DID INTERCENSAL ESTIMATES GO WRONG IN THE 1960's? A VIEW FROM THE NATIONAL LEVEL

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This paper reviews the performance of estimates of population of States and large SMSA's and their constituent counties published by the Census Bureau during the past decade in light of the results of the 1970 Census of Population. Differences between the estimates and the census counts are summarized, examined and reasons for such differences are explored in specific cases. Some attention is paid to the factors possibly contributing to the errors in the 1960's compared with the 1950's.

Background of Test Program

After both the 1950 and the 1960 censuses, the Census Bureau conducted comprehensive tests on the accuracy of methods of preparing population estimates. These tests not only reviewed the accuracy of census-prepared estimates but also considered the accuracy and reliability of alternative estimating procedures. The methods adopted for preparing State and metropolitan area estimates in the 1960's were chosen on the basis of the results of the 1960 test program. 1/ A similar test of even larger scale is now underway covering State and county estimates and is being carried out jointly and cooperatively with many States as part of the Federal-State Cooperative Program for Local Population Estimates. 2/ The present report is only a small part of that study and focuses on estimates that have been published and on the methods now in use by the Census Bureau. The accuracy of alternative procedures is not included here.

The present report covers both estimates that were prepared prior to the 1970 census as well as sets that represent some updating of the numbers on the basis of data available after the census, but none of the estimates incorporate any of the census results. By way of background, in January 1970, the Census Bureau published "provisional" estimates of State population as of July 1, 1969. These estimates, based mainly on the average of the results of what is commonly referred to as "Component Method II" and the "Regression", incorporated reported data series reflecting on migration and on population change up through the period ending July 1, 1968 and on extrapolations to July 1, 1969. 3/ For present purposes, these estimates (labelled "Set I" in the tables) were further extrapolated nine months to April 1, 1970 for comparison with 1970 Census. In spite of their very provisional nature, they are included in the review since they were the main figures available to the public at the time of the census and were providing the first impressions on the adequacy of intercensal estimates as the census counts were being announced.

By the time the final 1970 census results were becoming available in mid- and late 1970, it was possible to update the 1969 provisional estimates to incorporate reported data reflecting on migration up through the period ending July 1, 1969. This was done and the new figures in turn were extrapolated to the April 1, 1970 date (Set II). A final set (Set III) represents uniformly the average of the two methods used without adjustment for any States with special data. In effect it is essentially the same as the second set for all States except for seven States where supplemental local data or special censuses were used. 4/

Thus, at the State level we have for comparison three sets of estimates of State population, one set reflecting extrapolation for a 21-month period and the other two for a 9-month period. None of these estimates, in theory, represent the best estimates since it is now possible to develop yet another set of estimates which would incorporate all the reported available indicators of population change up through 1970.

The use of multiple estimates here is not intended to confuse (although it probably will) but rather to point up the situation that prevails. Estimates can be and are revised regularly to take advantage of the latest available data and their "illusive" nature should be kept in mind when assessing their accuracy.

In addition to the States, estimates are also reviewed and evaluated for the 100 largest SMSA's and their approximately 290 constituent counties. Only one set of estimates is evaluated here--a set consistent with published estimates for these areas for 1968. They have been updated from 1968 to 1969 by incorporating symptomatic data series for the period ending July 1, 1969 and extrapolated nine months to April 1970. The estimates incorporate the results of three estimating procedures--Component Method II, Composite, and Housing Unit--for all or part of the estimating period. 5/

Accuracy of State Estimates

Did the intercensal State estimates go wrong during the 1960's? How does the performance of the estimates in this decade compare with that of the preceding period? In general the State estimates were reasonably accurate, mainly within the margin of error expected of such estimates, and compare favorably with past experience. However, there were a sufficient number of exceptions to the generally favorable performance with some evidence of selective deterioration and regional bias to give cause for concern.

On an overall basis the average error of the provisional State estimates published before the census (table A) ran 2.3 percent--a very respectable showing in historical perspective. The corresponding error in 1960 was 2.4 percent and in 1950, 3.9 percent. The 1970 level of accuracy improves considerably as we move from the pro-

visional series to the updated regular set of estimates (based uniformly on the average of the results of the two standard estimating procedures). The average error drops to 1.9 percent on this basis (table B). This appears to be an increase over the error of 1.6 percent by these methods when tested against 1960, but the latter has the advantage of one more year's worth of current data so we need to await the final updating of the 1970 estimates before determining the extent of difference in the two sets. Incidentally, it is noteworthy that the reduction in the 1970 error from 2.3 percent for the provisional estimates to 1.9 percent based on the standard techniques cannot be attributed entirely to updating of the estimates. Part of the difference is due to the "special treatment" given to a number of States for which, in our wisdom, we saw fit to take advantage of additional local data designed to improve the estimates. In four States we were misled, viz. in Massachusetts and Kansas, estimates tied to the State censuses led to larger deviations from the census counts than the standard techniques; in Hawaii and D.C. the additional data series proved to be unreliable. In three other States, however, Delaware, Rhode Island, and New York, Federal special censuses in the second half of the 1960's provided solid bases for later estimates. Such Federal censuses are always to be preferred over "estimates".

