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EXAMPLES OF SOME ADJUSTMENT METHODOLOGIES

APPLIED TO THE 1980 CENSUS

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DRAFT
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Introduction

The goal of this project was to construct and implement several adjustment procedures on 1980 census data. Given the tight schedule of the project, it was arbitrarily decided to focus on adjustment of total population at the county level and to use simple methods of adjustment. These criteria led the group to the development of synthetic and regression methods of estimation and to the use of the particular data files to be described.

The project originated in mid-June, 1982 at which time the estimation methods were developed. However, it was not until mid-August that any of the data files were available for our use. One particular file, the PEP first-cut file, consists of the April CPS sample only and it was used in our work only because we were not certain when the final PEP file (April and August CPS samples) would be available.

This report consists of a section summarizing the adjustment methods used. It also contains four attachments. The summary section describes the adjustment methods and documents the data sources used. Briefly, method A1 utilizes demographic estimates of the population at the U.S. level with three different assumptions as to the size of the illegal persons segment. Methods B1 and B4 utilize the PEP estimates at the state and regional levels. Both methods B1 and B4 as well as method A1 are synthetic estimators. Methods C1, C2, and C3 are variants of regression models. PEP state data are regressed on independent variables tabulated from the 1980 census as well as variables collected annually from the states.

Attachment I describes some estimation detail regarding methods B1 and B4 while Attachment II lists the regression variables available. Attachment III provides various summaries of the estimates by method and some summary statistics related to the variables used. Attachment IV consists of Minitab computer printouts that relate to methods C1 and C2.

Summary of Methodology

A. Summary of Method Al Methodology

The following is intended to describe and document the methodology
and sources used to estimate total population by county in the 1980 census
by utilizing 1980 demographic estimates at the U.S. level. The demo-
graphic estimates were available by age-race-sex cells for the legal
population only. Assumptions as to the size of the illegal population
as well as its age-race-sex distribution were made. Once the demographic
estimates were adjusted to include the illegal population, a simple
synthetic estimator was used to derive the required 1980 total population
for each county.

I. Sources used
    A. 1980 Census publication PC 80-S1-1; At the U.S. level this
        publication provides an age-race-sex distribution into 18 five year
        age groups (<5, 5 to 9, 10 to 14,..., 80 to 84 and 85$^+$) by five
        race groups (White, Black, American Indian, Eskimo and Aleut, Asian
        and Pacific Islander and Other) and by sex.

    B. Population Division's internal file (POP*M1COUZ); at the county level
        this file contains an age-race/ethnicity-sex distribution in single
        year age groups by six race categories by Hispanic and non-Hispanic
        and by sex. The data are special tabulations from the 1980 census and
        are consistent with tabulations in published volumes of the 1980 census.

The race categories in the file were White, Black, American Indian, India Indian, other specified and other non-specified.

C. 1980 Demographic estimates (counts on cards); At the U.S. level the cards contained an age-race-sex distribution of the total U.S. population excluding illegal aliens. There were 18 age categories (<5, 5 to 9,..., 80 to 84, 85+) by two race groups (Black, Non-Black) by sex.

D. "Estimation of the Size of the Illegal Alien Population in the United States, Agenda Item B, November 1981, ASA Census Advisory Committee" by Robert Warren, Population Division; At the U.S. level the document provided an estimated distribution of illegal aliens by age-sex. The 14 age groupings were (<5, 5 to 9,..., 60 to 64 and 65+).

II. Modification of sources

Prior to implementing the synthetic estimation method, it was necessary to obtain an age-race-sex distribution of the illegal alien population at the U.S. level and merge the results with that in Source C (1980 Demographic estimates). The age-race-sex distribution of the illegal population was obtained in the following manner:

1. Using Source D, the distribution of the 65+ illegal population was assumed to be similar to that of the 65+ legal population by sex. Hence, if in Source C there were a, b, c, d and e numbers of males in age groups (65 to 69, 70 to 74, 75 to 79, 80 to 84 and 85+) respectively, and 24,000 males in the 65+ age category in Source D,

the 24,000 illegal were assigned to their age groups by using the
ratios a/(a+b+...+e), b/(a+b+...+e), etc.

2. It was somewhat arbitrarily decided to assume that there were
   five million illegal aliens in 1980 and that five percent were
   Black and 95 percent Non-Black. As Source D illustrated a level
   of 2.5 million illegal, the age-sex cell entries were ratio
   adjusted to reflect the five million level. In Attachment III,
   other levels of illegal aliens are also assumed.

