

FURTHER DEVELOPMENTS IN INTERCENSAL POPULATION ESTIMATES USING ADMINISTRATIVE RECORDS

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This paper relates to the evaluation of intercensal population estimates for states and metropolitan areas ongoing at the Census Bureau. The focus of the paper extends the present use of Administrative Records (individual income tax records in this instance) for the purpose of preparing Black population estimates for both States and SMSAs.

The specific experimentation reported on here involves linking demographic characteristics (age/race/sex) from a 10 percent sample of individuals on SSA's Master Earnings Record to the corresponding Federal tax returns. Net migration of the tax paying population, by characteristic, can be determined by matching address on successive periods of filing. In the present experimentation a slight modification of the existing method of adjusting migration of the tax paying population to migration of the total population is also described.

Although this study relates primarily to Black population estimates, the procedure of decomposing the tax file can provide estimates for any sub-group of the population which is separately classifiable in the tax files. In this paper comparisons are made between estimates of the total population derived by this detailed application (referred to as Extended Administrative Records method or EAR) and those obtained directly by the more simple application (of

working directly with the total as a whole) used in the regular estimates program in the 1970's.

For comparative and background purposes, the first part of this paper compares 1980 estimates of the total resident population for states and SMSAs prepared by "the standard" Census Bureau procedures used during the 1970's with the 1980 census counts. The comparisons put the estimates in historical perspective relative to level of accuracy--accuracy as measured by differences from the population census counts. The bulk of the paper, however, describes and evaluates the estimates of the Black population for states and SMSAs developed by EAR.

ACCURACY OF ESTIMATES OF TOTAL POPULATION

Text Table A summarizes for states the percentage differences (or "errors") between the estimates and the census counts. Average absolute percent differences are shown for 1960 and 1970 for the "best" estimates then in use, i.e., the average of two methods (Component Method II and Ratio-Correlation). For 1980, the table shows average errors for (1) these two methods plus Administrative Records (AR); (2) AR alone as used in the 1970's and (3) EAR referred to earlier. Descriptions of the basic methodology for the former methods have been provided in numerous Census Bureau publications and articles.[1]

An initial reading of the table suggests a significant lowering of the accuracy of the

Table A.-- SUMMARY EVALUATION OF 1980 STATE POPULATION ESTIMATES

ITEM	1960	1970	1980 UNADJUSTED			ADJUSTED FOR 1970 UNDERCOUNT					
			Three Methods	AR	EAR	Pro-Rata Adjustment			Differential Adjustment		
						Three Methods	AR	EAR	Three Methods	AR	EAR
ALL STATES (51)	1.64	1.18	2.46	2.48	2.08	1.87	1.90	1.77	1.51	1.52	1.42
More than 4 million (16)	1.23	1.02	2.07	2.01	1.84	1.77	1.88	1.10	0.84	0.98	0.80
1.5 to 4 million (18)	1.37	1.20	2.92	2.96	2.26	2.00	1.64	1.40	1.38	1.17	0.88
Less than 1.5 million (17)	2.40	1.31	2.34	2.42	2.11	1.83	2.19	2.79	2.27	2.41	2.59
Excluding D.C., AK, HI (14)	1.92	1.34	2.49	2.16	1.28	1.73	1.70	2.05	1.65	1.18	1.81
Positive Errors	25	30	10	6	12	21	27	31	25	20	33
Errors Greater than 3%	6	1	18	20	13	8	7	6	5	3	5
SOUTH (17)	1.88	1.09	3.47	3.39	3.02	1.93	2.11	1.66	1.59	1.79	0.92
Excluding D.C. (16)	1.42	1.12	3.63	3.43	2.70	1.83	1.90	1.42	1.05	1.14	0.90
Positive Errors	12	8	1	1	1	2	4	3	6	7	12
Errors Greater than 3%	2	1	12	12	9	4	2	1	1	1	0
NONSOUTH (34)	1.51	1.22	1.96	2.02	1.61	1.84	1.80	1.83	1.47	1.38	1.67
Excluding AK and HI (32)	1.51	1.20	1.96	1.89	1.40	1.85	1.66	1.53	1.41	1.09	1.23
Positive Errors	13	22	9	5	11	19	23	28	19	13	21
Errors Greater than 3%	4	0	6	8	4	4	5	5	4	2	5

