

$$(5) \quad \sum_{k=18}^{64} 12t_k(1+R_S)^{64-k} = \sum_{n=0}^{35} \frac{12b_n p_n^M}{(1+R_S)^n}$$

To obtain the internal rate of return to a couple ( $R_C$ ), we solve equation

$$(6) \quad \sum_{k=18}^{64} 12t_k(1+R_C)^{64-k} = \sum_{n=0}^{35} \frac{12b_n(p_n^M + p_n^F - 0.5p_n^M p_n^F)}{(1+R_C)^n}$$

It is clear, from inspecting equation (1) and (2), that both the accumulated payroll taxes and the discounted sum of benefits depend on the earnings stream,  $E$ . The nature of this dependency can be traced back to the provisions of the Social Security Act. The payroll tax is levied at a proportional rate on a legally specified taxable earnings base. In 1973 the OASDHI tax rate was 5.85 percent each on employees and employers on an earnings base of \$10,800. Workers whose earnings fall short of the earnings base pay taxes in direct proportion to their earnings. For those whose earnings are above the

earnings base, their average tax load tends to fall as earnings increase, hence the regressivity of the tax. The basic pension or Primary Insurance Amount (PIA) is similarly related to earnings, since the benefit formula is some function of the Average Monthly Wage (AMW). If the earnings stream has such a pervasive effect on the tax and benefit configurations, it is of interest to pinpoint the major causal factors behind the growth and level of earnings. For the empirical analysis, one would also want to know how cohort age-earnings profiles are estimated.

#### Cohort Age-Earnings Profiles

The pattern of earnings over time of a cohort of workers tends to depend on two causal factors. First, labor as an input shares in the overall secular growth of earnings. The secular growth of labor earnings has been observed in a number of countries including the United States.<sup>12</sup> This source of earnings growth was recognized and taken account of by Brittain (1967). Second, examinations of cross-sectional data have revealed that earnings do vary systematically with age and work experience. Since this significant source of earnings growth has received only a passing attention in the social security literature<sup>13</sup> a brief explanation of it, based on the important contributions of Becker (1964), Ben-Porath (1967), and Mincer (1970), is appropriate.

The observed tendency for individual earnings to rise with age can be viewed as an effect of returns to human capital investments. These investments include expenditures on such activities as schooling, on-the-job training, health and mobility. Becker (1964) has argued that a worker has an incentive to undertake his human capital investments at the

<sup>12</sup>For evidence of the secular growth of earnings in the United States, see, U. S. Department of Commerce, Office of Business Economics, *The National Income and Product Accounts of the United States, 1929-1965*. Statistical Tables (1966), Table 6.5, pp. 106-109.

<sup>13</sup>The possibility of individual earnings growing at different rates to reflect skill differences was mentioned by Aaron (1967), p. 70.

early stages of his career. His argument is based on the finiteness of human life and the resulting tendency of the demand price for human capital to fall with age. A worker does not make all his investments in the initial period because, as Ben-Porath (1967) observed, the marginal cost curve is upward sloping. The quantity of human capital "produced" will thus tend to decrease with age.

Let us express the above remarks in a rigorous way. Consider an individual  $i$ . His earnings in period  $j$  can be expressed as the sum of the return on all his previous net investments and the earnings from "unskilled labor."

$$(7) \quad E_{ij} = X_i + \sum_{t=0}^{j-1} r_i C_{it}$$

$E_{ij}$  denotes "gross" earnings since current investment costs  $C_{ij}$  are included in its definition.<sup>14</sup>  $X_i$  is the earnings stream to unskilled labor and  $r_i$  is the rate of return to individual  $i$ . To determine the shape of the earnings function, take the first and second difference of equation (7). Dropping the subscript  $i$  we obtain,

$$(8) \quad \Delta E_j = r \cdot C_j > 0 \text{ when } C_j > 0.$$

$$(9) \quad \Delta^2 E_j = r \cdot \Delta C_j < 0, \text{ since } \Delta C_j < 0.$$

Equation (8) says that gross earnings will increase so long as net investments costs are positive. The concavity of the

age-earnings profiles comes from equation (9). The negative sign of  $\Delta^2 E_j$  depends on the observation that individuals invest less in themselves as they advance in age.

Equations (7) to (9), and the assumptions on which they are based, suggest the shape of estimated cross-sectional age-earnings profiles; they slope upwards in a concave fashion. The profiles can be estimated from census data which show the earnings of individuals belonging to different age-groups at a point in time. What we need are *cohort* age earnings profiles; the earnings of the same cohort as it passes through time. Cohort age-earnings profiles can be estimated by means of moving cross-sectional profiles. Figure 1 on the following page illustrates how this can be done. Notice that the cohort age-earnings profile is steeper than the cross-sectional profiles. This is largely due to the secular growth of earnings.

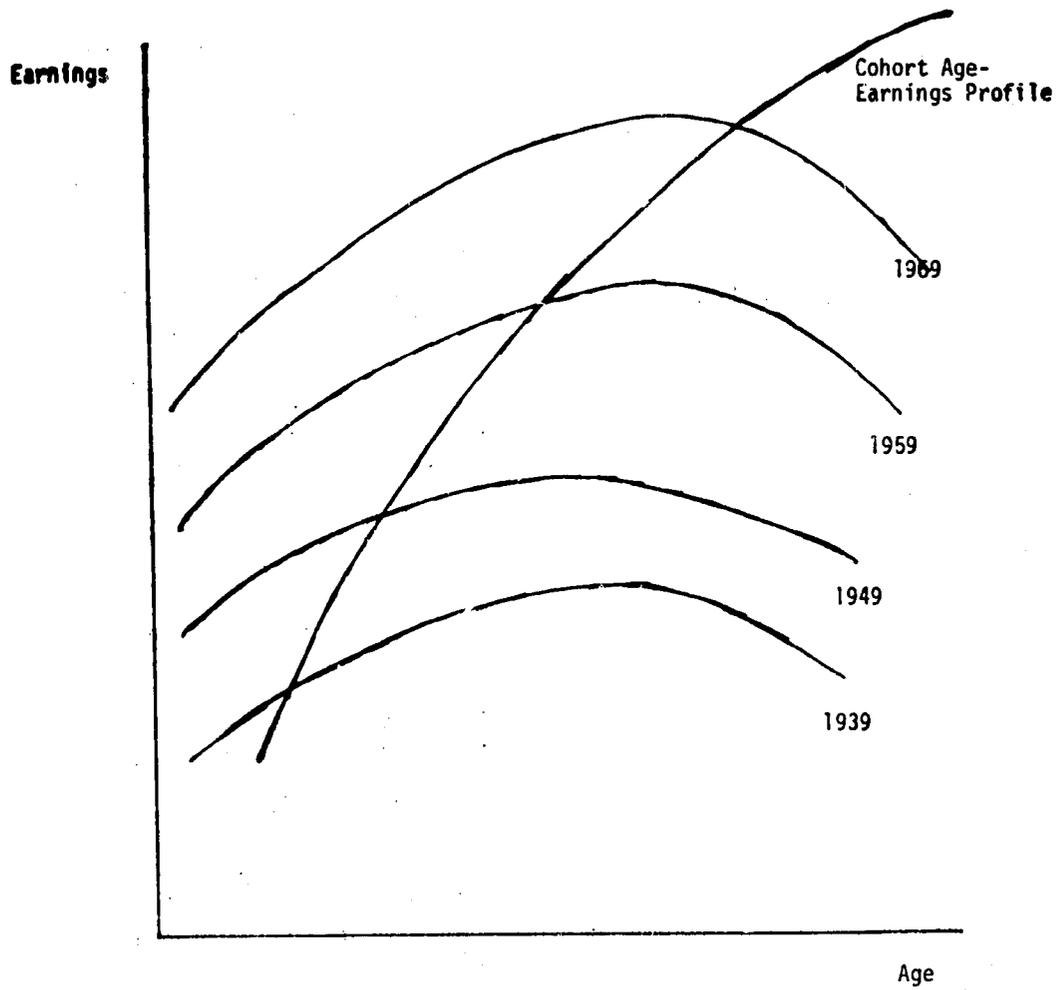
To estimate internal rates of return to black and white workers, a prior requirement was the cohort age-earnings profiles by race. The procedure illustrated in Figure 1 could not be followed because earlier census data for the U. S. are not available by race groups. The necessary information was therefore obtained through an indirect route. First, a time series of annual earnings of industry employees from 1937 to 1971 was obtained from establishment data published in the *National Income and Product Accounts*. The subdivisions by race was accomplished by multiplying the total earnings series by the ratio of white (non-white) median family income to total median family income. The re-