3. Finally, assuming that the age-race-sex distribution of the illegal
   population was similar to that in Source C, the age-race-sex distri-
   bution in Source C was raked to the age-sex and race marginals pro-
   vided in step 2 above.

Once step 3 was completed a merged age-race-sex table consisting of
Source C and the output of step 3 was obtained. We refer to this table
as the adjusted 1980 demographic analysis estimates. The detail in this table
is that of Source C. In order to apply the synthetic method, Source B county
level age groups were collapsed to comparable five year intervals and age/
ethnicity groups were collapsed so that the Hispanic-Black and Non-Hispanic-Black
categories jointly comprised the Black group and the remaining categories
were collapsed and designated as the Non-Black group.

III. Synthetic estimator A1

Let

D(i,j,k) ≡ number of persons in age group i, race j and sex k in the adjusted
1980 demographic analysis estimate,

$C_m(i,j,k) \equiv$ number of persons in age group i, race j and sex k in the related Source B collapsed file for county m.

(The index i ranges from age groups <5, 5 to 9,...., 80 to 84 and 85$^+$. The index j ranges over Black and Non-Black).

The synthetic estimator of total population for county m under method Al is $\tilde{P}_m = \sum_{(i,j,k)} C_m(i,j,k) \left[D(i,j,k) / \sum_{m \varepsilon U.S.} C_m(i,j,k) \right]$

where

$\sum_{(i,j,k)}$ denotes summation over all cells (i,j,k)

and

$\sum_{m \varepsilon U.S.}$ denotes summation over all counties m in the U.S. for a fixed cell (i,j,k).

B. Summary of methods B1 and B4

The following is intended to describe and document the methodology and sources used to estimate total population by county in the 1980 census by utilizing the 1980 Post Enumeration Program (PEP) estimates at the regional and state level. The PEP provided 1980 estimates of the institutional (prisons, mental institutions, etc.) population by age-sex and by race at the U.S. level and 1980 estimates of the non-institutional population by age-race-sex at the state level. While the U.S. level was used as a geographic control in Method A1, in methods B1 and B4 the state was used as the geographic control. Both methods B1 and B4 require the PEP estimate of institutional population be allocated to the state level.

I. Sources used

A. 1980 PEP First cut estimates (April CPS); This data file provides an age-race/ethnicity-sex distribution of the non-institutional population by state. There are 18 age groups (0 to 4, 5 to 9,..., 80 to 84, 85⁺) and 10 race/ethnicity categories (Hispanic by White, Black, Asian and Pacific Islander, American Indian, Eskimo-Aleut, and other; Non-Hispanic by White, Black,...., Other). As a part of the PEP, estimates of the age-sex and race distributions of the institutional population at the U.S. level were obtained. The distributions did not have the level of detail required and adjustments were made to obtain the detail necessary at the regional level. In addition, the file contains an age-race/ethnicity-sex distribution of the non-institutionalized population by state derived from the 1980 Population Census.

B. 1980 Census STF2B (internal file); At the county level this file
contains an age-race/ethnicity-sex distribution in single year
age groups by 8 race/ethnicity groups (Hispanic by White, Black,
American Indian etc. and Asian and Pacific combined and other;
Non-Hispanic by White, Black, etc.) by sex.

II. Modification of sources

Method B1 parallels method A1 in that it is a synthetic method of
estimation and that a component of the population must first be included in the
margin controls (institutional population versus illegal aliens). In method
B1, 1980 Census county population estimates are derived by controlling to
PEP state estimates of age-race/ethnicity-sex. The 10 race/ethnicity categories
in the non-institutional population under PEP are collapsed to 8 by combining
the Asian, etc. category with the American Indian, etc. category within both
Hispanic and non-Hispanic. This is done so that the race/ethnicity categories
in both sources (PEP non-institutional and 1980 census) are compatible.
Single year age categories on source B are grouped to be equivalent to the
18 age categories in source A. Given the above, the following modification of
sources was completed.

1. For each state and age-race/ethnicity-sex cell the difference between
the total population in source B and the 1980 census non-institutional
population data in source A was obtained. Refer to the data in the
cells as differences and denote by $D_1(i,j,k)$, (see below).

1a. At this stage the PEP estimates of the institutional population at the
U.S. level are broken down by age-race/ethnicity-sex within each region.
The method used is detailed in Attachment I.

