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Martin David
Paul L. Menchik

INCOME INSTABILITY, INEQUALITY, AND NON-EARNED INCOME

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Martin David
Department of Economics
University of Wisconsin

Paul L. Menchik
Department of Economics
Michigan State University

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ABSTRACT

We describe the properties of the income distribution observed for 3,740 men in Wisconsin, 1947-60. Classifying the population by year of birth allows us to identify cohort effects and the relative standing of individuals among their peers. Further classifying the population according to the level of income from sources other than earnings provides proxies for strata within the cohort with different initial wealth and savings behavior. Those with high wealth or extreme savings during the period fall in a high percentile of the non-earned income distribution; those with low wealth or extreme dissavings fall in a low percentile.

Within these wealth groups, striking differences in income dynamics are revealed. Older persons show more heterogeneity in long term income level and in income trend than younger persons. Wealthier persons have greater instability in their relative income position. A significant correlation between relative income position and positive trend in that position suggests a mechanism whereby the population is stratified into high-wealth, high-income and low-wealth, low-income groups over time.

Income Instability, Inequality, and
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In this paper we present a descriptive model of income and income change over a period of T years. We proceed first by partitioning the population into relevant subgroups, and then by formulating a simple stochastic model that includes measures of income instability, income stratification, and permanent inequality. Our data base is a sample of Wisconsin tax returns filed 1947-1959 (see David and Miller, 1970).

The principal objective of this exercise is to understand the role of wealth in the dynamics of income change.

DEFINING POPULATION COHORTS

For any one individual, lifetime economic prospects are encompassed by (a) an initial endowment of human and non-human capital, and (b) the power to market those endowments at future factor prices (Cowell, 1978). Human capital yields earnings, defined here as the sum of wages and salaries and self-employment income. Non-human capital yields non-earned income, defined here to include all other income sources included in Wisconsin adjusted gross income (e.g., interest, dividends, rents, and capital gains).

Because factor prices vary, equally endowed individuals born in different years face different economic prospects, and will presumably respond to differences in the markets they face by choosing different commitments to work and saving. Thus powerful arguments exist for defining cohorts on the basis of year of birth and studying income experiences of that cohort over time. We confine our attention to the six cohorts born prior to 1895, from

1895-1904, 1905-1914, 1915-1924, 1925-1929, and 1930-1934. We denote these groups $B \equiv 6,5...,1$ respectively (so that B increases with increasing age).

Unfortunately, a sample of T calendar years of observed income experience selects different stages in the life cycle of each birth cohort, as those who are born recently enter their adult years with the first observation while those who are born earlier already have elected to dispose of part of their initial endowments in the consumption and dissavings of past years of economic activity. The cumulative impact of decisions is to enhance the initial endowment of non-human capital or to diminish that endowment. <u>We assume that the percentile position of the individual in the distribution of non-earned income N may be used as a proxy for the effect of initial wealth endowments and motivation for lifetime saving</u>. The members of each birth cohort are partitioned into six groups determined by the 66^{th}, 74^{th}, 79^{th}, 85^{th}, 92^{nd}, and 96^{th} percentiles of non-earned iincome $P(N_P)$, for that cohort.[1] (This defines $P \equiv 1,2,...,6$.)

Together, classification by birth cohort and percentile divides the population into 36 groups $||B,P||$.[2] Within a group individuals are characterized by some commonality of the history of factor prices and length of labor market experience (reflected by age). Within the youngest cohort, the non-earned income percentile reflects largely the level of inter-generational transfers. In each successively older cohort the percentile position is increasingly influenced by lifetime decisions on the share of income saved and the cumulative stochastic effect of past history.

MEASURES OF INCOME EXPERIENCE

The array $Y(B,P) \equiv \| y_{it}(B,P) \|$, $i = 1,\ldots,I_{BP}$; $t = 1,\ldots,T_i$, constitutes the observations on income of individuals in one of the 36 groups identified. The problem is to summarize the array in a meaningful way. (The group identification B,P will be omitted for notational simplicity.)