The overall average, however, provides only a partial measure on the accuracy of the estimates. Looking at the individual State differences we find a serious worsening of the estimates between 1960 and 1970 in a selected number of cases. A simple stratification of the States on a regional basis shows that on the average estimates for States in the South performed far more poorly than those for States outside the South. There appears to be significant deterioration in the former and improvement in the latter between 1960 and 1970. In 1960 these methods for the States in the South yielded an average error of 1.9 percent, slightly higher than the average error of 1.5 percent for States outside the South (table C). By 1970, however, the average error for the States in the South was 3.1 percent compared with 1.3 percent for the balance of the country--a significant widening of the gap. Within the South the poorest estimates were: Mississippi, with a deviation from the census of +6.6 percent, Arkansas, +5.2, South Carolina, +5.1, West Virginia, +3.6, and Florida with a -4.2 percent (table 2). Maryland and Louisiana also had errors in excess of 3 percent. In addition to the relatively large differences for these Southern States, there also appears to be a "high bias". The estimates for thirteen of the seventeen States in the South exceeded the census counts. For the 34 States outside the South, of course, a low offsetting bias resulted with only 10 positive errors.

The average error of 1.3 percent for the 34 States outside of the South represents a very commendable showing even though four of these States still had errors in excess of 3 percent (but none over 5 percent).

Explanation of Poor State Estimates

Although there is no precise answer as to why the 1970 estimates for these Southern States were so poor and much worse than in 1960, a number of factors emerge which are suggestive of the elements contributing to the errors in specific instances.

(1) Probable overcorrection of births for South Carolina and Arkansas. These States had relatively low completeness of birth registration at the time of the 1950 Birth Registration Test and the estimation system for updating may have failed to reflect real improvements in birth registration. A recent study of completeness of birth registration indicates some improvements above the allowance used in our estimates and consequently we may have overcorrected births in the 1960's in the South on an overall basis.[6]

(2) An underlying assumption of Component Method II is that the procedure provides a very accurate estimate of the school-age population and of net migration for that group. The major uncertainty of the procedure lies in extending the school-age migration rate to the migration rate for the total population. Yet, contrary to expectations, in the cases of Mississippi and South Carolina, relatively large errors occurred in the basic estimates of the school-age population. The extension to the total population merely aggravated the situation. In the case of South Carolina, enrollment rates at the elementary school level were among the lowest of the States in 1960; thus, any improvement in these rates between 1960 and 1970 should result in an overestimate for both the school-age population and for the total population.

General deterioration of the school enrollment time series underlying Component Method II may have contributed to increased errors. There were many changes during the 1960's in the type of series available for estimates and lack of consistency and comparability over the period strains the methodology to distinguish between spurious and real changes. Furthermore, school data series of poor quality could seriously affect the estimate since enrollment data carries significant weight in both methods. This particular failing was not limited to the States in the South, however.

(3) In the case of Florida which unlike the other States had a low estimate, the underestimate of the population by Method II could be expected in view of the heavy net inmigration to the State at the older ages--a migration pattern that hardly could be reflected by this method. (This problem should disappear in the 1970's as MEDICARE statistics are used to measure the older population separately).

(4) The behavior of the regression model warrants particular attention. It is quite likely that a good part of the increase in the error in the regression-based estimates for the South is due to a change in the relationship of the input variables with a resulting upward bias in the estimate for selected States. The regression

technique for population estimation, as we know, is an imprecise instrument, and depends on the assumption that the general relationships of the variables that existed in the base period will continue. The model used to generate estimates during the 1960's was built upon data series covering the 1950-1960 period. Even here the States in the South deviated slightly more from the regression line, on the average, than States outside the South. The average deviation was 2.3 percent (root-mean-square error of 3.2 percent) compared with an average of 2.0 percent for the other States (root-mean-square error of 2.3 percent). So even at best we might expect slightly larger errors for States in the South in 1970 than the other States. When "projected" to 1970, however, the average deviation for the States in the South increased while the average for the States outside of the South improved, 2.9 percent for the former and 1.6 percent for the latter. But, in fact, the data for 1960-1970 (substituting 1970 census counts for estimates) indicate an improvement in the regression model with a significant decrease in the deviation about the regression line. The improvement in the average deviation was particularly noticeable for the States in the South (table D). The basic weights also changed with the economic variables dropping in importance. At the same time, the economic variables for the States in the South were increasing well above national averages.

1960-70 data indicate significant covergence toward national averages of the economic variables underlying the regression. In South Carolina, for example, the number of automobiles per capita in 1960 was 88 percent of the national average. By 1970, this had increased to 97 percent. Nonagricultural employment per capita increased from 81 to 93 percent of the national average, and the number of income tax returns rose from 74 to 87 percent. Similar types of convergence exist for the other States mentioned. Such faster growth rates of these variables in the South for the 1960's yielded "high" population estimates when substituted into the 1950-60 regression model used to generate 1970 estimates.

The upward bias and large errors of the regression were averaged in with the larger-than-usual errors by Method II, also on the high side, so that the ultimate result was substantially poorer estimates than in the earlier decade. On the brighter side, since it appears that the 1960-70 regression model is a much better expression of the relationship of the variables and population than the model reflecting the 1950-60 period, we could expect improved performance from the regression in the 1970's. 7/

(5) The errors by each of the methods for the States indicated were generally in the same direction, thus losing an important advantage of the averaging technique. In 1970 this was true for 15 of the 17 States in the South; in 1960 this occurred in only 7 cases. This failure to receive the "breaks of statistical averaging" (due to some common bias of the methods, no doubt) also contributed to the poorer performance of the estimates.