2. For each region, the differences by age-race/ethnicity-sex cells of
   each state in the region obtained in step 1 above are ratio adjusted
   to the regional PEP estimates of the institutional population by
   age-race/ethnicity-sex cell (derived in step 1a. above). For example, if

   $D_1(i,j,k)$ denotes the differences for state 1 in cell (i,j,k)

   $PEP_R(i,j,k)$ denote the PEP regional estimates of the institutional
   population in cell (i,j,k) (derived in step 1a. above) and

   $$\sum_{1 \epsilon R} D_1(i,j,k)$$ denotes the sum over all states 1 in region R,

   the ration adjusted difference for cell (i,j,k) in state 1 is

   $$RD_1(i,j,k) = D_1(i,j,k) \, [PEP_R(i,j,k)]/[\sum_{1 \epsilon R} D_1(i,j,k)].$$

3. Obtain a combined total population PEP estimate for cell (i,j,k)
   for state 1 by adding $RD_1(i,j,k)$ obtained above to the non-
   institutional PEP estimate for cell (i,j,k) for state 1.
   Denote this combined variable $CPEP_1(i,j,k)$.

Method B4 utilizes a combined total population (institutional and non-
institutional) regional distribution by age-race-ethnicity-sex from PEP.
For each state 1, the cells in the regional table are raked to age, race,
ethnicity, and sex marginals defined respectively as

$$\sum_{(j,j',k)} CPEP_1(i,j,j',k) \quad , \quad \sum_{(i,j',k)} CPEP_1(i,j,j',k) \quad , \quad \sum_{(i,j,k)} CPEP_1(i,j,j',k)$$

and $\sum_{(i,j,j')} CPEP_1(i,j,j',k)$.

Hence, in B4, the age/ethnicity category j was split into the separate categories race (White, Black, Asian and Pacific Islander, Eskimo, etc. and Other) and ethnicity (Hispanic, non-Hispanic). Denote the resulting raked cells by $RPEP_1(i,j,j',k)$. The county estimates of total population are obtained synthetically by ratio adjustment of the 1980 census count to the $RPEP_1(i,j,j',k)$ and summation over cells (i,j,j',k).

III. Synthetic estimators B1 and B4

The estimator of total population for county m in state 1 under method B1 is $\tilde{P}_{m,1}$, where

$$\tilde{P}_{m,1} = \sum_{(i,j,k)} C_m(i,j,k) \, [CPEP_1(i,j,k)/\sum_{m\epsilon1} C_m(i,j,k)]$$

and

$\sum_{m\epsilon1}$ denotes summation over all counties m in state 1 for a

fixed cell (i,j,k).

The estimator of total population for county m in state 1 under method B4 is $\bar{P}'_{m,1}$, where

$$\bar{P}'_{m,1} = \sum_{(i,j,j',k)} C_m(i,j,j',k) \left[RPEP_1(i,j,j',k) / \sum_{m \in 1} C_m(i,j,j',k) \right].$$

C. Summary of methods C1, C2, and C3

The following is intended to describe and document the methodology and sources used to estimate total population by county in the 1980 census by utilizing 1980 Post Enumeration Program (PEP) estimates at the state level. The three methods C1, C2, and C3 are the results of variants in regression models assumed. All county estimates resulting from C1, C2 and C3 are raked to their respective PEP estimated state population estimates.

I. Sources used

A. 1980 PEP first cut estimates (April CPS) of state total non-institutional population. To the state estimate was added a synthetically derived state total institutional population based on PEP estimates by age-sex, race, regional, etc., at the U.S. level. Essentially, this sum was the state PEP estimate of total population used in method B1.

Variance estimates of PEP state estimates were also used.

B. 1980 census STF2B (internal file); 1980 census state and county information was obtained from this file and used in constructing the variables given in Attachment II.

C. Population Division's internal file; this file provided county level data such as births, deaths, medicare, that are usually obtained from the individual states.

II. Regression estimators C1, C2 and C3

All three regression methods outlined below assume a linear model

$$y = X\beta + e$$

where the dependent variable y is the ratio of the PEP estimate of state total population to the corresponding 1980 census population. The set of potential independent variables considered are given in Attachment II. In developing the first two methods, C1 and C2, the step-wise regression subroutine in Minitab was used. The output is attached. The third method, C3, uses the same independent variables in methods C1 and C2 and assumes a normal distribution on e with a different variance-covariance structure than C1 or C2.

All three methods assume that the regression equation developed with respect to "state ratios" will apply to predicting county ratios. No finer geographic detail in the PEP estimates (state level) were available to us. Due to the high correlation among some of the independent variables it was necessary to remove some of the variables from model C1 below. No other attempt was made to investigate for further multi-collinearity. The variables removed were C4, C5, C10, C11, C12, and C14-C18. These variables are defined in Attachment II.