<sup>14</sup>The "net" earnings function can be expressed as  $Y_{ij} = X_i + \sum_{t=0}^{j-1} r_i C_{it} - C_{ij}$

It should be pointed out that observed earnings are perhaps better approximated by the net earnings function since much of current investment costs are made up of foregone earnings. Mincer (1970) has shown that general properties of the gross earnings function are also true for the net earnings function.

Figure 1

**Cohort Age-Earnings Profile Estimated By Means  
Of Moving Cross-Sectional Profiles**



**NOTE:** The four cross-sectional age-earnings profiles in 1939, 1949, 1959, 1969 can be estimated from decennial census data.

sulting earnings series was extrapolated to 1983, the terminal year, by assuming an annual growth rate of 6 percent for each group. Finally, weights from the 1959 cross-sectional age-earnings profile, calculated from Miller and Hornseth (1967), were applied to the annual earnings series to yield the required cohort age-earnings profiles by race.<sup>15</sup>

#### Other Assumptions

A number of other simplifying assumptions were made to carry through the computations. The first set of assumptions related to the incidence of the payroll tax and the timing of tax payments and benefits. It was assumed that the employer share of the payroll tax is fully shifted backward to the employee. Although the literature is not in complete agreement on this issue, full backward shifting appears to be the most plausible possibility.<sup>16</sup> It was also assumed that the worker's tax rate included the combined Old-Age Survivors and Disability Insurance (OASDI) tax rate. This corresponds with the tax experience of the worker we are studying; he is supposed to work regularly until retirement without disability or premature death. He thus pays the OASDI tax rate but receives only retirement benefits. On the timing of taxes and benefits, it was assumed that taxes are paid annually at the beginning of

each calendar year and that benefits are distributed annually starting on the worker's sixty-fifth birthday. Putting tax and benefit payments on an annual schedule simplifies matters, but it moves both taxes and benefits half a year ahead of the regular schedule if payments are on a monthly basis. However, since both taxes and benefits are moved up the estimated rates of return will not be significantly affected.

A second set of assumptions was made on the demographic variables. Two alternative ages, eighteen and twenty-two years, were chosen to represent the starting points of coverage under social security. Husbands and wives were assumed to be of the same age so that benefit payments were first awarded on their sixty-fifth birthday. Lastly, husbands and wives were assumed to come from the same ethnic origin. A couple was either all-white or all-black; interracial couples were not considered.<sup>17</sup>

The final set of assumptions was concerned with the financing of social security. An attempt was made to take into account some of the major provisions of the 1972 social security amendments. Of special note were the automatic provisions of the tax and benefit structures. In the model used here, the earnings base was assumed to grow after 1974 at an annual rate of 6 percent to reflect the general growth

<sup>15</sup>The approximate method used here to estimate cohort age-earnings profiles by race leads to two types of biases on the estimated rates of return. First, the use of white-non-white median family income weights to derive the annual earnings by race will tend to *overestimate* black male earnings relative to white male earnings. As a class, the average earnings of blacks tend to be lower than the average earnings of other non-whites. Also black housewives tend to participate more in the labor force and to contribute more to family income than corresponding white housewives. Second, the reliance on only the 1959 cross-sectional profile to account for the effect of age on earnings will tend, however, to *underestimate* the growth of black male earnings. This tendency hinges on the alleged rapid economic progress blacks achieved since the 1960's. The net effect of these opposing tendencies on the estimated rates of return is likely to be insignificant.

<sup>16</sup>An empirical study by Brittain (1971) purporting to demonstrate complete backward shifting has been sharply criticized by Feldstein (1972). See also the rejoinder by Brittain (1972b). Note that at least three other types of shifting of the employer tax are possible; complete forward shifting to higher prices, partial backward and forward shifting, and backward shifting to labor and other productive factors.

<sup>17</sup>Allowing interracial couples would have a small impact on the benefit side because of racial differences in mortality experience. White females tend to have a higher probability of survival than corresponding black females. See Tables A-9 and A-10 in appendix.

in earnings. A cost of living escalator clause was built into the benefit structure; benefit amounts were assumed to increase annually by 3 percent. Other 1972 amendment provisions included a 20 percent across the board increase in

benefits, an increase in widow's benefit from 82.5 to 100 percent of the deceased husband's basic pension, and a decrease in the age-computation point for men, for insured status and benefit computation purposes, from 65 years to 62 years.

#### IV. EMPIRICAL FINDINGS

##### An Overview

Estimated internal rates of return on social security contributions by race, family composition and starting ages of coverage are displayed in Table 1 below. Considering first the overall picture, it is seen that the general pattern of rates is quite impressive and compares well with rates available on other types of government debt. The rates range from 7.2 percent for a black worker with white earnings to 10.5 percent for a white couple with black earnings who gained coverage at 22 years of age. Using Britain's yard-

stick, the rates of return gravitate more towards the rates on long-run equity capital than towards rates on savings accounts.