Longitudinal data on individuals are not generally available. We are accustomed to studying distributions across individuals and calculating statistics such as the mean, variance, and coefficient of variation for single years of cross-sectional data [i.e., Ey_{it}, $E(y_{it}-Ey_{it})^2$ and $E(y_{it}-Ey_{it})^2/Ey_{it}$, for $t = t^*$]. The analogous summary of data over a period of years, $Ey_{i^*t} = \bar{Y}_{i^*}$, is of great interest to the individual, for whom it is an average income during the period T. It is less interesting as a matter of social policy where we are concerned with the experience of a collection of individuals and summary measures that characterize their economic progress and their relationship to each other over time.

The processes of income change, stratification, and consequent degrees of inequality across individuals can be described by a simple model applied to the relative incomes of individuals in a birth cohort as the cohort ages through time. Relative income Z_{it} is defined as the ratio of individual income to the expected value of income for his birth cohort C_{tB}:

$$Z_{it} \equiv y_{it}/C_{tB} \qquad \begin{matrix} i = 1,\ldots,I_{BP} \\ B,P = 1,\ldots,6 \end{matrix} \qquad (1)$$

The parameters of the model measure each of the following for individuals in the group (B,P):

(1) relative mean income -- $\bar{a}$,

(2) variance of individuals about the mean -- σ_a^2,

(3) mean trend, or trajectory, of relative income -- $\bar{b}$,

(4) variance of individual trajectories about $\bar{b}$ -- σ_b^2,

(5) covariation of a and b -- ρ,

(6) variance of individual income positions about their individual trend line -- σ^2.

These parameters may be given the following interpretation for each group (B,P):

(1) $\bar{a}$ expresses "permanent" income position relative to all individuals in the cohort B during the period of observation, 1947-1959;

(3) $\bar{b}$ expresses expected enhancement (+) or diminution (-) of income relative to the B^{th} cohort during the period of observation.

These numbers describe the deterministic portion of the pattern of relative income change observed for a group over a period of time. They are usually the focus of aggregate analysis in studies of longitudinal income change.

The remaining parameters describe stochastic aspects of relative income change and allocate variations into four additive classes:

(6) σ^2 measures random variation in relative income experienced by an individual around his unique linear trajectory for the period.[3]

(4) σ_b^2 measures the random variation between individuals in the trend of their relative income trajectory. $\sigma_b^2 = 0$ implies all individuals in a group have the common rate of improvement in

income $\bar{b}$, relative to the cohort. A large σ_b^2 reflects a substantial heterogeneity in the income trajectories of members of the cohort.

(2) σ_a^2 measures the dispersion in the relative income experienced by different individuals measured at the center of the period of observation for each individual. This is a measure of the expected <u>interpersonal</u> inequality of income within the group. $\sigma_a^2 = 0$ implies no long-term inequality among individuals.

(5) ρ measures the association of a_i, b_i implied by the trajectories for each individual in (B,P). $\rho > 0$ implies that persons with high relative incomes as compared to $\bar{a}$ also have trajectories with slopes higher than $\bar{b}$ (i.e., the "rich get richer" syndrome).

THE DYNAMIC MODEL

The exact specification of the model is

$$Z_{it}(B,P) = a_i + b_i (t - \bar{\bar{t}}_i) + \varepsilon_{it}, \tag{2a}$$

where $\bar{t}$ is the average of the time indexes for data from the i^{th} individual, and $t = \tau_1, \ldots, \tau_i \leq T$,

$i = 1, \ldots, I_{BP}$,

$B,P = 1, \ldots, 6.$

The stochastic specification is given by the assumption that individuals' parameters are drawn from a bivariate normal distribution:

$$(a_i, b_j) \sim N\left(\begin{bmatrix} \bar{a} \\ \bar{b} \end{bmatrix} \begin{bmatrix} \sigma_a^2 & \rho\sigma_a\sigma_b \\ \rho\sigma_a\sigma_b & \sigma_b^2 \end{bmatrix}\right). \tag{2b}$$

The residual is normally distributed with independent drawings across individuals, and time:

$$\varepsilon_{it} \sim N(0,\sigma^2) \text{ and } E(\varepsilon_{it},\varepsilon_{i't'}) = 0 \quad i \neq i' \text{ or } t \neq t. \tag{2c}$$

The model, first presented in David (1971), may be viewed as a 6-parameter summary of the information in Y(B,P).[4] The random specification of the parameters (a_i,b_i) permits relative income variation for an individual to be partitioned into two parts: the variation normal to his trajectory σ^2, and variation associated with the character of his trajectory relative to the average trajectory for those in the B,P group. b_i reflects systematic change in income for the individual, while σ reflects the instability of individual income in the long run.[5] Since the trajectory is for a period of 5 to 12 years, the b_i reflects movement at a particular stage of the life cycle, rather than a lifetime trajectory (which could not be modeled by a linear trend).