1. Method C1

Under this method, the linear model assumed is

$y = X\beta + e$ where $e \sim (0, \sigma^2 I)$. Using the step-wise regression subroutine with an F to enter and F to remove value of 1.5 (see Attachment IV), five variables were allowed to enter. Given the observations by E. Ericksen (JASA, 1974) that a reasonable number of independent variables to use in his sample regression method was about three or four, it was decided to use the prediction equation

$$Y_i = .807 + 1.19 \underset{(C7)}{X_{1i}} - 5.17 \underset{(C23)}{X_{2i}} + .216 \underset{(C24)}{X_{3i}}. \tag{a}$$

where $\hat{\sigma}^2 = .000225$.

Various summary measures via Minitab are appended to this report including the step-wise regression report and the usual analysis of variance tables for the three independent variables model above. Using (a) above, county predicted total population estimates were derived and are summarized under "method C1."

2. Method C2

Under this method, the linear model assumed is

$$y = X\beta + e \quad \text{where} \quad e \sim (0, \sigma^2 D)$$

where D is a diagonal variance-covariance matrix whose elements are the estimated variances of y from the PEP.

Transforming the elements of y and x by dividing each by the appropriate diagonal element (to its one half power), the step-wise regression routine with the same F to enter and F to remove value of 1.5 was used. The step-wise regression routine of Minitab does not allow weighted regression. Consequently, the step-wise routine was applied using the transformed data under a model in which the constant term in the original linear model above was the regression coefficient of the transformed column of ones. (In Attachment IV, step-wise regression, the transformed variable is denoted C35.) The resulting estimated β are the weighted least squares estimates. The following prediction equation

$$Y_i = 1.048 + 4.296\ X_{1i} - .464\ X_{2i} - 3.284\ X_{3i} - .268\ X_{4i}$$
$$\text{(C14)} \qquad \text{(C1)} \qquad \text{(C23)} \qquad \text{(C17)} \qquad \text{(b)}$$

where $\sigma^2 = 1.647$

was decided upon for reasons listed for model C1.

Various summary measures via Minitab are appended to this report and the results pertaining to method C2 are presented under the section termed weighted regression. The equation in (b) was used to produce county predicted total population estimates and summarized under "method C2."

3. Method C3

Under this method, the linear model assumed is

$$y = X\beta + e \quad \text{where} \quad e \sim (0, \sigma^2 I + D)$$

where D is as described in the section on method C2. Furthermore, it is assumed that e has a multivariate normal distribution. An iterative procedure was used to obtain maximum likelihood estimators of β and σ^2 given the independent variables C14, C1, C23, C17, C7 and C24. These variables were used because no step-wise procedure was available for this estimation method. The resulting prediction equation is

$$y_i = .816 - .503 \underset{(C1)}{X_{1i}} + .594 \underset{(C7)}{X_{2i}} + 4.596 \underset{(C14)}{X_{3i}} - .221 \underset{(C17)}{X_{4i}}$$
$$- 4.193 \underset{(C23)}{X_{5i}} + .219 \underset{(C24)}{X_{6i}} \tag{c}$$

and $\hat{\sigma}^2 = .0000191$.

The range of the elements of $\underline{D}$ is .0000134 to .000665. The equation in (c) was used to produce county predicted total population estimates and summarized under "method C3".

Attachment I.

Modification of PEP Institutional Population Estimates

Dual system estimates (PEP) of the institutional population are available at the following level of detail --

I. Sex by 6 age group categories (<15, 15 to 24, 25 to 34, 35 to 44, 45 to 64 and 65 $^+$) for the U.S.

II. 3 race groups (White, Black, Other) for the U.S.

III. 4 regions (Northeast, West, North Central, South)

The dual system estimates for the above categories are given at the end of this attachment.

We require the following level of detail -- region by sex by 18 age groups by 8 race/ethnicity cells.

To obtain the level of detail, the census institutional population was used in a manner similar to the use of the census population in obtaining the distribution of illegal persons in Method A1.