Why such fairly high rates on social security contributions? First, the cohort of workers chosen for study were fortunately scheduled to retire at a time when the benefit provisions have been repeatedly increased and liberalized by Congress. Second, the use of a cohort age-earnings profile in the estimation meant that the tax burden was much lighter at early ages when earnings are relatively small, as compared to the tax burden as-

Table 1  
Internal Rates of Return on Social Security Contributions, by Race, Family Composition and Starting Age of Coverage

STARTING AGE, RACE <sup>a</sup> AND TYPE OF EARNINGS PROFILE	FAMILY COMPOSITION <sup>b</sup>	
	SINGLE	COUPLE
	(PERCENT)	(PERCENT)
AGE 18		
Black worker	7.9	10.1
Black worker with white earnings	7.2	9.4
White worker	7.3	9.6
White worker with black earnings	8.1	10.4
AGE 22		
Black worker	7.9	10.1
Black worker with white earnings	7.2	9.4
White worker	7.4	9.7
White worker with black earnings	8.1	10.5

Source: Derived by author. See Section III of text for basic model.

<sup>a</sup>"Black" and "Non-Whites" are used synonymously. Note that well over 90% of non-whites are blacks.

<sup>b</sup>"Single" denotes a single man. "Couple" denotes a couple eligible for the wife's benefit. A couple is all-black or all-white, interracial couples are not considered.

sumed in studies which relied on a constant level of earnings or a constant growth rate of average earnings. The process of interest accumulation tends to give more weight to these "tax savings" at earlier ages.

### Family Composition

Consider next the differences in the rates of return due to family composition. The social security system awards relatively higher benefits to couples in recognition of the observed tendency of consumption needs to rise as family size increases. The question is by how much should couples benefit more than singles workers.

From Table 1, it is seen that the rate of return to single black male workers is 7.9 percent compared to a 10.1 percent rate of return to corresponding black couples. Similarly for whites, the rate to single white workers is lower (7.3 percent) than the rate of return to white couples (9.6 percent). As mentioned above, the benefit structure was the major explanatory factor behind the differences in rates by family composition. Under the present benefit provisions, for example, a couple's basic pension is 150 percent of the husband's basic pension. Moreover a retired widow is entitled to 100 percent of the basic pensions on the untimely death of her husband. Mortality factors also played a role in explaining the higher rates to couples since women have higher probabilities of survival than men. The differential survival experience, which yielded higher possibilities to white women than black women, fur-

ther explains why the percentage points differences between the rates of white couples and single workers 2.3 (percentage points) is higher than the corresponding black difference (2.2 percentage points).<sup>18</sup>

### Racial Comparisons

The focus on the intragenerational equity problem made it possible to obtain estimates of the rates of return to black and white workers. A comparison of black-white differences was made under two broad earnings assumptions. The first assumption was that black and white workers earned their average earnings. Rates of return based on this assumption are reported in the first and third rows of Table 1 for workers who gained coverage at eighteen years of age. Black single male workers and couples earned higher rates of return (7.9 percent and 10.1 percent) than corresponding white males and couples (7.3 percent and 9.6 percent). The underlying economic and demographic characteristics, interacting with the provisions of the social security law, produced this somewhat paradoxical result. Some forces pulled for, and other worked against, a relatively higher black rate of return.

First there is the empirical observation that the age-earnings profiles of blacks tend to be lower, flatter, and to peak earlier than the profiles of comparative whites.<sup>19</sup> The human capital literature, for example Becker (1964) and Mincer (1970), suggest that workers who make less investments in education and on-the-job-training tend to have lower

<sup>18</sup>The estimated probabilities of living beyond age 65 years (see table A-10 in the appendix) decreases at different rates for different race and sex subgroups. For both race groups, female possibilities of living past 65 years are higher than those of males. Within each sex group, black probabilities of surviving are lower than white probabilities from age 65 years to age 81 years (for males) and age 85 years (for females). After these latter ages, blacks have higher probabilities than whites. One would expect the effect of the relatively high black probabilities after the age of 80 years to be quite weak. Only a tiny fraction of blacks live to be eighty years. Also, these later probabilities will be heavily discounted in the estimation of the present value of benefits.

<sup>19</sup>Empirical support for this tendency can be found in the works of Hanoch (1967), Thurow (1969), and Hall (1970).

and flatter age-earnings profiles. Although, as figure 2 illustrates, blacks have lower and flatter cohort age-earnings profiles, it is not clear why blacks would necessarily want to undertake less human capital investments.<sup>20</sup>

The level and shape of the black age-earnings profiles produces opposing effects on the rates of return to blacks relative to the whites. The flatter shape of black profiles means that black earnings grow at a lower rate compared to white earnings. This implies lower benefits to blacks relative to whites. On the other hand, the lower level of black earnings at every age work toward a higher rate of return to blacks. This im-

plication is due to the progressive feature of the benefit structure which pays higher benefits per tax dollar to workers with low earnings than to workers with high earnings. The progressivity of the benefit structure can clearly be seen in Table 2 which shows replacement ratios for black and white workers.<sup>21</sup> A replacement ratio is the fraction of the average monthly wage a worker receives as a basic pension at the retirement age of 65 years. Table 2 shows that 77 percent of single black workers' earnings are replaced compared to only 65 percent for whites. Since blacks also have lower probabilities of survival than whites, we can conclude that the effect

Table 2  
**Average Monthly Wage (AMW), Primary Insurance Amount (PIA), and Replacement Ratios at Retirement Age, by Race and Family Composition**

RACE <sup>a</sup> AND FAMILY COMPOSITION <sup>b</sup>	AMW (DOLLARS) <sup>c</sup> (1)	PIA (DOLLARS) (2)	REPLACEMENT RATIO <sup>d</sup> (3)
Single			
Black Male	481.44	370.04	0.77
White Male	792.17	512.23	0.65
Couple			
Black	481.44	555.06	1.15
White	792.17	768.35	0.97

Source: Tables A6 and A8 in the appendix.

<sup>a</sup>"Black" and "Non-White" are used synonymously. Note that well over 90% of non-whites are black.

<sup>b</sup>"Single" denotes a single man. "Couple" denotes a couple eligible for the wife's benefit. A couple is all-black or all-white, interracial couples are not considered.

<sup>c</sup>AMW is an average of more recent taxable earnings. For the formula used to calculate the AMW, See *Social Security Bulletin, Annual Statistical Supplement, 1970*.