Transformation of absolute income to relative income position with respect to mean cohort income achieves several objectives. (1) The parameters estimated are tied to a representative sample of the United States population, despite the selectivity of the taxpaying population for young and old birth cohorts. (2) The changing mean income of each cohort includes nominal changes in the value of income and the changes in real productivity achieved with growth in the economy. Therefore estimates of the random coefficient model answer the question, "To what extent do particular individuals share in generalized increases in purchasing power achieved by a cohort?"

The model provides a dynamic mechanism for understanding income trajectories in which relative income position and relative standing in relationship to age contemporaries is highlighted--it displays, but offers no explanation for, differences in the rates of growth of real income for successive cohorts.[6] The model allows one to infer the extent to which any population group is stratified into relatively immobile layers, the degree to which this stratification will be augmented or decreased by systematic movement of individuals relative to the cohort mean, and the extent to which the group as a whole is moving toward or away from the mean for the cohort.

COMPARISON TO OTHER MODELS

Others working on income mobility have adopted less satisfactory measures of individual income trajectories. Schiller (1977) summarizes the experience of <u>all</u> cohorts in terms of ventiles (1/20 of the income distribution) and asks how much movement occurred between ventiles from 1957 to 1967. Long-term systematic income change (b_i) and within-person income instability (σ) are confounded in his use of the number of ventiles of change as a measure of mobility. Furthermore, <u>expected</u> movement in income over the life cycle is not partitioned from other types of mobility.

Benus and Morgan (1975) focus their attention on trends in absolute income change, thereby confounding σ_b^2 with changes in C_{tB}, as well as ignoring the life cycle effect.

The most careful modeling of income change is that of Lillard and Willis (1978). They present an elaborate model of earnings that permits both systematic effects of human capital and known job experience, and a stochastic structure allowing for a distribution of individual effects and autocorrelation of year-to-year experience. The employment experience variable in their model is a close correlate of birth year in the model used here. Lillard and Willis are able to control explicitly for human capital, while the classification used here does not. Nonetheless the approach taken here has the merit that it describes all income included in Wisconsin Adjusted Gross Income (AGI) and thereby captures interactions between human capital and rates of return on wealth. Second, the model used here summarizes the endogenous outcomes of differential on-the-job training and experience as σ_b and does not restrict members of the groups studied to a single trajectory. Last, focus on groupings by P allow us to explore hypotheses pertaining to the role of wealth in lifetime income distribution.

ESTIMATES OF WEALTH PERCENTILES

Table 1 shows the cumulative distribution of non-earned income, averaged over the period of observation 1947-1960 for a sample of Wisconsin men.

The sum of interest, dividends, rent, trust income, and capital gains reported on tax returns averaged over the reporting period (e.g., permanent, non-earned, property-related income) was computed. Note that the distribution of permanent non-earned income is over six times more unequal than the distribution of permanent income (viz., for all birth cohorts the coefficient of variation of permanent AGI is .886 while the coefficient of variation of permanent unearned income is 5.84). This dramatic disparity between AGI and property income inequality exists within birth cohorts as well as across cohorts and belies Paglin's (1975) argument that wealth inequality is largely life-cycle related.

Table 1 suggests an accumulation of wealth in the successively older birth cohorts. Comparison of the mean values reported for each cohort and the average age of persons during the sample period yields a lower-bound estimate of a rate of increase in permanent property income of over 7% for each year of calendar age. This estimate is a lower bound on the rate of accumulation we would observe for a given birth cohort due to real productivity growth over time (see Mirer, 1979).[7]

Growth of non-earned income can also be seen in Table 1 by inspection of the percentiles of successive cohorts. For example, the 85^{th} percentile is at approximately \$50 for the 1925-29 cohort, whose average age during the period of observation was 30; the 85^{th} percentile is just over \$100 for the 1915-1924 cohort, whose average age was 34. Tracing out these percentiles at a number of levels gives the percentile groups used in the model (Equation 2).

