THE 1919 BIRTH COHORT

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We have prepared life tables through June 30, 1987 for four subpopulations born in the United States in 1919: white males, white females, nonwhite males, and nonwhite females (table 1). These are cohort, or generation, tables, describing the mortality experience of a real cohort, in contrast to the usual, period tables which refer to synthetic cohorts subject to the age-specific probabilities of death experienced during some short interval of time, such as 1 year or 3 years.

Cohort life tables usually are constructed by selecting appropriate death rates from period tables for years for which period tables are available, then interpolating for the intervening years. We followed this procedure only in dealing with mortality from age 1 in 1920 through age 21 in 1940. For mortality in the first year of life we used 1919 infant mortality rates, and for mortality from 1940 on we used data on deaths by single year of age generously made available to us by the Bureau of the Census, which uses these data for its postcensal and intercensal population estimates and for its undercount evaluation [1].

In applying these mortality data to the cohort of 1919 resident births, we assumed nondifferential mortality by nativity. Though official statistics showed for some time that immigrants suffer higher age-specific mortality than the native-born, the well-known Kitagawa-Hauser study, undertaken in connection with the 1960 census, revealed that the denominator for official foreign-born mortality rates was understated because many immigrants reported themselves as natives in the census; and that, in fact, there was little difference in mortality between immigrants and natives, at least in 1960 [2]. Even if there were a difference in earlier years, the overall effect would still be insignificant, given the low level of immigration in the '20's and '30's.

You will notice in the table the increased male mortality between ages 22 and 26, reflecting World War II deaths. A cohort life table which is constructed for the purpose of depicting the underlying pattern of mortality for a cohort would eliminate this hump. We do not, however, because our objective is an empirical accounting for the 1919 birth cohort.

Our interest is not really in mortality, per se. Rather, ours is a project, undertaken in connection with the 50th anniversary of the Social Security program, to describe the distribution of effects the program has had on individuals: how much money has it taken from and returned to each. We thought that this distribution could best be understood if it were limited to a single birth cohort. The 1919 cohort was chosen because its members are young enough to have spent their entire adult working lives with the system in place, yet old enough to have already had substantial experience as program beneficiaries.

We decided to further limit the target population to those cohort members who were born in the United States. Persons migrating to the United States as adults spent only part of their working lives under the program, and their distribution of experiences therefore is atypical. Furthermore, we will need to know the total size of the cohort in order to put our numbers in perspective, and this total is known for the native-born.

The Social Security Administration obtains place-of-birth information on the application for a Social Security number. Before the mid-70's, when the entire file of applications was converted from a paper medium to machine-readable form, the practice was--unfortunately for us--to move the Social Security number application out of the file and into a claims folder whenever a claim for benefits was received. These application forms consequently were unavailable for the paper-to-tape conversion, and the only centralized record we have of them is a microfilm copy.

The fact that the 1919 native birth cohort numbers a couple of million people dictates that our investigation be carried out on a sample basis. A natural choice is the sampling design for the Social Security Administration's major statistics and research file, the Continuous Work History Sample, which selects a 1-in-100 sample of Social Security numbers based on the 6th, 8th, and 9th digits of the number. We ended up with a sample of over 26 thousand Social Security numbers belonging to persons born in the United States in 1919, including some 4 thousand for which we determined nativity by inspecting microfilm prints of the Social Security number application form. For each of the small number of cases where the form could not be located, or the place-of-birth item was left blank, or "unknown" was entered, or the entry was illegible, we imputed the nativity status of the record closest in file with the same year of issue and sex.

Were it the case that every person were issued a Social Security number when the program was inaugurated in mid-November 1936 which the person then used the rest of his or her life, then each person's experience under the Social Security program could be easily deduced from the program records for the Social Security number issued to the person. Or, if a person were issued several numbers but Social Security Administration records were properly cross-referenced, then the person's experience could be derived from the collection of program records for his or her several Social Security numbers. In fact, however, some persons were never issued a number, while others were issued more than one without the Social Security

Administration ever finding out about it.