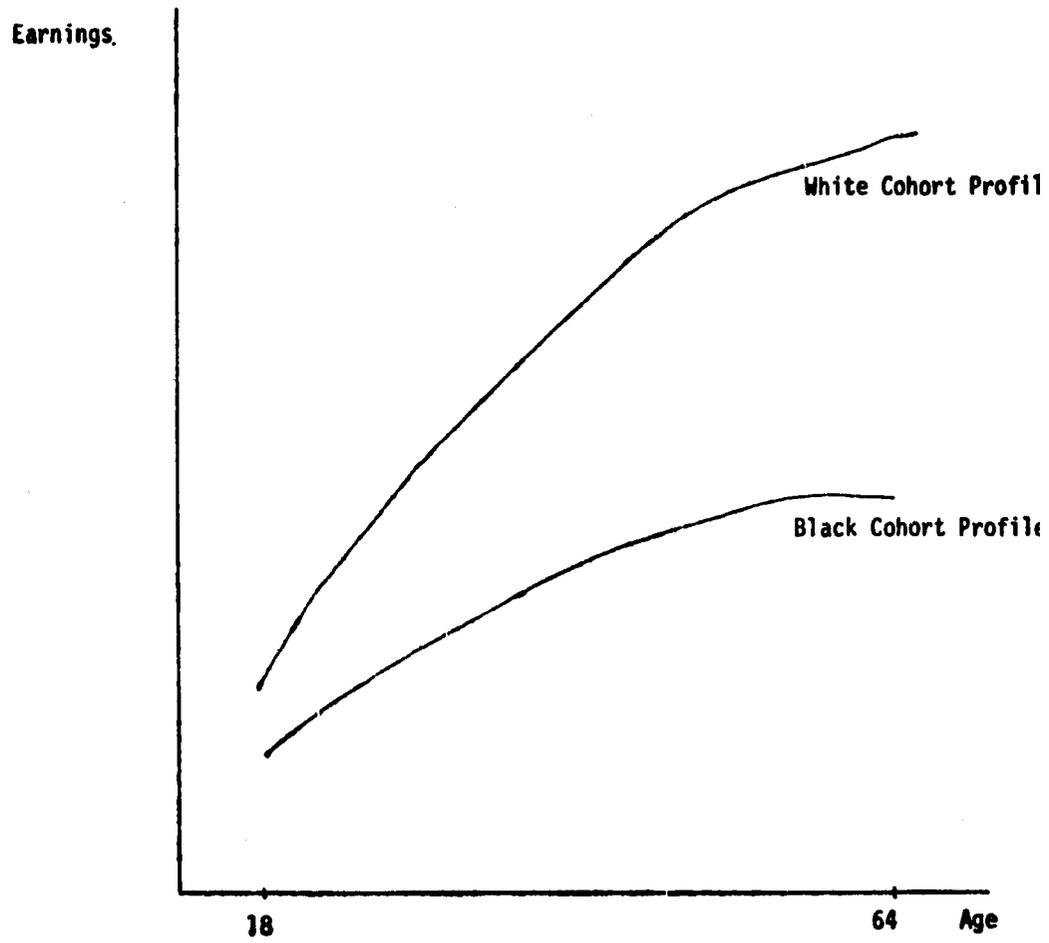
<sup>d</sup>Replacement Ratio = Col. (3) = Col. 2 ÷ Col. (1).

<sup>20</sup>One finds two opposing explanations of this phenomenon. Rosen (1972) provides a competitive market oriented explanations. Viewing the labor market as a dual market for jobs and "learning opportunities," he argues that there may well be discrimination in the human capital market and that the lower rental to black human capital will act as a disincentive for blacks to invest in themselves. On the other hand, Bergmann (1971) argues that blacks essentially constitute a non-competing group, forcibly isolated into inferior occupations with little prospects for upward mobility.

<sup>21</sup>The progressive nature of the benefit structure is also evident in the formula used to compute the Primary Insurance Amount (PIA). In the 1972 formula, the PIA is equivalent to 108.01% of the first \$110 of the Average Monthly Wage (AMW) plus 39.29% of the next \$290 plus 36.71% of the next \$150 and so on. Thus the lower your earnings, the higher the fraction of the AMW received back as benefits.

Figure 2

### Cohort Age-Earnings Profiles by Race



of the lower level of black earnings overwhelmed the combined effects of flatter black profiles and unfavorable black mortality experience and led to higher rates of return to blacks.

To test for the effects of flatter black profiles and unfavorable black mortality experience an attempt was made to standardize for the differences in the levels of earnings. This was done for each race group by giving it the average earnings of the other race group. For example, in the second row of Table 1, a black worker earns the average white income while retaining the black survival probabilities and the black flatter cross-sectional earnings profile. Comparing the second row with the third row of Table 1, it is apparent that black workers with white earnings earn a lower rate (7.2 percent) than white workers with white earnings (7.3 percent). The same result was found when white workers were given black earnings. Standardization by earnings classes resulted in lower rates of return to black males and couples than corresponding white males and couples.

### **Starting Age**

Lastly consider the effect of different starting ages of coverage on the rates of return. In calculating the rates of return for workers with different starting ages of coverage, the same assumptions and variables were employed except that the first four years of tax payments were ignored for those starting at twenty-two years of age. It is therefore to be expected that the late entrants earn rates of return generally higher than the rates earned by workers starting at eighteen years.

An extension of the analysis should examine different possible reasons for late coverage under social security. Different reasons for late coverage will in general lead to different rates of return. For example, if the reason for late coverage was due to full-time college education, then one would expect cohort age-earnings profiles of college graduates to be steeper than the profiles of high school graduates. Workers who gained coverage at twenty-two years because of college education may well earn lower rates of return than high school graduates who were covered at eighteen years.

## **V. CONCLUDING REMARKS**

The literature on individual equity has tended to ignore questions of how different socio-economic subgroups of the same generation fare under social security. Its almost exclusive concern has been with such intergenerational problems as the raw-deal-for-the-young hypothesis. This paper, by focusing on an intragenerational equity problem, represents a first rigorous attempt to redress this imbalance.

One of the most important factors determining how well a subgroup fares under social security is that subgroup's cohort age-earnings profile. Differences in the levels and slopes of age-earnings

profiles, together with the significant provisions of the latest (1972) amendments to social security, led to differences in the internal rates of return. For example, because of the progressivity of the benefit structure which pays relatively higher benefits per tax dollar of low average black earnings, it was found that the internal rates of return to black males and couples were higher than the corresponding rates for whites. Standardization for differences in average earnings reversed the results, yielding lower rates of return to black male workers and couples than to corresponding whites.

Finally, the reader is cautioned against making hasty and erroneous inferences, based on the empirical results, as to the overall performance of the Social Security System or how black workers, in particular, fare under it. First, other important components of the social insurance program, such as survivors, disability and health insurance programs, were not considered. Second, any general assessment of how blacks fare under the system must recognize that a relatively higher proportion of

black workers are low income earners and that these poor workers bear the brunt of the regressive payroll tax. On account of their low-income status, the *objective* rates of return which social security pays to black workers may well be less than their *subjective* rates of time preference in consumption. In addition, if blacks are thus forced to borrow in order to maintain their consumption levels, unequal and discriminatory practices in capital markets may imply much higher costs of borrowing than the remote returns on social security.



