The purpose of this paper is to compare estimates of lifetime income based on crosssectional data with those based on life-cycle data for selected cohorts of men. Estimates of lifetime income now available are based on the variation of income with age reported during a single survey year. The 1970 census will show the amount of income received in 1969 by men who. at the time of the census, were 18-24 years old, 25-34, etc., or other age groups. Estimates of lifetime income from, say, starting age 18, can be prepared from these figures if it is assumed that the variation of income with age for men 18 to 64 years old in 1969 approximates the pattern of income that will be received by 18 year olds as they age during their working lifetime provided some suitable adjustment can be made each year for the change in income due to inflation and economic growth. Until recently this has been an untested assumption because there are no data which trace a man's earnings from the time he starts working until he retires. It is now possible to simulate such data for selected cohorts of men on the basis of information on income and age collected by the Bureau of the Census in the 1950, 1960 and 1970 Censuses and in the Current Population Survey in each year since 1947. Men who were 25 to 34 years old in the 1950 census were 35 to 44 years old in 1960 and 45 to 54 years old in 1970. By comparing the incomes reported for each of these age groups in the past three censuses we can observe the actual variation of income by age for the cohort of men born in 1915-24 and we can compare those incomes with the data reported for men in the same age groups in the 1950 census. A similar comparison for the cohort born in 1925-34 would provide a test for the 35 to 44 year age group. These comparisons could be made for all men as well as for whites and for nonwhites; they could also be made for education groups if it is assumed that men do not complete additional years of schooling beyond age 25. The analysis could also be extended to occupation groups, but this involves the doubtful assumption that men remain in the same occupation during their working lifetime.

Since the 1970 census data have not been tabulated at present, analysis must be made on the basis of Current Population Survey data. Figures are available for 6 cohorts of men: those born in 1913-22, 1914-23, 1915-24, 1903-12, 1904-13, and 1905-14; i.e., those 25-34 in 1948, 1949, and 1950 and those 35-44 in those same years. On the basis of these data we can trace the average incomes of men 25 to 34 years old in the March 1948 CPS, 35 to 44 in the March 1958 CPS and 45 to 54 years old in the March 1968 CPS. The same information is available for men 35 to 44 years old, 45 to 54 years old and 55 to 64 years old in the same surveys. Similar data are also available from surveys conducted in March also available from surveys conducted in March 1949, March 1959 and March 1969 and for March 1950, March 1960 and March 1970.

CROSS-SECTIONAL DATA ON INCOME BY AGE

Table 1 below presents the basic information now used to compute estimates of lifetime income. It shows for each year the average income reported for men in various age groups. These figures are taken directly from the published CPS reports. In the typical method of computing lifetime income, the averages for these age groups are converted to estimates of average income for single years of age by fitting a parabolic function to the age group data. The value of expected income from age 30 to 54 and from age 40 to 64 is then computed according to the procedure described below.1 The results of this calculation are shown in Table 2, based on the cross-sectional income surveys conducted in March 1948, March 1949 and March 1950. The 25-year earnings figures on the lines for 1947, 1948 and 1949 in this table are based on the average incomes obtained in cross-section surveys with separate figures for 0, 4, 4 1/2 and 5 percent allowance for the increase in income due to inflation and economic growth. The figures on the lines for 1967, 1968, and 1969 are based on the average incomes for cohorts. Although it is customary to discount future incomes to present values, a zero discount rate is used in order to focus more directly on the issue under consideration. Also, it is customary to make allowance for the probability of death, but this too was deleted for the sake of simplicity of presentation.

COHORT DATA ON INCOME BY AGE

With respect to the data in table 2 along the diagonals showing income by cohorts, it should be noted that unlike the cross-section data which show a leveling off of income between the ages of 35 and 54 and a decline thereafter. the cohort data show a continuous rise in average income extending well into the mid-sixties. The reason for the difference is that the crosssection data show the variations in the payments made by the economy to men in different age groups at a given point in time. They reflect the employment conditions, demand for and supply of men with different amounts of experience and training, occupational wage differentials and other relevant factors as they exist at a given point in time. In contrast, the cohort data approximate the results that would be obtained by tracing a man's actual earnings over a period of time. They therefore reflect changes in income due to inflation and general increases in wage levels.