NOTE: AR refers to Administrative Records Method; EAR stands for Extended Administrative Records Method.

population estimates in the 1970's. The overall average error for states in the publication series amounted to 2.5 percent, significantly higher than the 1.2 percent in 1970 or the 1.6 percent in 1960. There was substantial regional (and directional) bias. The states in the South averaged 3.5 percent as compared with 2.0 percent for the states outside of the South. In 1970 the corresponding figures were 1.1 and 1.2, respectively. The directional bias of the estimates is very marked--only 9 states (all in the North) had positive deviations compared to 1960 and 1970 where little or no directional bias was evident. The higher error rates in 1980 were pervasive, applying to size class, region, and states individually.

The error rates for AR alone are about at the same level as for the average of methods. However, some improvement is noted for the EAR method. For the latter the average error is 2.1 percent-3.0 percent for the 17 states in the South and 1.6 percent for the nonSouth states. EAR's improvement extends to size class as well as to a reduction in "extreme" errors (errors in excess of 3.0 percent).

The estimates shown in Table A are designed to exclude the effects of Washington, D.C., Alaska, and Hawaii from the summary measure. The District of Columbia (being a core city of a large metropolitan area) is a unique area and can make a very large contribution to the overall average state error. Alaska and Hawaii have military concentrations much greater than any other state and they were not included in the 1960 evaluation.

Table B.--SUMMARY EVALUATION OF 1980 SMSA POPULATION ESTIMATES
(41 SMSAs with 1970 Black Population Exceeding 100,000)

ITEM	1970	1980 UNADJUSTED		
		Three Methods	AR	EAR
ALL SMSAs (41)	1.63	2.49	2.43	1.90
Positive Errors	17	11	14	10
Errors Greater than 3 Percent	5	14	14	8
SOUTH (22)	1.56	3.38	3.11	2.22
Positive Errors	11	1	4	5
Errors Greater than 3 Percent	3	12	12	5
NONSOUTH (19)	1.71	1.45	1.65	1.52
Positive Errors	6	10	10	5
Errors Greater than 3 Percent	2	2	2	3
Pop. More than 2 million (15)	1.39	1.71	1.95	2.06
Pop. 1 to 2 million (11)	2.36	2.96	2.91	1.72
Pop. less than 1 million (15)	1.24	2.92	2.56	1.86

NOTE: 1970 Universe consists of 37 observations; 19 in South, 18 in nonSouth

The increase in average error in the estimates for 1980 relative to earlier periods also shows up at the SMSA level. Table B shows average errors for 41 large SMSAs (with 100,000 or more Black population in 1970) using the same methods as for states. Overall, the 1980 errors are larger than in 1970 and match the level of error for states for each of the methods shown. For example, the average error in 1970 for 37 areas (of the 41 SMSAs in the 1980 universe) was 1.6 percent vs. 2.5 percent for all 41 SMSAs in 1980. The entire difference was confined to the SMSAs in the South, 1.6 percent in 1970 vs. 3.4 percent in 1980. Even the EAR method, which shows improvement over the conventional application of AR, was 2.2 percent in the Southern SMSAs--still appreciably higher than the 1970 error rate for these areas. The 1.5 percent error for Northern SMSAs in 1980 is slightly less than the 1.7 percent error rate for those areas in 1970.