The appropriate total population by age-race-sex cells from the STF2B file was diminished by the 1980 Population Census non-institutionalized population count on the PEP file. Some of the resulting entries were negative. This was felt to be caused by the 1980 Population Census non-institutionalized population count on the PEP file. The count on the PEP

file were preliminary numbers while the data on STF2B were final published figures. Given the tight schedule at hand, it was decided to convert all negative counts to zero. Using the resulting Census distribution (region x age-race-sex) detailed PEP marginal data was obtained in the following manner --

Let the derived distribution above of institutionalized persons be denoted $IC_r(i,j,k)$ for region r. Then,

1. age-sex (i,k) -->

$$[\text{PEP total U.S. institutional } (iUi',.,k)] \times$$

$$\frac{\sum\limits_{r,j} IC_r(i,j,k)}{\sum\limits_{r,j} IC_r(i,j,k)+IC_r(i',j,k)}$$

where U denotes union.

2. race/ethnicity $(.,j,.)$ -->

$$[\text{PEP total U.S. institutional } (.,jUj',.)] \times$$

$$\frac{\sum\limits_{r,i,k} IC_r(i,j,k)}{\sum\limits_{r,i,k} IC_r(i,j,k)+IC_r(i,j',k)}$$

For part 1., more than 2 age categories may be collapsed. For example, <15 must be broken into <5, 5 to 9, 10 to 14 implying 3 categories. In part 2., the institutional PEP Other category must be broken into the 4 categories -- Hispanic Asian, Indian, etc.; Non-Hispanic Asian, Indian, etc.; Hispanic Other; and Non-Hispanic Other. The white and black PEP institutional marginal must be subdivided by the subcategory Hispanic/Non-Hispanic which together with the race/ethnicity categories above totals the eight race/ethnicity categories needed.

We have thus obtained the full marginal distributions for sex by age, race/ethnicity, and region. These marginals were then raked (using the census institutional population as the starting values) to obtain the PEP institutional age-race/ethnicity-sex by region population estimates which were used in Methods B1 and B4.

Institutional - U.S.
Dual System Estimates

Total Races	DSE*	(1- C/DSE)x100	SE
Both Sexes	2,631,208	4.73%	1.9%
0-14	54,183	-39.97%	11.2%
15-24	421,217	13.62%	4.6%
25-34	298,997	3.69%	5.8%
35-44	168,747	16.20%	8.3%
44-65	347,753	16.46%	4.7%
65+	1,340,311	-.51%	1.3%
Male	1,327,326	6.90%	2.4%
0-14	34,288	-45.03%	14.4%
15-24	358,993	16.97%	5.3%
25-34	245,994	3.29%	6.4%
35-44	115,965	8.93%	9.7%
44-65	204,156	16.01%	6.5%
65+	367,930	-1.37%	1.4%
Female	1,303,882	2.53%	1.7%
0-14	19,895	-31.25%	16.2%
15-24	62,224	-5.72%	9.4%
25-34	53,003	5.51%	13.1%
35-44	52,782	32.18%	15.8%
44-65	143,597	17.10%	6.5%
65+	972,381	-.18%	1.8%
White	2,117,344	4.45%	1.9%
Nonwhite	513,864	5.89%	4.2%
Black	487,380	7.80%	4.3%

*DSE's are sum of Regions by Age, Race, Sex

PEP Regional Estimates of Total Institutionalized

Persons

1. Northeast   636,355

2. West   461,852

3. North Central   735,284

4. South   797,717
                    Total   2,631,208

Format of DIM-REG-S.

Variable name		Card #	Column
State identifier 1/		1	I6
adjusted DSE/census count		2	F10.8
Var (adjusted DSE/census count)		"	"

<div align="center"><u>independent variables</u>
2/</div>

			Card #	Column
C1)	proportion	Hispanic	3	F10.8
C2)	"	Black		"
C3)		White		"
C4)	"	White- non-Hispanic		"
C5)	"	Black- non-Hispanic		"
C6)	"	persons in houses with 1.01 or more persons/ room		"
C7)	"	substitutions		"
C8)	"	Hispanic substitutions		"
C9)	"	Black "	4	"
C10)	"	White "		"
C11)	"	White- non-Hispanic substitutions		"
C12)	"	Black- non-Hispanic substitutions		"
C13)	"	allocations		"
C14)	"	Hispanic allocations		"
C15)	"	Black "		"
C16)	"	White "		"
C17)	"	White- non-Hispanic allocations	5	"
C18)	"	Black- non-Hispanic allocations		"
C19)	1980 census/1970 census 3/			"
C20)	1980 provisional estimate/1980 census 4/			"
C21)	school enrollment/1980 census ages 6-14			"

1/ The adjusted DSE variable is the estimated total population for the state used in method B1. It is equal to the sum of the PEP dual system estimate of the non-institutionalized persons for the state plus a synthetically derived estimate of the institutionalized persons in the state based on data from the PEP.