Accuracy of SMSA Estimates

Shifting our attention to estimates for SMSA's and their constitutent counties we find much to be optimistic about with their accuracy, to some extent better than expected. On an overall basis the average error for the one hundred largest SMSA's was 2.0 percent, with no apparent regional bias, as with the States (table E). The 31 SMSA's in the South included in the test had the same average error, 2.0 percent, as the other areas. We find it an interesting anomaly that the SMSA estimates in the South were more accurate than their corresponding States--2.0 percent versus 3.1 percent. In the past we generally expected more accurate estimates for States since size of area usually has an important effect on level of accuracy. Implicitly, then, it is apparent that the nonmetropolitan or rural parts of the South were overestimated.

For the central counties, the average error was a relatively low 2.3 percent, again with no regional bias; "suburban" or ring counties had a much larger error, 3.7 percent. Here the South, non-South difference was significant--4.6 percent for the South versus 3.2 percent elsewhere, but the difference, we believe, is due more to size differentials than to any regional bias. The ring counties in the South in the test areas are generally much smaller in population than the ring counties outside the South.

In spite of the relatively small error on an overall basis, there still remained too many large errors for us to be complacent about estimates for such areas. The estimates for about 10 percent of the SMSA's differed from the census counts by more than 5 percent, about one-fourth of the ring counties had errors of this magnitude. Yet, this pattern and level of errors was about what could be expected based on observations of earlier tests of accuracy of estimates for metropolitan areas and counties. 8/

There doesn't seem to be any particular pattern or common element for the 10 SMSA's tested here with errors in excess of 5 percent. The estimates were generally low. In two instances the estimating technique cannot be faulted since the figures were tied-in with local State censuses (Massachusetts and Kansas) which eventually proved to be poor in relation to decennial census counts.

In other words, the current state of the art is such that one should expect some relatively large errors in at least a number of instances when making estimates for a large number of areas. In some instances the errors result from the inappropriations of the methodology to specific areas, such as the use of Component Method II to fast-growing resort and retirement-type areas (St. Petersburg, for example); in other cases poor or inconsistent data input could be the cause. Furthermore, most estimating procedures seem to fall short for areas of very rapid growth (table F) regardless of reason for growth.

A word about the methodology of the estimates for the SMSA's and their counties is also in order

since the particular application may also affect accuracy.

In general, as stated earlier, the estimates were prepared by averaging together the results of three estimating procedures using largely independent and separate input--Component Method II, Composite, and a Housing Unit Method. 9/ However, the estimates were prepared within the framework of our State estimates program so that the procedure involved working with the SMSA's (of the 100 largest) in each State and a "balance of State" category treated as separate units. The resulting estimates were adjusted to independently derived State totals. Aside from a practical need for providing consistent sets of SMSA and State estimates, our experience has been that imposing summary control totals of larger areas over smaller areas tends to reduce the overall average error of estimates. 10/ The test program now underway with the States should provide additional evidence on this point.

In light of the evidence indicated above for States and SMSA's, why the increased doubts about the adequacy of intercensal estimates? For one thing, of course, the number of geographic areas included in the above review is only a very small percentage of the thousands of separate areas such as counties and cities for which local estimates are available. Also, these findings are not representative of the accuracy of local estimates. Furthermore, it is clear to me that the topic is sparked, in large part, by the many controversies (complaints?) that arose when preliminary census field counts were announced and so many local officials were surprised and disappointed at the results for their areas. Invariably, local opinion was that the census counts were much too low--sometimes said as a matter of faith--others were being guided (or misguided) by their own city or county estimates.

The Census Bureau has not published any extensive estimates for cities, but if we had, I suspect that the results would also not be encouraging. Our experience, based on selected test studies, is that present methodology used for city estimates tend to greatly overstate the population. We haven't made an extensive review of local city estimates against the 1970 census, but it's obvious the question that needs to be answered is why estimates prepared locally tended to overstate the population (as indicated by the census). Perhaps there are different reasons for each specific area but let me generalize for this occasion based on knowledge on how many of these estimates are usually prepared and the expected accuracy of such methods.

The Census Bureau periodically conducts surveys on types of methods and kinds of estimates prepared by local agencies. 11/ We find that by and large city estimators tend to rely on a single method and single data source for making its population estimate, most often a "housing unit method" using building permit data. Reliance on a single method is in itself a serious weakness. Basing the method entirely on building permit data (and/or utility data) compounds the inadequacies of the estimates.

Some years ago we conducted a special study on the use of the housing unit method for making population estimates for cities. Even though we concluded that the housing unit method was a useful approach to population estimation, the results indicated a "positive" bias and high average error of the method. 12/

A major problem is that building permits, which are most often used as input, give us only one side of the picture and leads to some gross estimates of the housing inventory. Converting housing units to households and to population is no simple, straightforward task since the necessary components, i.e., changes in vacancy rates and in size of household since the last benchmark are not available on a current basis. Even if a fair estimate of the number of housing units is obtained, it has not always been possible to arrive at accurate estimates of the number of households.

One interesting fact that the tests show is that the error in the number of households was also very high and, in effect, contributes as much to the overall error in the estimate of population as the error introduced by the estimate of the size of household. The error introduced by lack of adequate data on current size of household is particularly significant in 1970 because of the rather sharp decline in the average size of household in the 1960's brought about by the steep decline in fertility and the large increase in number of one-person households.