## **APPENDIX**

**Table A-1**  
**Median Income in 1947-71 of Families by Race of Head**

YEAR	TOTAL INCOME (1)	WHITE INCOME (2)	NON-WHITE INCOME (3)	$Y_{NW} \div Y_W^a$ (4)
1947	\$ 3,031	\$ 3,157	\$ 1,614	0.51
1948	3,187	3,310	1,768	0.53
1949	3,107	3,232	1,650	0.51
1950	3,319	3,445	1,869	0.54
1951	3,709	3,859	2,032	0.53
1952	3,890	4,114	2,338	0.57
1953	4,233	4,392	2,461	0.56
1954	4,173	4,339	2,410	0.56
1955	4,421	4,605	2,549	0.55
1956	4,783	4,993	2,628	0.53
1957	4,971	5,166	2,764	0.54
1958	5,087	5,300	2,711	0.51
1959	5,417	5,643	2,917	0.52
1960	5,620	5,835	3,233	0.55
1961	5,737	5,981	3,191	0.53
1962	5,956	6,237	3,330	0.53
1963	6,249	6,548	3,465	0.53
1964	6,569	6,858	3,839	0.56
1965	6,957	7,251	3,994	0.55
1966	7,500	7,792	4,674	0.60
1967	7,974	8,274	5,141	0.62
1968	8,632	8,937	5,590	0.63
1969	9,433	9,794	6,191	0.63
1970	9,867	10,236	6,516	0.64
1971	10,285	10,672	6,714	0.63

Source: U. S. Bureau of the Census, *Current Population Reports*, Series P-60, No. 85, "Money Income in 1971 of Families and Persons in the United States," Table 11, p. 34. Washington, 1972.

<sup>a</sup>Col. (4) obtained by dividing Col. (3) by Col. (2).

**Table A-2**  
**Estimated Average Annual Earnings of**  
**Industry Employees by Race, 1937-83**

YEAR	TOTAL (1)	WHITE (2)	NON-WHITE (3)
1937	\$ 1,258	\$ 1,136	\$ 403
1938	1,230	1,111	394
1939	1,264	1,142	405
1940	1,229	1,298	480
1941	1,443	1,475	569
1942	1,709	1,677	674
1943	1,951	1,906	799
1944	2,109	2,166	947
1945	2,190	2,271	1,009
1946	2,359	2,475	1,132
1947	2,589	2,698	1,377
1948	2,786	2,895	1,546
1949	2,844	2,958	1,510
1950	2,992	3,106	1,684
1951	3,217	3,346	1,783
1952	3,402	3,599	2,045
1953	3,581	3,717	2,081
1954	3,667	3,814	2,116
1955	3,851	4,013	2,222
1956	4,055	4,233	2,226
1957	4,230	4,395	2,352
1958	4,375	4,559	2,332
1959	4,594	4,787	2,472
1960	4,743	4,923	2,727

Table A-2 (Continued)

YEAR	TOTAL (1)	WHITE (2)	NON-WHITE (3)
1961	\$ 4,884	\$ 5,094	\$ 2,716
1962	5,065	5,303	2,831
1963	5,243	5,495	2,904
1964	5,499	5,741	3,211
1965	5,705	5,945	3,275
1966	5,967	6,120	3,717
1967	6,236	6,473	4,022
1968	6,657	6,890	4,314
1969	7,098	7,368	4,657
1970	7,571	7,851	4,997
1971	8,061	8,367	5,264
1972	8,545	8,869	5,580
1973	9,057	9,401	5,915
1974	9,601	9,965	6,269
1975	10,176	10,565	6,646
1976	10,787	11,197	7,044
1977	11,435	11,869	7,467
1978	12,121	12,581	7,915
1979	12,848	13,336	8,390
1980	13,619	14,136	8,893
1981	14,436	14,984	9,427
1982	15,302	15,883	9,993
1983	16,220	16,836	10,592

Source: Col. (1), total average earnings for years 1937-1971 was obtained from, U. S. Department of Commerce, Bureau of Economic Analysis, *The National Income and Product Accounts of the United States, 1929-1965*, Statistical Tables (1966), Table 6.5 pp. 106-109, and *Survey of Current Business*, July 1969 and July 1971, Table 6.5. From 1972-1983, total average earnings was assumed to grow by 6% annually.

Col (2). White average earnings for 1947 to 1971 was obtained by multiplying Col. (1) of Table A-2 by the income weights Col. (2) ÷ Col. (1) from Table A-1. From 1937 to 1946, the required income weights were estimated from U. S. Bureau of Census, *Historical Statistics of the United States, Colonial Times to 1957*, Series C147-168, p. 167. From 1972-1983, white average earnings was assumed to grow by 6% annually.

Col. (3). Non-white average earnings was estimated from the same sources and by the same method as Col. (2).

Table A-3  
**Estimated Annual Income for Males 18-64 Years Old  
 In the Experienced Civilian Labor Force With  
 Earnings in 1959**

PRESENT AGE (YEARS)	WHITE INCOME <sup>a</sup> (1)	NON-WHITE INCOME <sup>a</sup> (2)	$Y_W \div \bar{Y}_W^b$ (3)	$Y_{NW} \div \bar{Y}_{NW}^b$ (4)
18	\$ 1,570	\$ 1,208	0.2818	0.4032
19	1,955	1,422	0.3509	0.4746
20	2,434	1,674	0.4368	0.5587
21	2,797	1,869	0.5020	0.6238
22	3,215	2,088	0.5770	0.6969
23	3,547	2,263	0.6366	0.7553
24	3,914	2,452	0.7024	0.8184
25	4,211	2,604	0.7557	0.8691
26	4,530	2,765	0.8130	0.9229
27	4,790	2,893	0.8596	0.9656
28	5,065	3,027	0.9090	1.0103
29	5,280	3,130	0.9476	1.0447
30	5,516	3,237	0.9899	1.0804
31	5,688	3,309	1.0208	1.1045
32	5,866	3,383	1.0528	1.1292
33	5,994	3,428	1.0757	1.1442
34	6,125	3,473	1.0992	1.1592
35	6,219	3,496	1.1161	1.1669
36	6,314	3,520	1.1332	1.1749
37	6,384	3,529	1.1457	1.1779
38	6,454	3,539	1.1583	1.1812
39	6,509	3,540	1.1682	1.1816
40	6,564	3,541	1.1780	1.1819

Table A-3 (Continued)

PRESENT AGE (YEARS)	WHITE INCOME <sup>a</sup> ( $Y_W$ )	NON-WHITE INCOME <sup>a</sup> ( $Y_{NW}$ )	$Y_W \div \bar{Y}_W$	$Y_{NW} \div \bar{Y}_{NW}$
	(1)	(2)	(3)	(4)
41	\$ 6,592	\$ 3,523	1.1830	1.1759
42	6,620	3,506	1.1880	1.1702
43	6,620	3,471	1.1880	1.1585
44	6,621	3,436	1.1882	1.1469
45	6,603	3,392	1.1850	1.1322
46	6,585	3,349	1.1818	1.1178
47	6,557	3,305	1.1768	1.1031
48	6,530	3,262	1.1719	1.0888
49	6,501	3,227	1.1667	1.0771
50	6,472	3,193	1.1615	1.0657
51	6,438	3,163	1.1554	1.0557
52	6,404	3,133	1.1493	1.0457
53	6,361	3,104	1.1416	1.0360
54	6,319	3,076	1.1341	1.0267
55	6,267	3,048	1.1247	1.0173
56	6,216	3,020	1.1156	1.0080
57	6,155	2,993	1.1046	0.9990
58	6,095	2,967	1.0939	0.9903
59	6,025	2,941	1.0813	0.9816
60	5,956	2,916	1.0689	0.9733
61	5,877	2,891	1.0547	0.9649
62	5,800	2,867	1.0409	0.9569
63	5,712	2,843	1.0251	0.9489
64	5,626	2,820	1.0097	0.9412

$$\bar{Y}_W = 5,572, \quad \bar{Y}_{NW} = 2,996$$

Source U. S. Department of Commerce. Bureau of the Census, *Present Value of Estimated Lifetime Earnings*, Technical paper 16 by Herman P. Miller and Richard A. Hornsath, 1937, p. 7, Table I.