2/ Independent variables C1 through C18 and C25 through C29 were obtained from the STF2B files and are available for all 3,137 counties in the U.S.

3/ The 1980 provisional estimate in variable C20 was obtained from Population Division. Variables C19 through C24 are not available for all counties in Alaska and one in Hawaii.

4/ Data components in C19 through C24 were obtained from Population Division. School enrollment refers to public school enrollment of students aged 6.25 to 14.25.

Variable name	Card #	Column

<u>independent variables</u>

C22)	1979 births/1980 census ages 0-1			"
C23)	1979 deaths/1980 census			"
C24)	1979 medicare/1980 census ages 66+			"
C25)	proportion vacant housing units	6		"
C26)	proportion occupied housing units with 1.01 or more persons/room			"
C27)	proportion year-round housing units which share an address or mobile home or trailer			"
C28)	proportion persons substituted for non-interview			"
C29)	proportion housing units allocated vacant but not substituted			"

Attachment III

County and state summaries for methods A1, B1, B4, C1, C2, and C3.

A. Table A1. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Black*

1980 Census County Population	Percent Black							
	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	245 1.0107	20 1.0123	10 1.0112	3 1.0175	1 1.0250	2 1.0279	7 1.0348	288 1.0117
5,000 to 10,000	306 1.0105	53 1.0126	20 1.0137	23 1.0166	17 1.0231	25 1.0271	28 1.0370	472 1.0141
10,000 to 25,000	509 1.0109	134 1.0120	54 1.0144	76 1.0175	52 1.0230	62 1.0277	87 1.0356	974 1.0157
25,000 to 50,000	259 1.0118	138 1.0130	44 1.0153	57 1.0188	44 1.0243	30 1.0285	39 1.0351	611 1.0162
50,000 to 100,000	119 1.0124	117 1.0138	45 1.0158	42 1.0206	31 1.0247	16 1.0285	8 1.0352	378 1.0163
100,000 to 250,000	59 1.0132	66 1.0138	45 1.0167	32 1.0204	19 1.0250	10 1.0317	3 1.0354	234 1.0171
250,000 to 500,000	7 1.0133	27 1.0142	25 1.0169	20 1.0201	8 1.0262	6 1.0312	2 1.0331	95 1.0186
500,000 +	2 1.0132	19 1.0144	19 1.0162	27 1.0197	6 1.0243	7 1.0301	5 1.0404	85 1.0200
Total	1506 1.0112	574 1.0131	262 1.0154	280 1.0189	178 1.0240	158 1.0283	179 1.0358	3137 1.0156

*The ratios are method A1 estimates of county total population divided by the 1980 census count for the county. Assumes 5.0 million illegal persons.

B. Frequency distribution of counties by their method A1 ratios*

Interval of ratios	Number
1.000 - 1.0025	2
1.0025 - 1.0075	46
1.0075 - 1.0125	1409
1.0125 - 1.0175	900
1.0175 - 1.0225	290
1.0225 - 1.0275	201
1.0275 - 1.0325	145
1.0325 - 1.0375	85
1.0375 - 1.0425	47
1.0425 - 1.0475	6
1.0475 - 1.0525	5
1.0525 - 1.0625	0
1.0625 - 1.0675	1
	3137

mean = 1.0156

standard deviation = .00734

median = 1.0129

maximum = 1.0661

minimum = 1.0016

*The ratios are method A1 estimates of county total population divided by the 1980 census count for the county (the District of Columbia is treated as a county). Assumes 5.0 million illegal persons.

C. Plot of method A1* county ratios versus 1980 census

   proportion Black

```
           C4
        1.075+                               *
             -
             -
             -
             -
        1.060+
Method A1     -
  ratio       -               *          *     *
             -               *          *    *  *
             -                              2  *
        1.045+              *          *27**** *
             -
             -                   *      **33446332* *
             -                 *      2*352574763***
             -              **2 *33587+625**
        1.030+      **      *286++++73*    *
             -   *      **5278+++++85*
             -  * ***23+9++++++5
             - 3 *75++8++++85332
             - ++++++++++87* *
        1.015+ +++++++99**
             - +++++84** *
             - +++75
             - +2 2
             - 32*
        1.000+
             +---------+---------+---------+---------+---------+C5
             .00       .20       .40       .60       .80      1.00
```

                                          Proportion Black

*Assumes 5.0 million illegal persons.

* - single point

+ - ten or more points

In the following, method A1 state summaries are listed and summarized in tabular and graphical form.