The figures in table 2 on expected earnings from age 30 to 54 and from age 40 to 64 based on cohort data are based on a parabola that was fit to the average incomes for the appropriate age groups. An interesting feature of table 2 is the comparison of the percent change in income for an age group over one and two decades and the allowances for growth and inflation in the crosssectional estimates of 25 year earnings. In the first block we see that income rose at 4.7% per year not only in the ten year period from 1947 to 1957 for the age groups 35-44, but also in the twenty year period from 1947 to 1967 for the 45-54 year age group. It is remarkable that the estimate of \$149,000 for 25 year earnings based on fitting a parabola to the cohort data is very close to the estimate of \$154,000 based on fitting a parabola to the cross-sectional data with an allowance of 4.5% for economic growth and inflation. This relation holds well throughout the whole table. It appears then that for at least over the past 20 years or so, the relation of income to age and the rates of inflation and economic growth have been so surprisingly stable that estimates of lifetime earnings from crosssectional data are quite reliable.

One indication of the stability of the relationship between income and age is the similarity of the growth rates for each age group. A curve, $Yn = A (1 + X)^T$ was fitted by least squares (logarithms) to the 23 years of income data shown in Table 1 for each of the age groups 25-34, 35-44, 45-54, and 55-64. The results show that the least squares estimate of X, the rate of inflation and growth over the 23 year period was 4.93% for the 25-34 year group, 5.03% for the 35-44 year group, 4.91% for 45-54, and 4.96% for the 55-64 group.

The figures below are the coefficients of a least square parabola (Yn = $A + BN + CN^2$) fitted to the mean incomes deflated by 5% per year, for the 4 age groups 25-34, 35-44, 45-54, and 55-64, for each year 1947 to 1969. In this equation, N is age, scaled so that N = <u>actual age-1</u>.

For example, for 1947:

 $Yn = 1511 + 1493 N - 293.5 N^2$.

The change coefficient B (Col. 2) and the rate of change C (Col. 3) are both quite stable over time. This standardization process reveals clearly that the parabolic coefficients are remarkably similar over the 23 years; that is, the age curve for income is very stable.

Thus, it appears that estimates of lifetime income based on cross-sectional data can be quite adequate if the distributions of income by age and the rates of inflation and economic growth are as stable as they have been over the past twenty years.

	<u>A</u>	B	<u>c</u>
1947	1,511	1,493	-293
1948	1,787	1,241	-248
1949	1,680	1,112	-222
1950	1,505	1,439	-282
1951	2,038	1 021	-222
1922	2,007	1,007	-207
1955	2,110	1,007	-207
1924	1 909	1 087	-205
1955	1,000	1 202	-205
1920	1,077	1 237	-240
1958	1 849	1 121	-231
1950	2,003	984	-291 -193
1960	1 713	1 310	-267
1961	1 843	1,113	-219
1962	1,526	1,371	-272
1963	1,695	1,157	-226
1964	1,756	1.144	-236
1965	1,649	1,323	-269
1966	1,744	1,264	-256
1967	1,689	1,244	-251
1968	1,781	1,200	-236
1969	1,805	1,335	- 267

¹For example, we take the incomes as centered on the mid ages of the groups (see below) and

Age	1947 Income			
3 0	2704			
40	3344			
5 0	3329			

fit a parabola, $Yn = A+BN+CN^2$, where N represents age; Yn represents the parabolic estimated value of income for any age N; and A, B, and C are coefficients obtained by fitting to the observed (above) 3 points. For the above values the equation becomes

$$Yn = 3146 + 293.25N - 3.275 N^2$$
.

From this we can estimate the incomes at every age N from say 30 to 54 and add them together to estimate 25-year earnings for a man age 30, without of course, allowance for death and for the effect of inflation or economic growth on income during the 25 years. Incidentally the result here is \$80,577. See the first entry under "expected income" in table 2.