With respect to persons in the 1919 cohort never issued a number, who, generally speaking, have necessarily had no connection with the Social Security program, neither as taxpayers nor as beneficiaries, it would satisfy our purposes just to know how many there are. Were it not for the other problem, the problem of unidentified multiple issuance, we could derive the number of persons never issued a number by subtracting the number of persons to whom a number has been issued from the total size of the cohort. Because of the multiple issuance problem, however, we do not know how many cohort members have been issued Social Security numbers.

How can we deal with the multiple issuance problem?

Now, when the Social Security Administration routinely publishes information on workers and beneficiaries, does it take account even of multiple issuance which is annotated in its files, let alone multiple issuance of which it is unaware, to adjust for double-counting? The answer is "no", and the rationale for the negative answer is that presumably an individual to whom multiple numbers have been issued is currently using only one. Probably a person who applies for another number has forgotten the earlier number, or has forgotten that there was an earlier number, or thinks that the earlier number is no longer valid.

Likewise, in our cohorts study, we will accept the 16,383 records current as of June 1987, whether they be records of current receipt of Social Security or supplemental security income benefits, current entitlement to Medicare, or current employment. It is reassuring that for three of the four race groups the number of current Social Security numbers is within 1 percent of the life table figure for age 68 in June 1987.

By similar logic, we will accept records with an indication of death. There are 6,166 of these, bringing the total number of accepted records to 22,549, representing about 2,255,000 people. Interpolating between ages 17 and 18 in our life tables to age 17 3/8 in mid-November 1936 yields an estimated cohort size of 2,368,000 as of that date, so there remain [2,368-2,255], or 113 thousand persons not accounted for. Yet we have 3,779 sample Social Security numbers, representing some 380 thousand numbers, which are neither current nor known deaths as of June 1987.

Among these 3,779 remaining numbers are 931 with an annotation that the owner of this number owns other numbers, as well. Although we haven't verified this, surely the great majority of these are the earlier numbers issued to persons whose other number is the current one.

How many of the remaining 2,848 numbers represent as-yet-undetected multiple issuance, and which ones are they? In a study which we reported on to the Washington, D.C. chapter of the ASA last December, we were able to uncover, at least for the 1919 cohort, almost as much heretofore undetected multiple issuance as heretofore detected. This despite the Social Security Administration's position that the extent of unknown multiple issuance is believed to be small [3]. In that study, for each of four randomly-selected dates in 1919, we collected all Social Security number applications and related forms with that date entered as the date of birth, sequenced them electronically to bring together records agreeing on various key fields such as parent's name or city of birth, and then made a visual determination of multiple issuance.

Still, this is far short of the number of multiple issuances we would need to uncover in order to explain the excess of Social Security numbers relative to the total size of the cohort, and the extent of multiple issuance can only be guessed at. In retrospect, a major factor explaining why that study didn't do even better is that certain records were missing information in the fields we used for matching. For example, as mentioned earlier, until the mid-1970's the application form was removed from the file during claims processing, its place taken in the file by a claims indication form which typically contained less identifying information. Also, in the first year of the program at least, employers were permitted to file applications on behalf of persons without numbers who had left their employ, so that the person's wages could be posted to some account; naturally, employers would not be privy to personal information such as the names of the worker's parents.

One formal approach to guessing the extent of multiple issuance uses a distribution of issuances by year (table 2) together with a model theorizing what proportion of each year's issuances are multiple issuances. A simple example is the model which has this proportion increasing linearly by .02 from .02 in 1936 to 1.00 in 1985. This simple model would estimate multiple issuance at 314 thousand (about 12 percent of all issuances), which leads to the plausible conclusion that another 64 thousand people born in 1919 who are neither currently active nor known deaths, have been issued numbers, while 49 thousand cohort members alive at the time of the program's inception were never issued numbers.