THE IMPACT OF IMPROVED COVERAGE IN THE 1980 CENSUS

In this section the reasons for the higher error rates in 1980 compared to earlier periods are explored and examined. A review of the figures does not suggest a deterioration of the input data or of the underlying assumptions included in the basic methodology, but rather a problem with our measuring instrument--the 1980 census of population; not that there is anything wrong with the 1980 census, in the sense that it is less reliable or complete than earlier censuses. To the contrary, there has been a substantial improvement in coverage in 1980 relative to 1970 which causes a poor reading on the 1980 estimates. The 1980 census enumerated about 5 million more persons than was expected on the basis of coverage levels of 1970 when an estimated 5.1 million (revised to 4.6 million) were "missed" by census takers.[2] Since local population estimates developed by the Census Bureau are designed to provide "census level" estimates, any significant change in census coverage would seriously impact the measured error. Any improvement in coverage becomes another "component of change" which cannot logically be included in the estimation process. It is obvious that this situation has occurred and it has seriously affected the traditional 1980 evaluation analysis.

A major purpose of this paper is to point out the flexibility of the Administrative Records approach to population estimation. But the evaluation of this or any method for 1980 needs to consider the role and the impact of the 1980 improvement in coverage.

A uniform upward prorated adjustment to the 1980 estimate to allow for increased coverage would reduce the overall average error in Table A to about 1.9 percent.[3] In this simple adjustment process, errors for states with initial positive deviations will get larger, as will states with negative deviations less than 1 percent. But, greater reductions in the average error occur when adjustments for census undercounts in 1970 are made, differentially by state.[4] The improvement in the estimates after adjustment is particularly noteworthy in EAR for estimates in the South where the average

error drops below 1 percent.[5]

These differential adjustments to the 1970 census counts are only illustrative and are provided to demonstrate the possible impact of the differential census coverage on the estimation error and to explain, in part, the problem of evaluating the 1980 estimate error relative to earlier periods. Other assumptions or methods to be applied for distributing the 1970 and 1980 undercounts to states to provide consistent census bases may yield different results for individual areas but are unlikely to impact the summary measures shown in Table A.[6]

The next section of the paper will consider the application of EAR in developing estimates of the Black population and the relative accuracy of such estimates as measured against the 1980 census (with the problems noted).

Methodology: EAR is an extension and modification of the basic AR used in the 1970's to produce estimates of total population of geographic areas--states, counties and cities. The basic AR procedure recodes the mailing address of the principal taxpayer to a very specific geographic residence (39,000 distinct governmental units) and generates figures on in-migrants, out-migrants and nonmigrants of federal tax filers, by matching addresses on individual tax returns for successive periods. This net migration rate for taxpayers is applied without adjustment to the area's estimated resident population to provide an annual estimate of net internal migration.

In the EAR application, the above is done separately by age, sex, and race of the primary tax filer. It is modified such that within each age/sex/race group, the area's tax filing out-migrants are adjusted (inflated) by the inverse of the group's "efficiency rate"[7] in the area to develop an estimate of total out-migrants. A similar adjustment is made for in-migrants of tax filers but the adjustment (inflation) factor for the in-migrants represents the average of the out-migrant factor for the area and the national efficiency factor for the same age/sex/race group.

In addition, the geographic universe in EAR is limited to each SMSA (or SMSA portion) in a state, plus the non-metropolitan remainder of that state, which is treated as a one-entity SMSA. State totals are derived by summing SMSA's and balance-of-state together. These state figures, both for total and by race, are controlled to an independent national estimate.

EVALUATION OF BLACK ESTIMATES

This section concentrates on the performance of EAR as a device for making annual estimates of the Black population for states and SMSAs. The Bureau of the Census published Black population estimates for states once before,[8] but subnational estimates of the Black population are not now (1982) part of the regular estimation program.