WEALTH AND LIFETIME INCOME

The model and classification developed facilitates a test of seven hypotheses: Consider any two birth cohorts, B and B′:

H1 $\sigma_a^2(B,P) > \sigma_a^2(B',P) \quad 6 > B > B' \quad P = 1,\ldots,6$

H2 $\sigma_b^2(B,P) > \sigma_b^2(B',P) \quad 6 > B > B' \quad P = 1,\ldots,6$

Consider any two wealth groups, P and P′:

Table 1

Cumulative Distribution of "Permanent" Non-Earned Income[a]
Defined by 5-13 Year Averages
(Wisconsin Male Taxpayers, 1947-1959; amounts in dollars)

Amount of non-earned income	Birth Year 1930-1934[b]	1925-1929	1915-1924	1905-1914	1895-1904	1894 and less[b]	Total
0	77	61	50	43	36	31	46.5
Negative, ≤ 50	94	86	78	67	59	49	70.0
≤ 100	94	92	85	74	66	56	76.1
≤ 150	95	95	88	79	70	62	80.1
≤ 200	97	97	91	82	74	66	83.1
≤ 250	98	98	92	84	77	71	85.1
≤ 300	99	98	93	86	80	74	87.0
≤ 500	99	99	96	92	86	80	91.4
≤ 800	100	100	98	95	91	86	94.6
≤ 1200	100	100	99	97	94	90	96.4
≤ 3000	100	100	100	99	97	97	98.9
Over 3000	100	100	100	100	100	100	100.0
Sample size	234	377	785	798	660	551	3740
Mean	57	23	71	169	455	502	222
Standard deviation	699	156	290	607	2380	1837	1297
Coefficient of variation	12.2	6.75	4.11	3.59	5.23	3.66	5.84
Number of men	234	377	785	798	660	551	3740

[a]The sum of interest, dividends, rent, trust income, and capital gains. Excludes income derived from capital invested in self-employment and partnerships.

[b]Selectivity of tax-filing individuals relative to the entire cohort implies that data observed for the youngest group are later in time on average than the four middle cohorts, while data for the oldest cohort are somewhat earlier.

H3 $\bar{a}\ (B,P) > \bar{a}\ (B,P')$ $\quad P > P' \quad B = 1,\ldots,6$

H4 $\sigma^2\ (B,P) > \sigma^2\ (B,P')$ $\quad P > P' \quad B = 1,\ldots,6$

H5 $\sigma\ (B,P)/\bar{a}\ (B,P) < \sigma\ (B,P')/\bar{a}\ (B,P')$

$P > P' \quad B = 1,\ldots,6$

H6 $\sigma_b^2\ (B,P) > \sigma_b^2\ (B,P')$ $\quad P > P' \quad B = 1,\ldots,6$

Last, for all groups:

H7 $\rho\ (B,P) > 0$ $\quad B,P = 1,\ldots,6$

The first two hypotheses assert a relationship across birth cohorts, conditional on the percentile rank of non-earned income. The comparison takes on meaning to the extent that we interpret differences across birth groups as a picture of the lifetime trajectory of individuals. The model is plausible for this purpose as both the value of cohort income and non-earned income may rise because of inflation and increases in factor productivity, without altering the percentile P(N) or the $\bar{a}$ that figures in the model.

Hypothesis H1 asserts for any given wealth level, interpersonal variation in relative income position will increase with age. (It may decrease subsequent to retirement as persons with large initial human capital and wealth make planned dissavings from their wealth accumulation and enjoy high levels of leisure.) Table 2 shows that H1 holds without exception for three of the six wealth levels, and is satisfied for 16 out of 21 possible comparisons.