We should explain the deviations from the general pattern of decreasing levels of issuance with time seen in table 2. The deviations in 1950-51 and 1955-56 are due to the expansion of employment covered by the Social Security program to include farm employment and self-employment. The increase in 1963 is due to the requirement for Social Security numbers on income tax forms, and the jump in 1973 to the Social Security Administration's initiative to issue numbers to all its program beneficiaries (residing in the United States).

No matter how we estimate the extent of multiple issuance, we will still need some way to decide which records are the multiple issuances and which we should keep. Our cohort life tables are useful here because they give us some sex-race controls. We may be able to do even more with them.

By differencing the distributions of age at death in the cohort life tables and in Social Security Administration data (table 3), we can obtain the distribution of age at death among deaths not known to the Social Security Administration. Now, age at death and age in year last employed often will be one and the same, particularly for males, so that when we go to decide which records represent deaths at a particular age not reported to the Social Security Administration, we may assign a higher probability to those records with last year employed at the age in question.

We hope to soon complete the task of choosing the records which will comprise our study file, so that we may proceed to obtain substantive results. We would like to suggest, in closing, that our cohort-based approach would be useful in investigating other phenomena, as well. How does a cohort's health change with time? What is its total lifetime geographic mobility? Does its educational attainment distribution change much after age 25?

Much of the necessary data could be gleaned from the volumes of various censuses, and some old census tapes would have to be spun. No doubt that interesting methodological issues would arise, as well.

NOTES

[1] We are grateful to Louisa Miller and J. Gregory Robinson of the Census Bureau for their help.

[2] Evelyn M. Kitagawa and Philip M. Hauser, Differential Mortality in the United States: A Study in Socioeconomic Epidemiology, Cambridge, Massachusetts: Harvard University Press, 1973. Also, see Bert Kestenbaum, "Mortality by Nativity", Demography, February 1986, pp. 87-90.

[3] Social Security Administration, Social Security Number Task Force: Report to the Commissioner, May 1971.