In summary, then, it appears that intercensal estimates are still viable, particularly for large areas, but considerable improvement is needed if the margin of error is to be maintained at reasonable levels. Unfortunately, accuracy of performance in one decade does not guarantee similar performance in later decades. Estimators need to be continually on the look-out for, or to arrange to develop, improved or new data series reflecting on population and new techniques of data manipulation if adequate estimates are to become available on an extensive and regular basis.

Footnotes

* The research underlying this report was carried out in the State and Local Population Estimates and Projections Branch, (Population Division), under the direction of Donald E. Starsinic, Branch Chief.

1/ For discussions, descriptions and citations of earlier studies, see "Accuracy of Methods of Preparing Postcensal Population Estimates for States and Local Areas", Meyer Zitter and Henry Shryock, Jr., Demography, Vol. I, No. 1, 1964.

2/ See, Meyer Zitter, "Federal-State Cooperative Program for Local Population Estimates, Status Report, January 1971", The Registrar and Statistician, Vol. 36, No. 4, April 1971.

3/ Although most State estimates were based uniformly on the results of the average of the two methods cited, this was not the case for 7 States where special kinds of data were available (e.g., special censuses). See, Current Population Reports, Series P-25, No. 436.

4/ Op. cit., Footnote 3/.

5/ See, Current Population Reports, Series P-25, No. 432.

6/ See, Bureau of the Census, Current Population Reports, Series P-25, No. 460, p. 5.

7/ The 1960-70 model is not final at this point since 1969 was the last year for which the variables were available. Consequently, the results are labelled "preliminary".

8/ Accuracy of Methods of Preparing Postcensal Estimates for Counties: A Summary Compilation, by Meyer Zitter, Donald E. Starsinic, and David L. Word, paper presented at annual meeting of Population Association of America, Boston, Massachusetts, August 18-20, 1968.

9/ Op. cit., Series P-25, No. 432.

10/ See article by Zitter and Shryock, "Accuracy of Methods....", op. cit., Footnote 1.

11/ The most recent inventory is published in Current Population Reports, Series P-25, No. 454.

12/ "Accuracy of the Housing Unit Method in Preparing Population Estimates for Cities", Donald E. Starsinic and Meyer Zitter, Demography, Vol. V, No. 1, 1968.

Table A.--SUMMARY OF DEVIATION (PERCENT) OF PROVISIONAL STATE ESTIMATES FROM CENSUS COUNTS: 1970, 1960, AND 1950
(Alaska and Hawaii included in 1970 only)

Summary Measure	1970	1960	1950
All States			
Average deviation	2.30	2.44	3.93
Root means square deviation	2.86	3.39	5.53
Deviation in excess of 3%	18	14	19
Deviation in excess of 5%	3	4	13
Positive deviations	25	28	21
South			
Average deviation	3.17	2.49	4.04
Root means square deviation	3.68	3.45	4.87
Deviation in excess of 3%	9	5	10
Deviation in excess of 5%	2	2	6
Positive deviations	14	9	3
Non-South			
Average deviation	1.86	2.41	3.87
Root means square deviation	2.34	3.35	6.51
Deviation in excess of 3%	9	9	8
Deviation in excess of 5%	1	2	7
Positive deviations	11	19	18

Table B.--SUMMARY OF DEVIATIONS (PERCENT) OF ALTERNATIVE SETS OF 1970 STATE ESTIMATES FROM 1970 CENSUS

Summary Measure	Set I Provisional 1969 Estimates Published in P-25, No. 436 Extrapolated to 1970	Set II Revised 1969 Estimates Extrapolated to 1970	Set III Average of Methods for 1969 and Extrapolated to 1970
All States			
Average deviation	2.30	2.06	1.86
Root means square deviation	2.86	2.56	2.37
Deviation in excess of 3%	18	15	11
Deviation in excess of 5%	3	3	3
Positive deviations	25	26	23
South			
Average deviation	3.17	3.22	3.05
Root means square deviation	3.68	3.57	3.40
Deviation in excess of 3%	9	6	7
Deviation in excess of 5%	2	0	3
Positive deviations	14	12	13
Non-South			
Average deviation	1.86	1.48	1.26
Root means square deviation	2.34	1.88	1.65
Deviation in excess of 3%	9	9	4
Deviation in excess of 5%	1	3	0
Positive deviations	11	14	10

Table C.--SUMMARY OF DEVIATION (PERCENT) OF STATE ESTIMATES BY COMPONENT AND REGRESSION METHODS: 1970 AND 1960
(Includes Alaska and Hawaii in 1970 only)

Summary Measure	Method II 1960	Method II 1970	Regression 1960	Regression 1970	Average of Methods 1960	Average of Methods 1970
All States						
Average deviation	2.31	2.23	2.72	2.05	1.64	1.86
Root means square deviation	3.52	2.82	3.66	2.62	2.41	2.37
Deviation in excess of 3%	10	13	17	12	6	11
Deviation in excess of 5%	4	5	8	2	2	3
Positive deviations	28	30	20	20	25	23
South						
Average deviation	3.16	3.55	2.79	2.90	1.88	3.05
Root means square deviation	5.03	4.09	3.98	3.39	2.84	3.40
Deviation in excess of 3%	5	9	5	8	2	7
Deviation in excess of 5%	3	5	3	1	1	3
Positive deviations	10	13	10	13	12	13
Non-South						
Average deviation	1.87	1.58	2.68	1.62	1.51	1.26
Root means square deviation	2.34	1.95	3.47	2.13	2.14	1.65
Deviation in excess of 3%	5	4	12	4	4	4
Deviation in excess of 5%	1	0	5	1	1	0
Positive deviations	18	17	10	7	13	10