Table 2

Approximate Percentile Points of the Distribution of Non-Earned Income by Birth Year, and Associated Statistics

Percentile in the distribution of non-earned income, ρ		Birth Year (1) 1930-1934	(2) 1925-1929	(3) 1915-1924	(4) 1905-1914	(5) 1895-1904	(6) 1894 and less
66	$N_\rho(S)$				\$50	\$100	\$200
	$\bar{a}$ ($\sigma_{\bar{a}}$)				.93 (.43)	.96 (.49)	1.00 (.61)
	$\bar{b}$ ($\sigma_{\bar{b}}$)				.0028 (.044)	.013 (.098)	-.049 (.077)
	ρ (a_i,b_i)				.340*	.623*	.147
	σ (V)				.171 (.18)	.341 (.36)	.349 (.35)
74	$N_\rho(S)$				\$100	\$200	\$300[17]
	$\bar{a}$ ($\sigma_{\bar{a}}$)				.99 (.50)	1.04 (.71)	1.04 (1.00)
	$\bar{b}$ ($\sigma_{\bar{b}}$)				.013 (.049)	.016 (.065)	.0067 (.13)
	ρ (a_i,b_i)				.360*	.488*	.864*
	σ (V)				.594 (.60)	.255 (.25)	.341 (.33)

Table 2--Continued

Percentile in the distribution of non-earned income, ρ	Birth Year (1) 1930-1934	(2) 1925-1929	(3) 1915-1924	(4) 1905-1914	(5) 1895-1904	(6) 1894 and less
79 $N_\rho(S)$			$50	$150	$300[18]	$500
$\bar{a}$ ($\sigma_{\bar{a}}$)			1.01 (.39)	.890 (.411)	1.18 (1.17)	.89 (.43)
$\bar{b}$ ($\sigma_{\bar{b}}$)			-.0042 (.074)	-.0036 (.039)	.019 (.19)	-.045 (.099)
ρ (a_i,b_i)			.330*	.324	.785*	.418
σ (V)			.198 (.20)	.176 (.20)	.437 (.37)	.339 (.38)
85 $N_\rho(S)$		$50	$100	$300 [18]	$500	$800
$\bar{a}$ ($\sigma_{\bar{a}}$)		1.04 (.34)	1.16 (.66)	1.13 (.34)	1.09 (.65)	1.03 (.59)
$\bar{b}$ ($\sigma_{\bar{b}}$)		-.018 (.084)	-.001 (.096)	-.007 (.061)	-.008 (.086)	-.019 (.088)
ρ (a_i,b_i)		.050	.633*	.455	.114	-.252
σ (V)		.230 (.22)	.313 (.27)	.211 (.19)	.434 (.40)	.466 (.45)

Table 2--Continued

Percentile in the distribution of non-earned income, ρ	Birth Year (1) 1930-1934	(2) 1925-1929	(3) 1915-1924	(4) 1905-1914	(5) 1895-1904	(6) 1894 and less
92 $N_\rho(S)$	\$50	\$100	\$200	\$500	\$800	\$1200
$\bar{a}$ ($\sigma_{\bar{a}}$)	1.33 (.51)	1.16 (.43)	.97 (.40)	1.22 (.76)	1.08 (.82)	1.86 (2.21)
$\bar{b}$ ($\sigma_{\bar{b}}$)	-.091 (.140)	-.002 (.102)	-.009 (.053)	.010 (.051)	.033 (.091)	.055 (.268)
ρ (a_i,b_i)	-.554*	.422		.271	.283	.813*
σ (V)	.416 (.31)	.249 (.21)	.319 (.33)	.434 (.36)	.346 (.32)	.694 (.37)
96 $N_\rho(S)$	\$200 [2]	\$150 [13]	\$500	\$1200 [13]	\$1200 [18]	\$3000
$\bar{a}$ ($\sigma_{\bar{a}}$)			1.56 (.86)		1.41 (.93)	1.69 (.138)
$\bar{b}$ ($\sigma_{\bar{b}}$)			-.039 (.108)		.027 (.123)	-.051 (.310)
ρ (a_i,b_i)			.610*		.082	-.135
σ (V)			.508 (.33)		.534 (.38)	1.002 (.59)

Note: See text above, under "Measures of Income Experience," for definition of symbols. S denotes size of the sample, which is shown whenever fewer than 25 individuals were observed; no statistics are shown when fewer than 15 individuals were observed.

Hypothesis 2 asserts that variation in the trajectories observed for individuals also rises with increasing age. The pattern appears to hold for the cohorts 1914-1895, but is reversed in comparisons between those and younger individuals. (The pattern can be rationalized by the explanation that the two youngest cohorts are dominated by persons who leave school early and therefore have a lower return to experience. Only in the older groups where H2 is confirmed is the sample fully representative.) H2 does not appear unequivocally supported.