<sup>a</sup>The original income data was given only for even ages. Data for odd ages was derived by interpolation.

<sup>b</sup>Col. (3) and Col. (4) were obtained by dividing Col. (1) and Col. (2) by the respective mean incomes. A graph of Col. (3) [or Col. (4)] against age is concave, reflecting the shape of cross-sectional (1959) age-earnings profiles.

**Table A-4**  
**Estimated Annual Earnings 1937-83 Adjusted by 1959**  
**Age Income Weights for Males by Race**

AGE(YEARS)	YEAR	$Y_W^W$ (1)	$Y_B^W$ (2)	$Y_B^B$ (3)	$Y_W^B$ (4)
18	1937	\$ 320	\$ 114	\$ 162	\$ 458
19	1938	390	138	187	527
20	1939	499	177	226	638
21	1940	652	241	299	810
22	1941	841	328	396	1,023
23	1942	1,068	429	509	1,267
24	1943	1,339	561	654	1,560
25	1944	1,637	716	823	1,882
26	1945	1,846	820	931	2,096
27	1946	2,127	973	1,093	2,390
28	1947	2,452	1,252	1,391	2,726
29	1948	2,743	1,465	1,615	3,024
30	1949	2,928	1,495	1,631	3,196
31	1950	3,171	1,719	1,860	3,431
32	1951	3,523	1,856	1,991	3,778
33	1952	3,871	2,200	2,340	4,118
34	1953	4,086	2,287	2,412	4,309
35	1954	4,257	2,362	2,469	4,451
36	1955	4,547	2,518	2,611	4,715
37	1956	4,850	2,550	2,622	4,986
38	1957	5,091	2,724	2,778	5,191
39	1958	5,326	2,724	2,755	5,387
40	1959	5,639	2,912	2,922	5,658
41	1960	5,824	3,226	3,207	5,789

Table A-4 (Continued)

AGE (YEARS)	YEAR	$Y_W^W$	$Y_B^W$	$Y_B^B$	$Y_W^B$
		(1)	(2)	(3)	(4)
42	1961	\$ 6,052	\$ 3,227	\$ 3,178	\$ 5,961
43	1962	6,300	3,363	3,280	6,143
44	1963	6,529	3,450	3,331	6,302
45	1964	6,803	3,805	3,635	6,500
46	1965	7,026	3,870	3,661	6,645
47	1966	7,202	4,374	4,100	6,751
48	1967	7,586	4,713	4,379	7,048
49	1968	8,038	5,033	4,647	7,421
50	1969	8,558	5,409	4,963	7,852
51	1970	9,071	5,773	5,275	8,288
52	1971	9,616	6,050	5,505	8,749
53	1972	10,125	6,370	5,781	9,188
54	1973	10,662	6,708	6,073	9,652
55	1974	11,208	7,051	6,377	10,137
56	1975	11,784	7,414	6,699	10,647
57	1976	12,368	7,781	7,037	11,186
58	1977	12,983	8,168	7,395	11,754
59	1978	13,604	8,558	7,769	12,349
60	1979	14,255	8,968	8,166	12,980
61	1980	14,909	9,379	8,581	13,640
62	1981	15,597	9,812	9,021	14,338
63	1982	16,282	10,244	9,482	15,071
64	1983	16,999	10,694	9,969	15,846

Source: Table A-2 and Table A-3.

Col. (1) =  $Y_W^W$  = Col. (3) of Table A-3 x Col. (2) of Table A-2. It represents a cohort profile of a white male worker with white earnings.

Col. (2) =  $Y_B^W$  = Col. (3) of Table A-3 x Col. (3) of Table A-2. It represents a cohort profile of a white male worker with non-white earnings.

Col. (3) =  $Y_B^B$  = Col. (4) of Table A-3 x Col. (3) of Table A-2. It represents a cohort profile of a non-white male worker with non-white earnings.

Col. (4) =  $Y_W^B$  = Col. (4) of Table A-3 x Col. (2) of Table A-2. It represents a cohort profile of a non-white male worker with white earnings.

**Table A-5**  
**Social Security Earnings Base and**  
**Contribution Rate**

YEAR	ANNUAL EARNINGS BASE <sup>a</sup> (DOLLARS)	OASDI TAX RATES		OASDHI TAX RATES	
		EMPLOYEE PLUS EMPLOYER (PERCENT)	EMPLOYEE PLUS EMPLOYER (PERCENT)	EMPLOYEE PLUS EMPLOYER (PERCENT)	EMPLOYEE PLUS EMPLOYER (PERCENT)
1937	\$ 3,000	2		2	
1938	3,000	2		2	
1939	3,000	2		2	
1940	3,000	2		2	
1941	3,000	2		2	
1942	3,000	2		2	
1943	3,000	2		2	
1944	3,000	2		2	
1945	3,000	2		2	
1946	3,000	2		2	
1947	3,000	2		2	
1948	3,000	2		2	
1949	3,000	2		2	
1950	3,000	3		3	
1951	3,600	3		3	
1952	3,600	3		3	
1953	3,600	3		3	
1954	3,600	4		4	
1955	4,200	4		4	
1956	4,200	4		4	
1957	4,200	4.5		4.5	
1958	4,200	4.5		4.5	
1959	4,800	5		5	
1960	4,800	6		6	

Table A-5 (Continued)

YEAR	ANNUAL EARNINGS BASE <sup>a</sup> (DOLLARS)	OASDI TAX RATES	OASDHI TAX RATES
		EMPLOYEE PLUS EMPLOYER (PERCENT)	EMPLOYEE PLUS EMPLOYER (PERCENT)
1961	\$ 4,800	6	6
1962	4,800	6.25	6.25
1963	4,800	7.25	7.25
1964	4,800	7.25	7.25
1965	4,800	7.25	7.25
1966	6,600	7.7	8.4
1967	6,600	7.8	8.8
1968	7,800	7.6	8.8
1969	7,800	8.4	9.6
1970	7,800	8.4	9.6
1971	7,800	9.2	10.4
1972	9,000	9.2	10.4
1973	10,800	9.7	11.7
1974	12,000	9.7	11.7
1975	12,600	9.7	11.7
1976	13,500	9.7	11.7
1977	14,100	9.7	11.7
1978	15,000	9.6	12.1
1979	15,900	9.6	12.1
1980	17,100	9.6	12.1
1981	18,000	9.6	12.3
1982	19,200	9.6	12.3
1983	20,100	9.6	12.3

Source: Social Security Administration, *Social Security Bulletin, Annual Statistical Supplement, 1970*, p. 21. *Social Security Bulletin*, March 1973, p. 23.