Table D.--SUMMARY OF DISPERSION OF CENSUS COUNTS ABOUT LEAST SQUARE REGRESSION LINE: 1950-60 AND 1960-70

(Figures are expressed as percent deviations of estimates derived from regression (Y_c) from Census counts)

Summary Measure	1960 Census Deviation		1970 Census Deviation	
	1950-60 Projected from 1940-50	1950-60 Actual a/	1960-70 Projected from 1950-60	1960-70 Actual b/
All States				
Average deviation	2.72	2.07	2.05	1.52
Root means square deviation	3.66	2.59	2.62	1.99
Deviation in excess of 3%	17	7	12	5
Deviation in excess of 5%	8	3	2	2
Positive deviations	20	22	20	23
South				
Average deviation	2.79	2.29	2.90	1.44
Root means square deviation	3.98	3.15	3.39	1.78
Deviation in excess of 3%	5	2	8	1
Deviation in excess of 5%	3	3	1	2
Positive deviations	10	8	13	12
Non-South				
Average deviation	2.68	1.95	1.62	1.67
Root means square deviation	3.47	2.32	2.13	2.34
Deviation in excess of 3%	12	5	4	4
Deviation in excess of 5%	5	0	1	0
Positive deviations	10	14	7	11

a/ Regression Equation: $Y_c = .06+.30X_1+.14X_2+.22X_3+.08X_4+.07X_5+.12X_6$

X_1 = Births; X_2 = Deaths; X_3 = Ele. Enrollment; X_4 = Income Tax Returns (Federal); X_5 = Passenger Auto Registration; X_6 = Nonagricultural Employment

b/ Provisional Regression Equation: $Y_c = -.08+.23X_1+.25X_2+.46X_3+.09X_4+.03X_5+.05X_6$

Table E.--DIFFERENCES (PERCENT) BETWEEN CENSUS COUNTS AND ESTIMATES FOR 100 LARGEST SMSA'S: 1970

	Average Percent Difference			No. of errors in excess of 5%		
	SMSA's	Central Counties	Suburban Counties	SMSA's	Central Counties	Suburban Counties
Total, 100 largest SMSA's	2.0	(120) 2.3	(169) 3.7	10	12	45
South (N=31)	2.0	(37) 2.3	(57) 4.6	3	4	21
Non-South (N=69)	2.0	(83) 2.3	(112) 3.2	7	8	24
100 SMSA's by size group						
25 largest	2.1					
Next 25 largest	1.8					
3rd group	1.8					
4th group	2.2					

Distribution of Errors for 100 Largest SMSA's

	All SMSA's	SMSA's Outside South	South
N =	100	69	31
Less than 1 percent	33	24	9
1.0 to 1.9 percent	27	18	9
2.0 to 2.9 percent	18	11	7
3.0 to 4.9 percent	12	9	3
5.0 percent and over	10	7	3

Table F.--PERCENT DISTRIBUTION OF COUNTY ERRORS, BY RATE OF GROWTH

Growth rate / Average error	Gains of				Population loss
	Less than 10%	10 to 25%	25 to 50%	50% and over	
N =	(69)	(86)	(72)	(41)	(22)
Under 3 percent.....	64	73	54	46	64
3 to 5 percent.....	23	17	15	19	18
5 percent and over..	13	10	31	34	18