Table 1.--Cohort Life Tables for 1919 Native Birth Cohort

Age x	White males		White females		Nonwhite males		Nonwhite females	
	l(x)	d(x)	l(x)	d(x)	l(x)	d(x)	l(x)	d(x)
0	1228.0	109.7	1159.0	83.0	179.0	25.1	174.0	19.7
1	1118.3	17.2	1076.0	14.9	153.9	3.7	154.3	3.3
2	1101.1	8.1	1061.0	7.0	150.3	1.6	150.9	1.4
3	1093.0	5.4	1054.1	4.8	148.7	.9	149.5	.9
4	1087.6	4.4	1049.3	3.8	147.8	.6	148.6	.7
5	1083.2	3.6	1045.5	3.0	147.2	.5	148.0	.6
6	1079.6	2.9	1042.5	2.4	146.6	.5	147.4	.5
7	1076.7	2.4	1040.1	1.9	146.2	.4	146.9	.4
8	1074.3	2.0	1038.2	1.6	145.8	.4	146.5	.3
9	1072.3	1.8	1036.6	1.3	145.4	.3	146.2	.3
10	1070.5	1.6	1035.3	1.2	145.1	.3	145.9	.3
11	1068.9	1.6	1034.1	1.1	144.8	.3	145.7	.3
12	1067.3	1.6	1032.9	1.2	144.5	.3	145.4	.3
13	1065.7	1.7	1031.8	1.2	144.1	.4	145.1	.4
14	1064.1	1.8	1030.6	1.3	143.7	.5	144.7	.5
15	1062.3	1.9	1029.3	1.4	143.3	.5	144.2	.6
16	1060.4	2.1	1027.9	1.5	142.8	.6	143.6	.7
17	1058.3	2.2	1026.5	1.5	142.2	.6	142.9	.7
18	1056.1	2.2	1024.9	1.4	141.5	.7	142.2	.8
19	1053.9	2.3	1023.5	1.6	140.9	.7	141.4	.8
20	1051.6	2.3	1021.9	1.6	140.1	.8	140.6	.8
21	1049.4	2.3	1020.4	1.6	139.3	.7	139.8	.7
22	1047.1	3.6	1018.8	1.5	138.6	.8	139.1	.7
23	1043.5	4.9	1017.2	1.5	137.8	.8	138.4	.7
24	1038.6	7.9	1015.7	1.5	137.0	.8	137.7	.7
25	1030.7	11.6	1014.2	1.4	136.3	.8	137.1	.6
26	1019.2	2.0	1012.7	1.5	135.5	.6	136.5	.6
27	1017.2	2.1	1011.3	1.4	134.8	.6	135.9	.6
28	1015.1	2.0	1009.9	1.3	134.2	.6	135.3	.6
29	1013.1	1.9	1008.6	1.3	133.6	.6	134.7	.5
30	1011.2	1.9	1007.3	1.4	133.1	.6	134.2	.6
31	1009.3	2.7	1005.9	1.0	132.4	.8	133.6	.4
32	1006.6	2.2	1004.9	1.1	131.7	.6	133.2	.4
33	1004.4	2.4	1003.9	1.1	131.1	.7	132.8	.5
34	1002.1	2.1	1002.7	1.2	130.4	.6	132.3	.5
35	1000.0	2.2	1001.5	1.3	129.8	.6	131.8	.5
36	997.8	2.3	1000.2	1.4	129.2	.7	131.2	.6
37	995.5	2.5	998.7	1.6	128.5	.7	130.7	.6
38	993.0	2.9	997.2	1.7	127.8	.8	130.1	.7
39	990.1	3.0	995.5	1.8	127.0	.8	129.4	.7
40	987.1	3.3	993.7	2.0	126.2	.9	128.7	.8
41	983.8	3.5	991.7	2.1	125.3	.9	127.9	.7
42	980.3	4.0	989.6	2.2	124.4	1.0	127.2	.8
43	976.3	4.5	987.3	2.7	123.4	1.0	126.4	.8
44	971.8	4.9	984.7	2.8	122.4	1.1	125.6	.9
45	966.8	5.4	981.8	3.1	121.3	1.2	124.7	.9
46	961.4	5.8	978.7	3.4	120.1	1.3	123.8	1.0
47	955.6	6.6	975.3	3.7	118.8	1.4	122.8	1.0
48	949.0	7.2	971.6	4.0	117.4	1.6	121.8	1.1
49	941.8	8.1	967.5	4.5	115.8	1.7	120.7	1.2
50	933.6	8.6	963.1	4.7	114.2	1.8	119.5	1.2
51	925.0	9.1	958.4	4.9	112.4	1.8	118.3	1.2
52	916.0	9.9	953.5	5.5	110.6	1.8	117.1	1.3
53	906.0	10.7	948.0	5.7	108.7	2.0	115.8	1.3
54	895.4	11.1	942.4	6.0	106.7	2.0	114.5	1.3
55	884.2	11.6	936.4	6.3	104.7	2.0	113.2	1.3
56	872.7	12.0	930.1	6.6	102.7	2.0	111.9	1.3
57	860.6	12.8	923.5	7.0	100.8	2.1	110.6	1.3
58	847.8	13.6	916.5	7.5	98.7	2.2	109.4	1.5
59	834.3	14.4	909.0	7.9	96.5	2.3	107.9	1.4
60	819.8	15.1	901.1	8.3	94.2	2.4	106.5	1.5
61	804.8	16.1	892.8	9.4	91.9	2.4	105.0	1.6
62	788.7	17.0	883.4	24.1	89.5	2.5	103.4	1.7
63	771.7	18.2	859.3	10.9	87.0	2.6	101.7	1.9
64	753.5	19.2	848.4	11.8	84.4	2.7	99.8	2.0
65	734.4	19.9	836.6	12.6	81.6	2.8	97.8	2.1
66	714.5	20.8	824.0	13.4	78.8	2.7	95.8	2.1
67	693.7	21.6	810.6	14.3	76.1	2.7	93.7	2.3
68	672.1		796.4		73.4		91.4	