Background: A 1970 test of Black population estimates for states concluded that the Census Bureau could not and would not publish "official" postcensal estimates by race for states using the state of art methodology then available.[9] That determination was made from assessing the results of an estimation process which used a longitudinal sample file of employed workers by state of

employment (the one percent Continuous Work History Sample (CWHS)) to develop the component of net residential interstate migration.[10]

The major problem encountered there in estimating the Black population for 1970 was an extreme regional bias and the magnitude of errors for individual states.[11] The estimates for Blacks in the Southern states were consistently 5 to 10 percent higher than the 1970 counts; the errors in the Northern states were of the same magnitude but of opposite direction.

Availability of a New Data Base: In 1977, a pilot study on the same subject (Black estimates for states) was published, but the basic data set used to develop estimated interstate migration differed in a number of ways from the previous study.[12] The sampling ratio determining internal migration was 1 percent as before, but the calculation of internal migration was developed from a data base consisting of the universe of federal income tax payers, not job holders covered by Social Security. Data on the CWHS file is related to place of employment which usually differs from place of residence. By contrast, the Federal tax file is normally residence specific.

The proportion of Blacks in the South filing federal tax returns has increased substantially over the past 10 years, and current (1980) differences in tax coverage among Blacks (North vs. South) have been sharply reduced.

Table C.--RATIO OF EXEMPTIONS TO POPULATION

Area	Black		Nonblack	
	1970	1980	1970	1980
U.S.	79.3	83.1	95.8	91.4
SOUTH	71.7	82.8	92.5	89.3
South Atlantic	74.6	83.0	93.3	89.5
E. South Central	65.1	80.3	90.0	87.2
W. South Central	71.1	84.4	92.9	90.1
NONSOUTH	87.8	83.4	97.1	92.4
Northeast	85.9	82.9	96.5	91.1
North Central	88.5	82.8	97.9	94.1
West	90.5	87.8	96.7	91.6

Coverage of Federal tax returns filed by Blacks in the South increased over ten percentage points since 1970, in spite of tax legislation changes liberalizing filing requirements for low income persons (e.g., teenagers and elderly, working parttime). The effect of reasonably constant coverage now (1980) suggests that future estimates of the Black population should be even more accurate than those presented here.

Current Developments: The data base discussed in the preceding paragraphs has been greatly expanded since the 1977 study. Net migration in that report was generated from a 1 percent sample, but that sample was increased to 10 percent shortly after publication. This increased sample size permits adequate Black population estimates to be developed for SMSAs as well as states. The analysis presented here indicates that reasonable estimates of the Black population can be made for localities having as few as 15,000

Blacks. In the next decade the sample base will be expanded to 20 percent which will further decrease sampling error.

The underlying system in EAR for producing annual estimates for a constant April 1 estimation date is component and iterative (i.e., the estimated population developed for year (t) builds on the estimate of population for year (t-1). Annual population estimates are developed using SMSAs as the primary geographic base[13] for each of the three primary races. Estimates of the total population for SMSAs and estimates of the population for states by race and for the total resident population are calculated by summing upwards.

Analysis of the Estimates: The evaluation contained in the following section presents direct comparisons of the Black estimates for 1980 from EAR against the 1980 census. Current information derived by demographic techniques indicates that the 1980 enumeration of Blacks nationwide is still "short" by about 1.6 million or 5.7 percent.[14] In 1970, the net undercount derived by similar means was 1.9 million or 7.7 percent. However, this improved coverage is not large enough to justify the development of a system for making the two censuses compatible. There is, however, some suggestion (possibly circular) that the bulk of the improvement in the Black undercount between 1970 and 1980 may be confined to the smaller metropolitan and rural sections of the South (see section on SMSAs).

(A)--States: Unfortunately, the entire array of the 50 individual states and the District of Columbia do not form a particularly appropriate universe for analysis by race. Since the migration component in EAR is based on a ten percent sample, percentage errors are shown only for the 39 states and the District of Columbia where the 1980 Black population exceeds 20 thousand.