<sup>a</sup>The annual earnings base after 1974 is assumed to increase automatically by an annual rate of six percent.

**Table A-6**  
**Estimated Annual Taxable Earnings for Males**  
**by Race, 1937-83**

AGE (YEARS)YEAR	$E_W^W$ (1)	$E_B^W$ (2)	$E_B^B$ (3)	$E_W^B$ (4)
18 1937	\$ 320	\$ 114	\$ 162	\$ 458
19 1938	390	138	187	527
20 1939	499	177	226	638
21 1940	652	241	299	810
22 1941	841	328	396	1,028
23 1942	1,068	429	509	1,267
24 1943	1,339	561	654	1,560
25 1944	1,637	716	823	1,882
26 1945	1,846	820	931	2,096
27 1946	2,127	973	1,093	2,390
28 1947	2,452	1,252	1,391	2,726
29 1948	2,743	1,465	1,615	3,000
30 1949	2,928	1,495	1,631	3,000
31 1950	3,000	1,719	1,860	3,000
32 1951	3,523	1,856	1,991	3,600
33 1952	3,600	2,200	2,340	3,600
34 1953	3,600	2,287	2,412	3,600
35 1954	3,600	2,362	2,469	3,600
36 1955	4,200	2,518	2,611	4,200
37 1956	4,200	2,550	2,622	4,200
38 1957	4,200	2,724	2,778	4,200
39 1958	4,200	2,724	2,755	4,200
40 1959	4,800	2,912	2,922	4,800
41 1960	4,800	3,226	3,207	4,800

Table A-6 (Continued)

AGE (YEARS)	YEAR	$E_W^W$ (1)	$E_B^W$ (2)	$E_B^B$ (3)	$E_W^B$ (4)
42	1961	\$ 4,800	\$ 3,227	\$ 3,178	\$ 4,800
43	1962	4,800	3,363	3,280	4,800
44	1963	4,800	3,450	3,331	4,800
45	1964	4,800	3,850	3,635	4,800
46	1965	4,800	3,870	3,661	4,800
47	1966	6,600	4,374	4,100	6,600
48	1967	6,600	4,713	4,379	6,600
49	1968	7,800	5,033	4,647	7,421
50	1969	7,800	5,409	4,963	7,800
51	1970	7,800	5,773	5,275	7,800
52	1971	7,800	6,050	5,505	7,800
53	1972	9,000	6,370	5,781	9,000
54	1973	10,662	6,708	6,073	9,652
55	1974	11,208	7,051	6,377	10,137
56	1975	11,784	7,414	6,699	10,647
57	1976	12,368	7,781	7,037	11,184
58	1977	12,983	8,168	7,395	11,754
59	1978	13,604	8,558	7,769	12,349
60	1979	14,255	8,968	8,166	12,980
61	1980	14,909	9,379	8,581	13,640
62	1981	15,597	9,812	9,021	14,338
63	1982	16,282	10,244	9,482	15,071
64	1983	16,999	10,694	9,969	15,846

Source: Table A-4 and Table A-5.

Col. (1) =  $E_W^W$  = Taxable earnings of white worker with white earnings

Col. (2) =  $E_B^W$  = Taxable earnings of white worker with non-white earnings

Col. (3) =  $E_B^B$  = Taxable earnings of non-white worker with non-white earnings

Col. (4) =  $E_W^B$  = Taxable earnings of non-white worker with white earnings

**Table A-7**  
**Social Security (OASDI) Taxes for Males by Race,**  
**1937-83**

AGE (YEARS)	YEAR	$\frac{T^W}{W}$ (1)	$\frac{T^W}{B}$ (2)	$\frac{T^B}{B}$ (3)	$\frac{T^B}{W}$ (4)
18	1937	\$ 6.40	\$ 2.28	\$ 3.24	\$ 9.16
19	1938	7.80	2.76	3.74	10.54
20	1939	9.98	3.54	4.52	12.76
21	1940	13.04	4.82	5.98	16.20
22	1941	16.82	6.56	7.92	20.56
23	1942	21.36	8.58	10.18	25.34
24	1943	26.78	11.22	13.08	31.20
25	1944	32.74	14.32	16.46	37.64
26	1945	36.92	16.40	18.62	41.92
27	1946	42.54	19.46	21.86	47.80
28	1947	49.04	25.04	27.82	54.52
29	1948	54.86	29.30	32.30	60.00
30	1949	58.56	29.90	32.62	60.00
31	1950	90.00	51.57	55.80	90.00
32	1951	105.69	55.68	59.73	108.00
33	1952	108.00	66.00	70.20	108.00
34	1953	108.00	68.61	72.36	108.00
35	1954	144.00	94.48	98.76	144.00
36	1955	168.00	100.72	104.44	168.00
37	1956	168.00	102.00	104.88	168.00
38	1957	189.00	122.58	125.01	189.00
39	1958	189.00	122.58	123.97	189.00
40	1959	240.00	145.60	146.10	240.00
41	1960	288.00	193.56	192.42	288.00

Table A-7 (Continued)

AGE (YEARS)	YEAR	$T_W^W$	$T_B^W$	$T_B^B$	$T_W^B$
		(1)	(2)	(3)	(4)
42	1961	\$ 288.00	\$ 193.62	\$ 190.68	\$ 288.00
43	1962	300.00	210.19	205.00	300.00
44	1963	348.00	250.12	241.50	348.00
45	1964	348.00	279.12	263.54	348.00
46	1965	348.00	280.57	265.42	348.00
47	1966	508.20	336.80	315.70	508.20
48	1967	514.80	367.61	341.56	514.80
49	1968	592.80	382.51	353.17	564.00
50	1969	655.20	454.36	416.89	655.20
51	1970	655.20	484.93	443.10	655.20
52	1971	717.60	556.60	506.46	717.60
53	1972	828.00	586.04	531.85	828.00
54	1973	1,034.21	650.68	589.08	936.24
55	1974	1,087.18	683.85	618.57	983.29
56	1975	1,143.05	719.16	649.80	1,032.76
57	1976	1,199.70	754.76	682.59	1,084.85
58	1977	1,259.35	792.30	717.31	1,140.14
59	1978	1,305.98	821.57	745.82	1,185.50
60	1979	1,368.48	860.93	783.94	1,246.08
61	1980	1,431.26	900.38	823.78	1,309.44
62	1981	1,497.31	941.95	866.02	1,376.45
63	1982	1,563.07	983.42	910.27	1,446.82
64	1983	1,631.90	1,026.62	957.02	1,521.22

Source: Table A-5 and Table A-6.