We make allowance for inflation and economic growth by multiplying the estimated income (Yn) at each age (N) by (1 + X) ^{N=30} where X is an assumed constant rate of inflation and growth per year and N=30 is the number of years that intervene before a man now age 30 reaches age N. Applying an allowance of 4.0% per year to the above data we obtain \$142,000, the second figure in table 2. (In current dollars)

Year	All ages	14 - 19	20 - 24	25 - 34	35 44	45 - 54	55 - 64	65 and over
1947	2 636	746	1 641	2 704	3 3//	3 329	2 795	1.906
1948	2,755	692	1 911	2,898	3,508	3,378	2,946	1,778
1949	2,677	638	1,808	2,842	3,281	3,331	2,777	1.827
1950	2,994	634	1,969	3,068	3,782	3,733	3,123	1.894
1951	3,275	744	2,326	3,511	4,112	3,884	3,356	1.891
1952	3,406	745	2,311	3,707	4,130	4,292	3,664	2.211
1953	3,549	803	2,285	3,909	4,435	4,382	3,796	2,217
1954	3,565	737	2,310	3,774	4,461	4,437	3.755	2.151
1955	3.748	668	2,439	3,984	4.644	4.786	4.231	2,295
1956	4,005	708	2,670	4,403	5,200	5.012	4.270	2,351
1957	4.068	678	2,614	4,552	5,300	5.227	4.295	2,233
1958	4.162	671	2.643	4,681	5,433	5,345	4,515	2,283
1959	4,487	708	2,783	4,956	5,926	5.587	5,166	2,559
1960	4.659	693	2,808	5.160	6.271	5,994	5,089	2,775
1961	4,893	680	2,960	5,389	6,424	6,263	5,563	3,229
1962	4,970	708	2,959	5,379	6.847	6,387	5,587	2,943
1963	5,125	708	2,928	5,705	6,872	6,747	5,938	3,097
1964	5,329	773	3,172	6.073	7,211	6,914	5,884	3,534
1965	5,692	901	3,532	6,458	7,878	7,538	6,360	3,241
1966	6,019	942	3,728	6,935	8,257	8,098	6,825	3,335
1967	6,159	1,015	3,669	7,107	8,443	8,342	7,004	3,667
1968	6,626	1,042	3,896	7,617	9,115	8,967	7,828	3,988
1969	7,202	1,099	4,149	8,378	10,042	9,873	8,405	4,306
1969 SOURCE: U.S. B	7,202 ureau of th	1,042 1,099 e Census, <u>C</u>	4,149 urrent Popu	8,378	10,042 <u>rts, S</u> eries	9,873 P-60, annu	8,405 al issues.	4,

Table 2.--Expected Income From Age 30 to 54 and From Age 40-64 Based on Cross-Sectional and Cohort Data

(Expected	income	in	thousands	of	dollars)
(Twbco coa	TT10.01100		offic discription	~	dorrarb)

Year	Mean Income by age			Expected income from age 30-54 with assumed annual growth rate of:			
	25-34	35-44	45 - 54	0%	4.0%	4.5%	5.0%
1947 1957	2,704	3,344 5,300	3,329	80	142	154	166
1967 Growth rate		4.7%	8,342 4.7%	149			
1948	2,898	3,508 5,433	3,378	83	147	158	171
1968 Growth rate		4.5%	8,967 5.0%	157			
1949 1959	2,842	3,281 5,926	3,331	80	142	154	166
1969 Growth rate		6.1%	9,873 5.6%	171			
Year	35-44	45-54	5564	Exp	xpected income from age 40-64		
1947 1957	3,344	3,329	2,795	78	132	142	153
1967 Growth rate		4.6%	7,004 4.7%	139			
1948 1958	3,508	3,378 5,345	2,946	80	137	148	159
1968 Growth rate		4.7%	7,828 5.0%	148			
1949 1959	3,281	3,331 5,587	2,777	77	131	141	152
1969 Growth rate		5.3%	8,405 5.7%	1 5 6			