Table 1.--PERCENT DEVIATION OF ALTERNATIVE SETS OF STATE ESTIMATES FROM CENSUS COUNTS: 1970

Region, Division, and State	Population April 1, 1970 1/ (Census) (In thousands)	PERCENT DIFFERENCE		
		Set I Provisional 1969 Estimates Published in P-25, No. 436 Extrapolated to 1970	Set II Revised 1969 Estimates Extrapolated to 1970	Set III Average of Methods for 1969 and Extrapolated to 1970
UNITED STATES, TOTAL.....	203,185	0.3	0.3	0.2
Regions				
Northeastern States.....	49,001	0.2	-0.2	0.4
North Central States.....	56,577	-0.3	-0.3	-0.5
The South.....	62,797	1.5	1.8	1.6
The West.....	34,810	-1.0	-0.9	-1.2
Northeast				
New England.....	11,848	-2.2	-2.7	-1.8
Middle Atlantic.....	37,153	1.0	0.6	1.2
North Central				
East North Central.....	40,253	-0.1	-0.6	-0.6
West North Central.....	16,324	-0.5	0.4	-0.1
South				
South Atlantic.....	30,671	0.6	0.5	0.1
East South Central.....	12,804	3.0	3.1	2.9
West South Central.....	19,322	2.0	2.9	2.9
West				
Mountain.....	8,282	-2.0	-1.0	-1.2
Pacific.....	26,528	-0.7	-0.8	-1.2
New England				
Maine.....	994	-1.5	-2.0	-2.2
New Hampshire.....	738	-1.6	-1.5	-1.2
Vermont.....	445	-0.5	-1.1	-0.5
Massachusetts.....	5,689	-3.4	-3.9	-2.7
Rhode Island.....	950	-3.7	-3.7	0.1
Connecticut.....	3,032	0.2	-0.7	-1.0
Middle Atlantic				
New York.....	18,191	1.4	0.6	2.2
New Jersey.....	7,168	0.9	1.1	0.7
Pennsylvania.....	11,794	0.4	-0.2	-0.2
East North Central				
Ohio.....	10,652	1.6	0.9	0.9
Indiana.....	5,194	-0.8	-1.0	-1.0
Illinois.....	11,114	0.1	-0.6	-0.9
Michigan.....	8,875	-0.4	-0.4	-0.5
Wisconsin.....	4,418	-3.7	-3.5	-3.6
West North Central				
Minnesota.....	3,805	-2.2	-1.7	-1.5
Iowa.....	2,825	-1.5	1.1	1.4
Missouri.....	4,677	(Z)	0.7	0.7
North Dakota.....	618	-0.7	1.0	0.2
South Dakota.....	666	-1.4	-0.3	-0.6
Nebraska.....	1,484	-2.2	-1.7	-1.6
Kansas.....	2,249	3.7	4.1	-0.4
South Atlantic				
Delaware.....	548	-	-1.4	-2.8
Maryland.....	3,922	-2.6	-3.0	-3.4
District of Columbia.....	757	5.8	4.2	-1.3
Virginia.....	4,648	1.7	1.4	0.8
West Virginia.....	1,744	4.1	3.4	3.6
North Carolina.....	5,082	3.5	2.8	2.9
South Carolina.....	2,591	4.9	5.1	5.1
Georgia.....	4,590	2.4	2.7	2.2
Florida.....	6,789	-4.7	-4.2	-4.2
East South Central				
Kentucky.....	3,219	0.9	1.5	1.6
Tennessee.....	3,924	2.4	2.4	2.2
Alabama.....	3,444	3.1	3.1	2.6
Mississippi.....	2,217	7.1	6.9	6.6
West South Central				
Arkansas.....	1,923	4.6	5.4	5.2
Louisiana.....	3,643	3.9	3.5	3.2
Oklahoma.....	2,559	1.1	1.2	1.3
Texas.....	11,197	1.1	2.7	2.8
Mountain				
Montana.....	694	0.3	-0.5	-0.9
Idaho.....	713	1.3	2.2	2.4
Wyoming.....	332	-3.9	-1.3	-0.7
Colorado.....	2,207	-3.6	-3.2	-3.0
New Mexico.....	1,016	-1.9	0.7	0.4
Arizona.....	1,772	-2.7	-1.1	-1.3
Utah.....	1,059	-0.1	0.1	-0.1
Nevada.....	489	-3.7	-2.3	-3.8
Pacific				
Washington.....	3,409	1.1	0.1	0.7
Oregon.....	2,091	-1.8	-0.4	-0.3
California.....	19,956	-1.1	-1.1	-1.7
Alaska.....	302	-5.0	-3.5	-3.4
Hawaii.....	770	4.8	1.9	-0.2

1/ Figures from 1970 Census of Population PC(V2)-1, United States, Advance Report, Table 1. See, PC(1)-A, U.S. Summary, for final corrections.