Col. (1) -  $T_W^W$  = OASDI tax amount for white male with white earnings

Col. (2) =  $T_B^W$  = OASDI tax amount for white male with non-white earnings

Col. (3) =  $T_B^B$  = OASDI tax amount for non-white male with non-white earnings

Col. (4) =  $T_W^B$  = OASDI tax amount for non-white male with white earnings

**Table A-8**  
**Primary Insurance Amount Subject to Automatic**  
**PROVISIONS,<sup>a</sup> 1984-2019**

AGE (YEARS) YEAR	$B_W^W$ (1)	$B_B^W$ (2)	$B_B^B$ (3)	$B_W^B$ (4)	
65	1984	\$ 512.23	\$ 391.89	\$ 370.04	\$ 499.55
66	1985	527.59	403.64	381.15	514.53
67	1986	543.42	415.75	392.58	529.97
68	1987	559.72	428.22	404.36	545.87
69	1988	576.52	441.07	416.49	562.24
70	1989	593.81	454.30	428.98	579.11
71	1990	611.63	467.93	441.85	596.48
72	1991	629.97	481.97	455.11	614.38
73	1992	648.87	496.43	468.76	632.81
74	1993	668.34	511.32	482.82	651.79
75	1994	688.39	526.66	497.31	671.35
76	1995	709.04	542.46	512.23	691.49
77	1996	730.31	558.74	527.59	712.23
78	1997	752.22	575.50	543.42	733.60
79	1998	774.79	592.76	559.72	755.61
80	1999	798.03	610.55	576.52	778.28
81	2000	821.97	628.86	593.81	801.62
82	2001	846.63	647.73	611.63	825.67
83	2002	872.20	667.16	629.98	850.44
84	2003	898.19	687.17	648.87	875.96
85	2004	925.14	707.79	668.34	902.23
86	2005	952.89	729.02	688.39	929.30
87	2006	981.48	750.89	709.04	957.18
88	2007	1,010.93	773.42	730.31	985.90
89	2008	1,041.25	796.62	752.22	1,015.47
90	2009	1,072.49	820.52	774.79	1,045.94
91	2010	1,104.67	845.14	798.03	1,077.32
92	2011	1,137.81	870.49	821.97	1,109.63
93	2012	1,171.94	896.61	846.63	1,142.92
94	2013	1,207.10	923.51	872.03	1,177.21
95	2014	1,243.31	951.21	898.19	1,212.53
96	2015	1,280.61	979.75	925.14	1,248.90
97	2016	1,319.03	1,009.14	952.89	1,286.37
98	2017	1,358.60	1,039.41	981.48	1,324.96
99	2018	1,399.36	1,070.60	1,010.92	1,364.71
100	2019	1,441.34	1,102.71	1,041.25	1,405.65

Source: Primary Insurance Amount (PIA) for 1972 was obtained from, *United States Senate Congressional Records*, June 29, 1972, pp. S10774-S10775.

<sup>a</sup>In accordance with the automatic provisions of the 1972 Social Security Amendments, the 1975 PIA was assumed to be 108% of the 1972 PIA. Thereafter, the PIA was assumed to increase automatically at an annual growth rate of 3%.

**Table A-9**  
**Number of Survivors at Single Years of Age**  
**Out of 100,000 Born Alive, by Color and**  
**Sex; United States 1959-61**

AGE (YEARS)	WHITE		BLACK	
	MALE	FEMALE	MALE	FEMALE
65	65,834	80,739	51,392	60,825
66	63,603	79,333	49,149	58,957
67	61,280	77,818	46,856	57,092
68	58,871	76,184	44,535	55,210
69	56,384	74,418	42,214	53,278
70	53,825	72,507	39,914	51,274
71	51,204	70,451	37,643	49,189
72	48,526	68,247	35,405	47,038
73	45,797	65,884	33,219	44,853
74	43,022	63,351	31,101	42,676
75	40,207	60,641	29,064	40,540
76	37,366	57,765	27,125	38,461
77	34,513	54,736	25,280	36,433
78	31,658	51,546	23,501	34,425
79	28,814	48,191	21,748	32,395
80	25,993	44,676	19,994	30,315
81	23,204	41,066	18,227	28,175
82	20,466	37,221	16,465	25,997
83	17,827	33,401	14,744	23,826
84	15,345	29,648	13,117	21,727
85	13,065	26,046	11,620	19,744
86	10,969	22,497	10,193	17,729
87	9,071	19,069	8,836	15,696
88	7,378	15,840	7,547	13,660
89	5,888	12,873	6,323	11,640
90	4,600	10,219	5,174	9,675
91	3,514	7,914	4,124	7,823
92	2,626	5,972	3,195	6,142
93	1,917	4,391	2,403	4,670
94	1,369	3,147	1,753	3,434
95	956	2,203	1,240	2,438
96	656	1,511	850	1,672
97	440	1,014	570	1,122
98	288	665	374	735
99	185	425	239	470
100	115	265	149	239

Source: U. S. Department of Health, Education, and Welfare, *United States Life Tables, 1959-1961*, Vol. 1, No. 1-6, Tables 5, 6, 8, 9, pp. 16-25.

**Table A-10**  
**Estimated Probability of Living from Age 65 Years**  
**To 100 Years by Color and Sex;**  
**United States, 1959-61**

AGE (YEARS)	WHITE		BLACK	
	MALE	FEMALE	MALE	FEMALE
65	1.0000	1.0000	1.0000	1.0000
66	.9661	.9826	.9563	.9693
67	.9308	.9638	.9117	.9386
68	.8942	.9436	.8666	.9077
69	.8564	.9217	.8214	.8759
70	.8176	.8980	.7766	.8430
71	.7777	.8725	.7325	.8087
72	.7371	.8453	.6889	.7733
73	.6956	.8160	.6464	.7374
74	.6535	.7846	.6052	.7016
75	.6107	.7511	.5655	.6665
76	.5675	.7154	.5278	.6323
77	.5242	.6779	.4919	.5990
78	.4808	.6384	.4573	.5659
79	.4377	.5968	.4232	.5326
80	.3948	.5533	.3890	.4984
81	.3524	.5079	.3546	.4632
82	.3108	.4610	.3204	.4274
83	.2707	.4131	.2869	.3917
84	.2331	.3672	.2552	.3572
85	.1984	.3225	.2261	.3246
86	.1666	.2786	.1983	.2915
87	.1377	.2362	.1719	.2580
88	.1121	.1962	.1468	.2246
89	.0894	.1594	.1230	.1914
90	.0699	.1266	.1007	.1591
91	.0533	.0980	.0802	.1286
92	.0399	.0740	.0627	.1010
93	.0291	.0544	.0467	.0768
94	.0208	.0390	.0341	.0565
95	.0145	.0273	.0241	.0401
96	.0099	.0187	.0165	.0275
97	.0067	.0125	.0111	.0184
98	.0044	.0082	.0073	.0121
99	.0028	.0053	.0046	.0077
100	.0017	.0033	.0029	.0048

Source: Derived from Table A-9.

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