D. Alphabetical listing of state data -

Row	1980 census population	Method A1 estimate	1980 census Black Pop.	1980 census Prop. Black
1	3893888.	3988773.	996335.	.255872
2	401851.	409869.	13643.	.033950
3	2718215.	2755133.	74977.	.027583
4	2286435.	2329467.	373768.	.163472
5	23667902.	24080884.	1819281.	.076867
6	2889964.	2937537.	101703.	.035192
7	3107576.	3156090.	217433.	.069969
8	594338.	606710.	95845.	.161263
9	638333.	669411.	448906.	.703247
10	9746324.	9910371.	1342688.	.137764
11	5463105.	5609417.	1465181.	.268196
12	964691.	979442.	17364.	.018000
13	943935.	956178.	2716.	.002877
14	11426518.	11654754.	1675398.	.146624
15	5490224.	5579800.	414785.	.075550
16	2913808.	2949905.	41700.	.014311
17	2363679.	2398560.	126127.	.053360
18	3660777.	3718656.	259477.	.070880
19	4205900.	4321519.	1238241.	.294406
20	1124660.	1138170.	3128.	.002781
21	4216975.	4323452.	958150.	.227213
22	5737037.	5816308.	221279.	.038570
23	9262078.	9442086.	1199023.	.129455
24	4075970.	4130172.	53344.	.013087
25	2520638.	2592781.	887206.	.351977
26	4916686.	4999379.	514276.	.104598
27	786690.	796850.	1786.	.002270
28	1569825.	1591148.	48390.	.030825
29	800493.	814530.	50999.	.063709
30	920610.	932537.	3990.	.004334
31	7364823.	7499401.	925066.	.125606
32	1302894.	1321148.	24020.	.018436
33	17558072.	17888468.	2402006.	.136804
34	5881766.	6022373.	1318857.	.224228
35	652717.	660838.	2568.	.003934
36	10797630.	10984595.	1076748.	.099721
37	3025290.	3071966.	204674.	.067654
38	2633105.	2668708.	37060.	.014075
39	11863895.	12046456.	1046810.	.088235
40	947154.	959100.	27584.	.029123
41	3121820.	3209840.	948623.	.303869
42	690768.	698853.	2144.	.003104
43	4591120.	4683284.	725942.	.158119
44	14229191.	14505386.	1710175.	.120188
45	1461037.	1480926.	9225.	.006314
46	511456.	518034.	1135.	.002219
47	5346818.	5470616.	1008668.	.188648
48	4132156.	4192955.	105574.	.025549
49	1949644.	1974846.	65051.	.033366
50	4705767.	4772432.	182592.	.038802
51	469557.	476563.	3364.	.007164

*Assumes 5.0 million illegal persons.

E. Frequency distribution of states by their method A1 ratios*

Interval of ratios	Number
1.0000 - 1.0125	4
1.0125 - 1.0175	28
1.0175 - 1.0225	10
1.0225 - 1.0275	6
1.0275 - 1.0325	2
1.0325 - 1.0375	0
1.0375 - 1.0425	0
1.0425 - 1.0475	0
1.0475 - 1.0525	1
	51

Mean ratio = 1.0175

Standard deviation = .00635

median = 1.0158

maximum = 1.0487

minimum = 1.0117

*The ratios are method A1 estimates of state total population divided by the 1980 census count for the state. (The District of Columbia is included as a state.) The method A1 state estimate is derived as the sum of method A1 county estimates. Assumes 5.0 million illegal persons.

F. Plot of method A1* state ratios versus 1980 census proportion Black

```
                    PU
              1.050+
                  -                                        *
                  -
                  -
                  -
                  -
              1.040+
Method A1         -
   ratio          -
                  -
                  -
              1.030+
                  -                              2   *
                  -                        *  *
                  -                     *  *  *
                  -
              1.020+        *     2*2
                  -            ******
                  -        **23*  *
                  -        253*
                  -        72*
              1.010+
                  +---------+---------+---------+---------+---------+PB
                 .00       .20       .40       .60       .80      1.00
```