TABLE 2.—PERCENT DEVIATION OF STATE ESTIMATES FOR CENSUS COUNTS BY COMPONENT AND REGRESSION METHODS: 1970 AND 1960

Division and State	Method II 1960	Method II 1970	Regression 1960	Regression 1970	Average of methods 1960	Average of methods 1970
UNITED STATES, TOTAL..	-0.01	+0.24	-0.01	+0.24	-0.01	+0.24
New England:						
Maine	+0.12	-2.64	-1.18	-1.73	-0.53	-2.18
New Hampshire	+0.33	-0.91	+0.56	-1.48	+0.44	-1.19
Vermont	-2.91	+0.22	-6.18	-1.26	-4.54	-0.52
Massachusetts	-0.18	-2.82	+2.01	-2.62	+0.92	-2.72
Rhode Island	+0.75	+0.37	+0.06	-0.12	+0.40	+0.12
Connecticut	-2.55	-0.98	+2.98	-1.09	+0.22	-1.04
Middle Atlantic:						
New York	-0.11	+2.96	+0.40	+1.52	+0.14	+2.24
New Jersey	-1.54	+1.74	+1.43	-0.30	-0.06	+0.72
Pennsylvania	+1.22	+0.07	+0.21	-0.55	+0.72	-0.24
East North Central:						
Ohio	+2.08	+0.88	-0.40	+0.84	+0.84	+0.86
Indiana	-1.00	-1.50	-4.53	-0.41	-2.76	-0.95
Illinois	+2.03	-1.77	+1.21	+0.02	+1.62	-0.87
Michigan	+2.47	-0.88	-4.15	-0.02	-0.84	-0.45
Wisconsin	+2.86	-2.42	-1.38	-4.84	+0.74	-3.63
West North Central:						
Minnesota	+0.34	-0.46	-2.20	-2.45	-0.93	-1.45
Iowa	+2.59	+2.55	-4.67	+0.26	-1.04	+1.41
Missouri	-0.29	+0.45	-1.35	+1.01	-0.82	+0.73
North Dakota	+4.38	+2.66	-6.43	-2.23	-1.02	+0.22
South Dakota	+4.15	+1.16	-2.20	-2.29	+0.98	-0.57
Nebraska	+4.21	-0.94	-1.45	-2.28	+1.38	-1.61
Kansas	-1.01	-0.75	-4.03	-0.11	-2.52	-0.43
South Atlantic:						
Delaware	+3.87	-3.78	-4.20	-1.80	-0.16	-2.79
Maryland	-1.57	-2.86	+2.08	-3.88	+0.26	-3.37
District of Columbia	-17.10	-5.54	-1.24	+2.77	-9.17	-1.34
Virginia	+0.46	+1.73	-0.09	-0.09	+0.18	+0.82
West Virginia	+5.97	+4.55	-2.59	+2.63	+1.69	+3.59
North Carolina	+1.60	+2.16	+2.35	+3.53	+1.98	+2.85
South Carolina	+2.50	+7.11	+1.75	+3.11	+2.12	+5.11
Georgia	-1.81	+1.20	+3.05	+3.28	+0.62	+2.24
Florida	-6.06	-7.42	+10.15	-1.01	+2.04	-4.21
East South Central:						
Kentucky	+4.86	+0.86	-0.26	+2.35	+2.30	+1.60
Tennessee	-0.58	+1.12	-0.39	+3.24	-0.48	+2.18
Alabama	+0.26	+3.38	+8.71	+1.87	+4.48	+2.62
Mississippi	+2.23	+5.05	+0.78	+8.19	+1.50	+6.62
West South Central:						
Arkansas	-0.94	+5.42	+5.90	+4.90	+2.48	+5.16
Louisiana	-2.39	+4.45	+0.77	+1.85	-0.81	+3.15
Oklahoma	+0.55	+1.50	-0.77	+1.15	-0.11	+1.33
Texas	+0.90	+2.06	+2.41	+3.53	+1.66	+2.79
Mountain:						
Montana	+1.89	+2.75	-3.04	-4.54	-0.58	-0.89
Idaho	+1.62	+4.33	-6.53	+0.48	-2.46	+2.41
Wyoming	-1.41	+1.12	-2.16	-2.46	-1.78	-0.67
Colorado	-1.43	-1.95	-0.95	-4.07	-1.19	-3.01
New Mexico	-5.77	+3.06	-7.60	-2.21	-6.68	+0.42
Arizona	-0.92	-0.20	-0.18	-2.31	-0.55	-1.25
Utah	+1.08	+0.10	-3.31	-0.33	-1.12	-0.12
Nevada	+2.58	-2.54	+7.25	-5.14	+4.92	-3.84
Pacific:						
Washington	-0.91	+0.75	-2.09	+0.57	-1.50	+0.66
Oregon	+0.84	+0.63	+0.05	-1.26	+0.44	-0.32
California	-4.11	-1.90	-3.45	-1.42	-3.78	-1.66
Alaska		-4.18		-2.53		-3.35
Hawaii		-0.74		+0.41		-0.17

Table 3.--DISPERSION OF CENSUS COUNTS ABOUT LEAST SQUARE REGRESSION LINE: 1950-60 AND 1960-70

(Figures are expressed as percent deviations of estimates derived from regression (Y_c) from Census counts)

Region, Division and State	1950-60	1960-70 1/ Preliminary
New England		
Maine	+1.0	-2.4
New Hampshire	+2.6	-1.4
Vermont	-0.4	-3.2
Massachusetts	+3.7	-1.3
Rhode Island	+0.7	+0.4
Connecticut	+2.8	+0.5
Middle Atlantic		
New York	+1.9	+3.3
New Jersey	+1.6	+1.9
Pennsylvania	-0.1	-0.2
East North Central		
Ohio	-0.7	+2.0
Indiana	-2.4	-0.4
Illinois	+2.7	+1.7
Michigan	-4.4	+1.1
Wisconsin	+1.2	-3.2
West North Central		
Minnesota	+0.6	-1.7
Iowa	-0.7	-0.3
Missouri	+1.1	+2.3
North Dakota	-1.4	-1.0
South Dakota	+1.6	-1.1
Nebraska	+2.7	-1.2
Kansas	-0.2	+0.5
South Atlantic		
Delaware	-2.3	+0.7
Maryland	-0.5	-2.7
District of Columbia	+5.2	+5.5
Virginia	-1.0	-0.3
West Virginia	-5.2	-1.1
North Carolina	+0.6	(Z)
South Carolina	-3.0	+1.0
Georgia	+1.8	+1.0
Florida	-0.1	+0.8
East South Central		
Kentucky	+0.2	-0.4
Tennessee	-0.4	+0.9
Alabama	+2.0	+0.7
Mississippi	+4.0	+5.2
West South Central		
Arkansas	+8.3	+2.1
Louisiana	-1.9	+2.7
Oklahoma	+1.5	+0.1
Texas	-1.0	+3.3
Mountain		
Montana	-2.1	-2.0
Idaho	-3.2	+0.3
Wyoming	-0.4	-2.0
Colorado	-1.7	-4.0
New Mexico	-4.7	-0.4
Arizona	-1.8	-0.6
Utah	-2.6	-0.1
Nevada	+4.8	-0.9
Pacific		
Washington	-2.5	-1.0
Oregon	-1.5	-2.7
California	-2.7	-0.1
Alaska		+1.4
Hawaii		-2.6

1/ Preliminary; Independent variables are for 1960 and 1969.