The next four hypotheses characterize differences in the income characteristics of those with increasing levels of wealth-yielding financial returns. Hypothesis 3 asserts a positive correlation between earned and non-earned income so that the relative income level of each wealth group is ordered according to its percentile position in the non-earned income distribution. This ordering is preserved in 36 of 47 possible comparisons, strongly supporting the hypothesis.[8]

The hypothesized correlation describes a situation in which individuals with high "permanent" returns to labor activity also have relatively high income from non-earned sources. The latter must reflect either higher than average returns on an average wealth holding or average returns on higher than average wealth holdings. Note that the observed correlation reflects interpersonal differences and does not depend upon the dynamics of income and wealth change.

Hypothesis 4 asserts increasing relative individual instability of income as wealth increases; hypothesis 5 asserts declining coefficients of variation for income stability as wealth increases. The increased variability of relative income is confirmed by the ordering of 37 out of 47 possible comparisons. The increased variability is so large that the ordering is reversed in only 4 instances by calculating the coefficient of variation. Hence hypothesis 5 must be rejected, with the implication that individuals with larger non-earned income obtain income from riskier sources than those with less non-earned income in their cohort; the extent of this increased risk is sufficient to exceed any increase that might be expected from higher incomes.

Hypothesis 6 asserts that dispersion of trajectories increases monotonically with position in the distribution of non-earned income. Heterogeneity of trajectories will rise with wealth, if capital markets are imperfect. Some persons are better able to secure high rates of return on assets than others in the cohort. The importance of this variation in return on assets naturally increases with the absolute amount of non-earned income. The hypothesis of increasing dispersion is supported in 33 of 47 possible comparisons.

Hypothesis 7 asserts a process of stratification; within each group steeper income trajectories are associated with average relative income positions that are above the mean for the group, i.e., the (relatively) rich get richer. The converse of this hypothesis is a hypothesis of regression toward the mean (see Figure 1). A value of $\rho = 0$ implies a balance between instances of stratification and regression. Eleven of the 24 subgroups indicate ρ that is significantly greater than zero at the .01 level. Two more subgroups show positive covariance significant at the .05 level. The positive correlation connotes increasing stratification <u>within</u> the population group over time. Only one subgroup (the youngest cohort

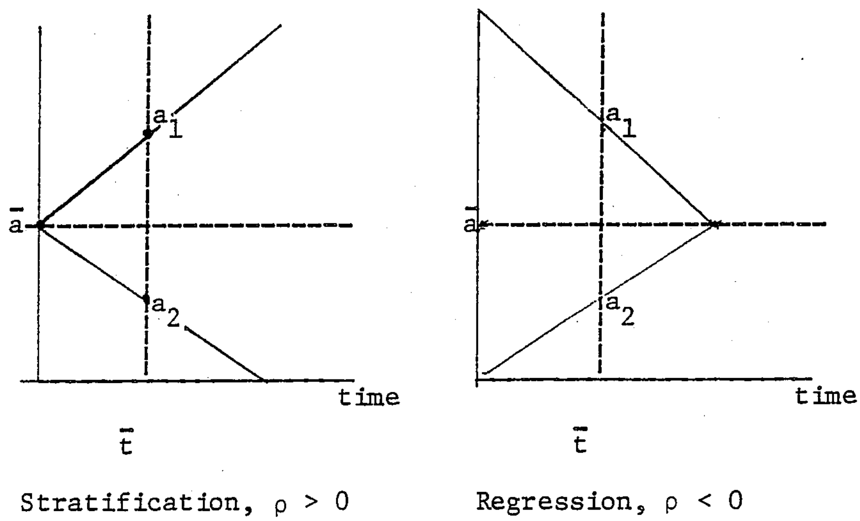

Figure 1. A Graphical Interpretation of ρ

where representativeness is a problem) indicates significant negative covariance, or regression of individuals toward the group mean position, $\bar{a}$.

Thus, within each subgroup we observe a pattern of stratification occurring, in which those who occupy relatively higher positions, with respect to the cohort as a whole, also have relatively higher trends. (The classification controls for average income from portfolios, but not for the return on capital invested in proprietorships, which is reported as self-employment income. Recomputation of the model to exclude those with self-employment income made no discernible difference in the character of the findings with respect to any of the conjectures or the number of significant ρ.)