Table 2.--Social Security Number Issuances, by Year of Issuance

Year issued	White males	White females	Nonwhite males	Nonwhite females	Total, all groups
1936	1282	1042	64	16	2404
1937	4267	2874	500	128	7769
1938	1895	1494	314	135	3838
1939	1374	989	278	129	2770
1940	866	616	202	88	1772
1941	575	588	181	131	1475
1942	171	580	107	178	1036
1943	97	432	39	224	792
1944	62	249	37	169	517
1945	181	139	47	71	438
1946	177	135	46	56	414
1947	83	86	22	30	221
1948	37	83	13	30	163
1949	19	62	12	18	111
1950	20	89	10	24	143
1951	34	124	15	62	235
1952	43	92	7	26	168
1953	19	97	2	21	139
1954	20	67	4	18	109
1955	67	83	14	26	190
1956	95	81	7	29	212
1957	16	57	6	16	95
1958	12	43	0	12	67
1959	6	48	2	9	65
1960	9	45	1	11	66
1961	5	39	3	10	57
1962	8	48	2	11	69
1963	12	123	1	12	148
1964	4	62	1	17	84
1965	5	48	0	10	63
1966	5	63	0	13	81
1967	9	51	3	12	75
1968	6	41	2	9	58
1969	6	48	3	7	64
1970	4	34	1	7	46
1971	3	29	1	9	42
1972	6	41	1	7	55
1973	17	59	4	14	94
1974	5	26	3	12	46
1975	3	60	1	7	71
1976	2	17	0	0	19
1977	2	10	1	3	16
1978	0	7	1	0	8
1979	1	2	0	2	5
1980	0	2	0	0	2
1981	1	1	2	2	6
1982	0	2	0	0	2
1983	0	1	1	0	2
1984	0	2	1	0	3
1985	0	2	0	1	3
1986	0	0	0	0	0
1987	0	0	0	0	0

Table 3.--Age at Death: Deaths Known to the Social Security Administration

Age at death	White males	White females	Nonwhite males	Nonwhite females	Total, all groups
18	7	1	1	0	9
19	2	4	0	0	6
20	7	4	2	0	13
21	5	3	1	1	10
22	10	1	4	0	15
23	18	5	1	0	24
24	46	7	3	0	56
25	94	3	4	1	102
26	14	3	3	0	20
27	19	3	6	0	28
28	5	5	5	0	15
29	13	2	7	0	22
30	10	8	1	0	19
31	17	4	4	1	26
32	14	6	5	1	26
33	14	4	3	0	21
34	17	5	5	1	28
35	22	6	6	0	34
36	27	11	4	0	42
37	29	10	5	2	46
38	31	9	7	3	50
39	35	15	8	4	62
40	31	6	12	3	52
41	36	12	11	0	59
42	38	13	9	3	63
43	50	14	6	5	75
44	42	16	11	9	78
45	47	20	8	6	81
46	57	30	15	7	109
47	75	20	16	5	116
48	62	33	22	9	126
49	74	42	14	10	140
50	81	31	18	4	134
51	87	34	23	9	153
52	87	31	22	9	149
53	99	55	22	12	188
54	113	52	21	12	198
55	100	54	25	9	188
56	107	58	23	13	201
57	120	45	20	15	200
58	115	54	20	8	197
59	132	59	21	17	229
60	153	75	25	14	267
61	155	76	31	22	284
62	167	102	17	12	298
63	158	82	36	19	295
64	170	128	32	19	349
65	187	128	33	17	365
66	221	124	24	21	390
67	214	130	25	29	398