Table 4.--PERCENT DEVIATION OF ESTIMATES FOR 100 LARGEST SMSA'S FROM CENSUS: 1970

SMSA	April 1, 1970 Census (In thousands)	Percent Difference
New York, N.Y.	11,570	0.1
Los Angeles-Long Beach, Calif.	7,032	-0.6
Chicago, Ill.	6,979	-1.9
Philadelphia, Pa.	4,818	1.1
Detroit, Mich.	4,200	-0.1
San Francisco-Oakland, Calif.	3,110	-2.1
Washington, D.C.-Md.-Va.	2,861	-0.5
Boston, Mass. 1/	3,375	-4.4
Pittsburgh, Pa.	2,401	-1.0
St. Louis, Mo.-Ill.	2,363	0.7
Baltimore, Md.	2,071	-3.4
Cleveland, Ohio	2,064	0.6
Houston, Texas	1,985	0.5
Newark, N. J.	1,857	2.7
Minneapolis-St. Paul, Minn.	1,814	-5.0
Dallas, Texas	1,556	1.0
Seattle-Everett, Wash.	1,422	-2.0
Anaheim-Santa Ana-Garden Grove, Calif.	1,420	-5.1
Milwaukee, Wis.	1,404	-4.6
Atlanta, Ga.	1,390	0.9
Cincinnati, Ohio	1,385	-1.7
Paterson-Clifton-Passaic, N. J.	1,359	1.0
San Diego, Calif.	1,358	-5.0
Buffalo, N. Y.	1,349	-1.5
Miami, Fla.	1,268	-5.1
Kansas City, Mo.-Kan.	1,257	0.7
Denver, Colo.	1,228	-5.2
San Bernadine-Riverside-Ontario, Calif.	1,143	-0.7
Indianapolis, Ind.	1,110	-2.7
San Jose, Calif.	1,065	-3.2
New Orleans, La.	1,046	2.1
Tampa - St. Petersburg, Fla.	1,013	-3.9
Portland, Ore.-Wash.	1,009	-0.9
Phoenix, Ariz.	968	-4.2
Columbus, Ohio 2/	916	-2.3
Providence-Pawtucket-Warwick, R.I.-Mass. 2/	770	-2.0
Rochester, N. Y.	883	-1.0
San Antonio, Texas	864	1.6
Dayton, Ohio	850	0.8
Louisville, Ky.-Ind.	827	-0.7
Sacramento, Calif.	801	-2.5
Memphis, Tenn.-Ark.	770	2.2
Fort Worth, Texas	762	-3.2
Birmingham, Ala.	739	0.1
Albany-Schenectady-Troy, N. Y.	722	0.4
Toledo, Ohio-Mich.	692	-1.0
Norfolk-Portsmouth, Va.	681	1.0
Akron, Ohio	679	1.6
Hartford, Conn. 3/	817	-0.5
Oklahoma City, Okla.	641	-1.9
Syracuse, N. Y.	637	-0.3
Gary-Hammond-East Chicago, Ind.	633	-1.9
Honolulu, Hawaii	631	1.3
Ft. Lauderdale-Hollywood, Fla.	620	-5.5
Jersey City, N. J.	609	0.8
Greensboro-Winston-Salem-High Point, N. C.	604	0.7
Salt Lake City, Utah	558	-0.9
Allentown-Bethlehem-Easton, Pa.-N. J.	544	-1.7
Omaha, Nebr.-Iowa	541	-1.9
Nashville, Tenn.	541	1.3
Grand Rapids, Mich.	539	-3.3
Youngstown-Warren, Ohio	536	-0.4
Springfield-Chicopee-Holyoke, Mass. 4/	583	-5.5
Jacksonville, Fla.	529	-0.6
Richmond, Va.	518	1.9
Wilmington, Del.-N. J.	499	-0.4
Flint, Mich.	497	-0.2
Tulsa, Okla.	476	0.8
Orlando, Fla.	428	-2.8
Fresno, Calif.	413	1.8
Tacoma, Wash.	411	0.7
Harrisburg, Pa.	411	-2.4
Charlotte, N. C.	409	2.4
Knoxville, Tenn.	400	1.8
Wichita, Kansas	389	5.9
Bridgeport, Conn. 5/	793	0.5
Lansing, Mich.	378	-2.7
Mobile, Ala.	377	1.3
Canton, Ohio	372	-0.8
Davenport-Rock Island-Moline, Iowa-Ill.	363	2.2
El Paso, Texas	359	-1.1
New Haven, Conn. 6/	745	-1.8
Worcester, Mass. 7/	638	-4.2
Wilkes-Barre-Hazelton, Pa.	342	-0.3
Peoria, Ill.	342	-0.9
Utica-Rome, N. Y.	341	6.2
York, Pa.	330	-3.0
Bakersfield, Calif.	329	2.4
Little Rock-North Little Rock, Ark.	323	2.2
Lancaster, Pa.	320	-3.1
Beaumont-Port Arthur-Orange, Texas	316	0.9
Chattanooga, Tenn.-Ga.	305	2.0
Binghamton, N. Y.	303	1.3
Reading, Pa.	296	-0.7
Shreveport, La.	294	2.4
Spokane, Wash.	287	-4.5
South Bend, Ind.	280	-1.4
Duluth-Superior, Minn.-Wis.	265	1.1
Johnstown, Pa.	263	(Z)
Corpus Christi, Texas	285	5.6

1/ Mass. SEA C
2/ Rhode Island SEA A
3/ Conn. SEA C
4/ Mass. SEA A
5/ Conn. SEA A
6/ Conn. SEA B
7/ Mass. SEA B

(Z) Less than 500 or 0.05 percent.