Table D-1.--EVALUATION OF BLACK ESTIMATES (STATES)
(1980 Black Population Greater than 20,000)

Area	Positive Errors In Estimation	Mean Percent Error	Percent of Change in Black Proportion Correctly Estimated
All States (40)	21	3.2	71
NonSouth (23)	15	3.7	75
South (17)	6	2.7	67

When the size threshold is moved upwards from 20 thousand to 100 thousand Blacks, the average error in estimating Black population for states declines from 3.2 percent (Table D-1) to 2.5 percent (Table D-2). The decline is much more pronounced for states in the North than in the South reflecting the large number of Northern States in the 20 to 100 thousand range. The 2.5 percent average error in estimating the 1980 Black population for states shown in Text Table D-2 is exactly equal to the "apparent" average error in estimating the total 1980 state population in the publication series (3 Methods) shown in Table A.[15]

Table D-2.--EVALUATION OF BLACK ESTIMATES (STATES)
(1970 Black Population Greater than 100,000)

Area	Positive Errors in Estimation	Mean Percent Error	Percent of Change in Black Proportion Correctly Estimated
All States (28)	11	2.5	70
NonSouth (13)	7	2.3	80
South (15)	4	2.9	61

Although one measure, and perhaps the standard criterion for population estimation, is mean error (Col. 2 of Tables D-1 and D-2), another area of concern with regard to Black estimates is an adequate measure of the error in estimating the area's proportion of Blacks. Census counts for New York and Florida aptly illustrate this secondary concept.

Table E.--BLACK POPULATION IN 1970 AND 1980
(Numbers in Thousands)

State	Census Counts			Proportion Black		
	1970	1980	Percent Change	1970	1980	Proportional Change
New York	2,169	2,402	10.7	11.9	13.7	+1.8
Florida	1,042	1,342	28.8	15.3	13.8	-1.5

Even though Florida's rate of Black population increase was triple that of New York, the proportion Black increased in New York by 1.8 percentage points while declining by 1.5 percentage points in Florida. In Florida, the growth of the White population greatly surpassed that of Blacks, resulting in a lower proportion of Blacks in 1980 than in 1970.

The far right column in Tables D-1 and D-2 (and for the SMSA summaries following) provide an index for assessing error in estimated proportional change. In New York the actual 1970-80 proportional increase in the Black population was 1.8 percentage points (11.9 to 13.7) as opposed to an estimated proportional change of 2.5 percentage points (11.9 to 14.4).[16] In Florida, on the other hand, the intercensal change was a negative 1.5 percentage points (15.3 to 13.8) and the estimated proportional change was a negative 1.9 percentage points (15.3 to 13.4).

The calculation of "Proportional change correctly estimated" is derived by subtracting from unity the ratio of the absolute error in estimating proportional change to the actual proportional change. The table below illustrates this concept using a two state grouping.

State	Error In Estimated Proportional Change	Census Proportional Change	Proportional Change Estimated
New York	+0.7	+1.8	61
Florida	-0.4	-1.5	73
Total	1.1	3.3	67

For any individual area, the index will be meaningless (negative) if the absolute error in

estimated proportional change exceeds the census proportional change. However, the index is computed on aggregated data for homogeneous areas and can be useful for assessing EAR's ability to capture significant proportional changes in Black population at the local levels.

(B)--SMSAs: Since SMSAs were the building blocks used to prepare the estimates described here, the SMSAs can be examined separately to provide a more specific unit of analysis for evaluating Black population estimates than states. Furthermore, for many Northern states, Black population residing in SMSAs is equivalent to Black population residing in states.

Text Table E, following, summarizes the error rates on the Black population for 166 SMSAs having a 1970 Black population in excess of 15 thousand. In the North, the mean absolute percent error of the estimates declines very little with decreasing size of the Black population (2.5 percent for the nine SMSAs containing 250 thousand Blacks to 3.9 percent for the 22 SMSAs with between 15 and 25 thousand Blacks). In addition, the ability of the method to correctly estimate the change in the proportion Black is nearly constant throughout all size classes.