None of the groups investigated is characterized by an average trend, $\bar{b}$, that exceeds the dispersion in trends, σ_b, among the individuals in that group. On average one would predict little or no change in relative income position for the subgroups as a systematic trend in time. What is clear, however, is that a process of stratification, indicated by $\rho > 0$, contributes to the cohort-related rise in interpersonal inequality, σ_a, confirmed in H1. Furthermore, significant stratification is concentrated in the lower percentiles of the wealth distribution, suggesting that those with low initial wealth positions and relatively low earned incomes experience lower probabilities for movement into higher relative income positions than those with higher earned incomes.

INTERPRETATION

In a controversial paper by Paglin (1975) and subsequent comments (Nelson et al., 1977) heated exchanges over whether inequality is increasing or decreasing in the United States have been aired. The model at hand offers a distinctive insight into that debate. Following the assumptions underlying Table 2, we concluded that income inequality increased with (calendar) age within groups defined on wealth (H1). The higher wealth groups also showed higher relative income positions (H3). This pattern was achieved by a random process of stratification actually observed in the data (H7), where in most subgroups those with better positions at the beginning of the period showed higher rates of improvement relative to the cohort.

All these findings have been taken relative to the experience historically recorded for major cohorts, so that the "life cycle" effect motivating Paglin's comments on inequality has been controlled (by decades of age, although a more precise control would be desirable). Estimates of σ_a put a lower bound on the rate of growth of inequality due to initial wealth.

Greater intergenerational transfers, giving young people more initial wealth than 20 years ago, lead us to expect historically increasing inequality if people who inherit more also earn more (see Menchik, 1978). Aging of those in the labor force would also contribute to increasing (within cohort) inequality. Thus the processes at work in Table 2 would be thought to yield increased inequality observed for the population as a whole. The only offset is that the influx of those born during the post-World War II "baby boom" into the labor market in the last decade would cause a reweighting of aggregate inequality statistics to make them appear smaller.

NOTES

[1]The percentiles are arbitrary, but were chosen to display the upper tail of the non-earned income distribution.

[2]Limited numbers of observations reduce our estimates to 24 of the 36 possible cells.

[3]If the trajectory is not linear, σ also includes specification errors.

[4]An auto-correlation specified for ε_{it} did not enhance the description of lifetime income patterns for the bulk of the population studied, largely because of the relatively short time series available for study.

[5]To the extent that other determinants of Z_{it} are introduced into the deterministic model, the number of parameters estimated will rise and the importance of the stochastic portion of the model will decline. If, however, we remember that most other variates are endogenous to the development of income over a lifetime, it is apparent that Equation (2) provides a useful summary of lifetime income trajectories.

Use of the classification on non-earned income does not constrain values of the parameters of the model. Since income is the sum of earned and non-earned components, then

$$Y_{it} \equiv E_{it} + N_{it},$$

where E_{it} denotes earned income of i in period t. The partition of individuals into the groups P is determined by the mean of non-earned income, $\bar{N}_i \equiv E\,N_{it}$. If

$$N_p \leq \bar{N}_i < N_{p+1}, \quad \text{then} \quad P_i = P.$$

Unless E_{it} and N_{it} are perfectly correlated, $\bar{Y}_i \equiv E(Y_{it})$ is not determined by $\bar{N}_i$. Hence $\bar{a}$ is not constrained within the group $\underline{\underline{p}}$. Furthermore, no a priori relationship exists between the value of $\bar{N}_i$ and the rate of growth of income b_i, so long as individuals can choose varying rates of saving and dissaving out of their incomes.

[6]Demographic conditions, vintages of human capital, and changes in significant features of compensation such as increasing eligibility for fringe benefits each contribute to such an explanation and should be modeled explicitly in further work.

[7]Calculations on the actual change in financial wealth income for these cohorts, by year, revealed rates of increase of 9 to 24% historically (David and Miller, 1970, p. 93).

[8]Non-earned income constitutes 5% of income for the sample. Hence a small definitional correlation is assured, unless those with more wealth have less human capital or choose to take more leisure than those with little wealth.

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