In the South, the pattern of deteriorating estimates by size of the Black population is quite substantial and the ability of EAR to gauge proportional change is also markedly

affected. The apparent improvement in coverage in the 1980 census for both Blacks and Whites in the less populous SMSAs in the South may have played a relatively important role here. There are 26 SMSAs in the South where EAR underestimated the Black population by at least five percent, as opposed to only two instances where there was an overestimate of this magnitude. The EAR estimates of the Black population in these 26 SMSAs were subject to a mean estimation error of 7.9 percent. But seven of these areas also incurred a negative estimation error of more than 5.0 percent for the white (nonblack) population and an additional seven areas had negative estimation errors of between 3.0 and 4.9 percent for the white population.

(C)--Time Series: The series of annual population estimates for 24 large areas containing one-quarter million Blacks reveal that the regularity of the annual increments lends credence to both the mathematical properties of the estimating model and the symptomatic data used in the development of the estimates. The regularity of the Black population estimates series developed by EAR also holds true for the total population estimates.

Conclusion--and Future Prospects The test estimates of the Black population for states and SMSAs produced here appear to meet any reasonable standard for accuracy and consistency.[17]

Table F.--ANALYSIS OF BLACK POPULATION ESTIMATES FOR SMSAs*

SIZE OF BLACK POPULATION IN SMSA (In Thousands)	AGGREGATE (In Thousands)				INDIVIDUAL AREAS		DISTRIBUTION OF ESTIMATION ERROR					
	1970 Census	1980 Census	1980 Estimate	Percent Error	Mean Absolute Percent Error	Percent of "Change in Proportion Black Estimated"***	More than +5	+2 to +5	-2 to +2	-5 to -2	Less than -5	
250+												
ATI (24)	13,452	15,282	15,154	-0.8	2.0	76	0	1	14	9	0	
North (9)	6,786	7,649	7,640	-0.1	2.5	77	0	1	5	3	0	
South (15)	6,665	7,633	7,514	-1.6	1.7	75	0	0	9	6	0	
100 to 250												
ATI (28)	3,840	4,539	4,450	-2.0	2.7	70	0	2	13	9	4	
North (10)	1,306	1,543	1,524	-1.2	2.0	86	0	1	6	2	1	
South (18)	2,534	2,996	2,926	-2.3	3.0	60	0	1	7	7	3	
50 to 100												
ATI (37)	2,418	3,018	2,954	-2.1	3.7	72	1	9	7	11	9	
North (15)	877	1,097	1,100	+0.3	3.4	70	1	6	2	5	1	
South (22)	1,542	1,921	1,855	-3.4	3.8	73	0	3	5	6	8	
25 to 50												
ATI (43)	1,428	1,739	1,705	-2.0	4.6	64	3	8	11	9	12	
North (20)	664	830	834	+0.5	3.8	70	3	5	8	1	3	
South (23)	763	909	871	-4.2	5.3	61	0	3	3	8	9	
15 to 25												
ATI (34)	685	918	910	-0.9	4.8	63	6	5	9	7	7	
North (22)	433	600	600	0.0	3.9	74	4	5	5	7	1	
South (12)	252	318	309	-2.8	6.4	50	2	0	4	0	6	

* Detailed tables showing error rates for the Black population for the 166 individual SMSAs reflected in this summary table can be obtained by writing to: David L. Word, Population Division, Bureau of the Census, Washington, D. C. 20233

** See text for definition.

There is a great deal of interest in Black population estimates for local areas and the production of an annual estimate series for the Black population would be a logical extension to the existing estimates program at the Census Bureau.

In this particular application, of making Black estimates, the geographic universe has been limited to each SMSA in a state plus the nonmetropolitan remainder of that state. In the original specifications, it was planned that metropolitan areas were to be divided into a core city and suburb. However, substantive geographic coding problems in the data sets (vital statistics as well as residence on the tax files) might have tended to obfuscate the viability of EAR as a valid estimating technique. Nevertheless, for additional validation of the procedure, EAR will be extended to central cities and suburban remainders despite the problems in geographic coding outlined above. Extremely preliminary evidence does suggest that the Black estimates of suburbs may be overestimated at the expense of the central city.

The EAR method illustrates a more detailed application of the basic AR method made possible (through matching and linking) by decomposing the population into logical, demographic subgroups. The method also attempts to address the problem of differential area (state and SMSA) coverage and possible differences in migration of filers and non-filers.

With the advent and availability of the 1980 population census, and the direct overlap of census and IRS records for that year it may be possible to more completely address the problem of differential migration of tax filers and non-filers. The 1980 census information can also be supplemented by national and regional data from surveys on the characteristics of filers and non-filers as a way of allowing for differential migration between the two groups. The potential of this information goes far beyond population (migration) estimates. In particular, research on income by household may be enriched by these files.

NOTES AND REFERENCES

[Editors' Note: The terms North and NonSouth are used interchangeably through this paper.]

- [1] See Current Population Reports, Series P-25, No. 699.
- [2] See Current Population Reports, Series P-23, No. 115.
- [3] As a practical matter this large adjustment in the final process may distort the estimate and alert the analyst to an estimation procedural problem. The problem would be minimized or vitiated entirely if the adjustments were made incrementally each year, as the estimates are cumulated over time.
- [4] The procedure to adjust the 1970 counts

upwards involved a regression technique using symptomatic indicators associated with undercount as the independent variables. A modification of the illustrative 1970 state undercount rate appearing in Current Population Reports, Series P-23, No. 65 was the source of the dependent variable.

The particular equation chosen to estimate 1970 undercount rates for states was:

$$\text{Undercount (Rate)} = -5.3 + .15 (\text{Rate of Movement; 1969 to 1970}) + .03 (\text{Percent Minority}) + .25 (\text{Vacancy Rate}) + .08 (\text{Percent of Adult Population with less than 5th grade education}) + .35 (\text{Rate of Allocation for non response}).$$

- [5] Since EAR is based on a 10 percent sample of returns, the results are subject to a sampling error. The sampling error is only a small fraction of the observed error.
- [6] Ten different combinations of symptomatic variables were investigated to estimate state undercount in 1970. Under each assumption, the 1980 mean state error by EAR ranged between 1.4 to 1.5 percent.
- [7] Efficiency is the product of (1) Coverage ($\frac{\text{Returns}}{\text{Population}}$) in a particular year and (2) Match Rate ($\frac{\text{Returns filed in two years}}{\text{Returns filed in one year}}$). See Current Population Reports, Series P-23, No. 67.
- [8] Ibid.
- [9] "Use of Administrative Records for Making Small Area Population Estimates" by Meyer Zitter and David L. Word. Paper presented at the Annual Meeting of the Population Association of America, April 1973.
- [10] Research for that project was begun by Meyer Zitter and Elizabeth Nagy and finished by Zitter and David Word.
- [11] By contrast, the official 1970 estimates for the total population of states exhibited very little regional bias when compared to the 1970 census counts.
- [12] Current Population Reports, Series P-23, No. 67.
- [13] For purposes of closure, population estimates for SMSAs which cross state boundaries are treated separately.
- [14] Current Population Reports, Series P-23, No. 115.
- [15] Apparent is used here guardedly. The national enumeration in 1980 exceeded expectations by nearly five million or 2.2 percent. This error in estimating the national count is, of course, reflected in the individual state estimates.
- [16] There is strong evidence that the 1980 national enumeration of Blacks would have been 100,000 greater had persons of Spanish origin provided racial designations consistent with the 1970 census. Under this hypothesis, the Black count in New York City alone might have been 50 to 70 thousand greater.
- [17] The errors in the Black population estimates are about the same level as errors in the total population for equivalent population size.