Proportion Black
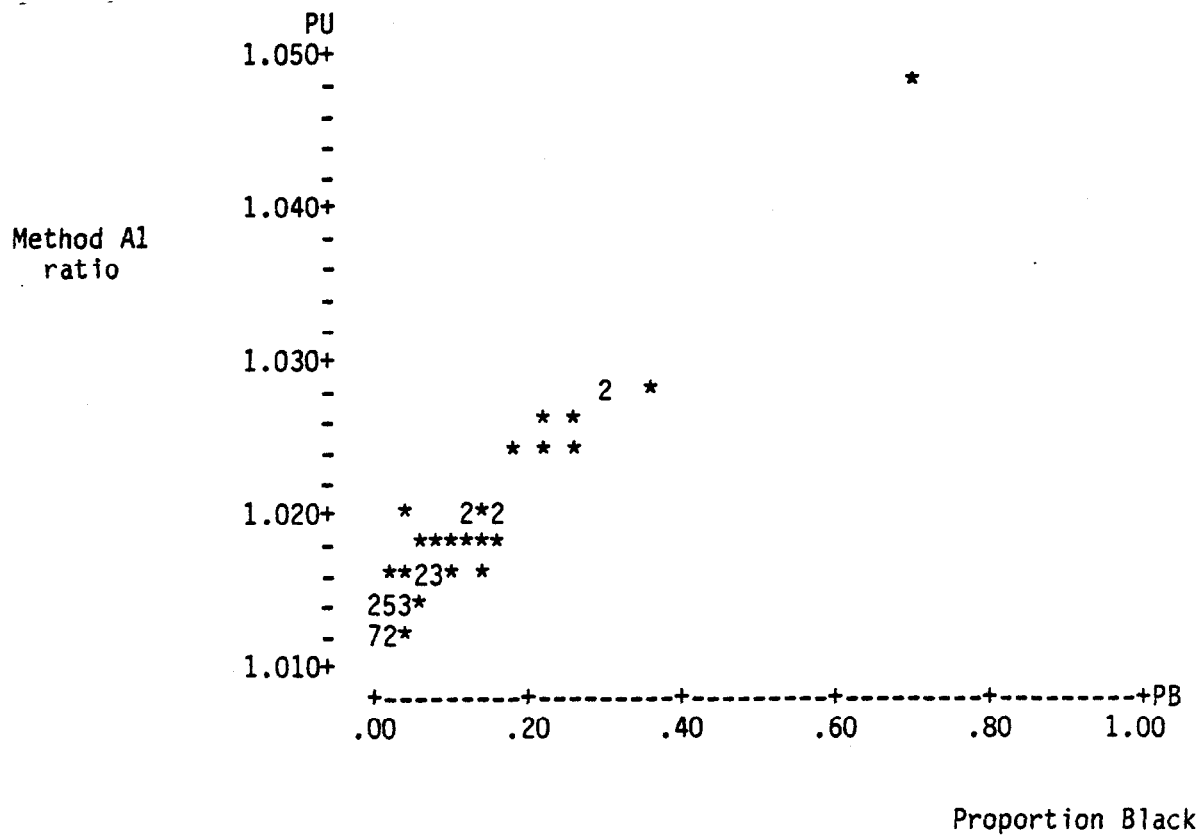
*Assumes 5.0 million illegal persons.

A. Table A1. _____ Frequency and Mean of county ratios by 1980 census county population and 1980 census county percent Black*

1980 Census County Population	Percent Black							Total
	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	
0 to 5,000	245	20	10	3	1	2	7	288
	0.9947	0.9962	0.9970	1.0024	1.0091	1.0153	1.0246	0.9958
5,000 to 10,000	306	53	20	23	17	25	28	472
	0.9944	0.9961	0.9982	1.0019	1.0093	1.0143	1.0262	0.9986
10,000 to 25,000	509	134	54	76	52	62	87	974
	0.9943	0.9957	0.9983	1.0019	1.0087	1.0147	1.0243	1.0001
25,000 to 50,000	259	138	44	57	44	30	39	611
	0.9945	0.9959	0.9987	1.0025	1.0097	1.0148	1.0234	0.9998
50,000 to 100,000	119	117	45	42	31	16	8	378
	0.9946	0.9960	0.9988	1.0038	1.0092	1.0141	1.0229	0.9992
100,000 to 250,000	59	66	45	32	19	10	3	234
	0.9949	0.9959	0.9993	1.0039	1.0090	1.0170	1.0226	0.9997
250,000 to 500,000	7	27	25	20	8	6	2	95
	0.9950	0.9963	0.9994	1.0033	1.0105	1.0160	1.0209	1.0015
500,000 +	2	19	19	27	6	7	5	85
	0.9951	0.9965	0.9993	1.0037	1.0090	1.0165	1.0285	1.0038
Total	1506	574	262	280	178	158	179	3137
	0.9945	0.9959	0.9988	1.0031	1.0092	1.0148	1.0244	0.9994

*The ratios are method A1 estimates of county total population divided by the 1980 census count for the county. Assumes 1.25 million illegal persons.

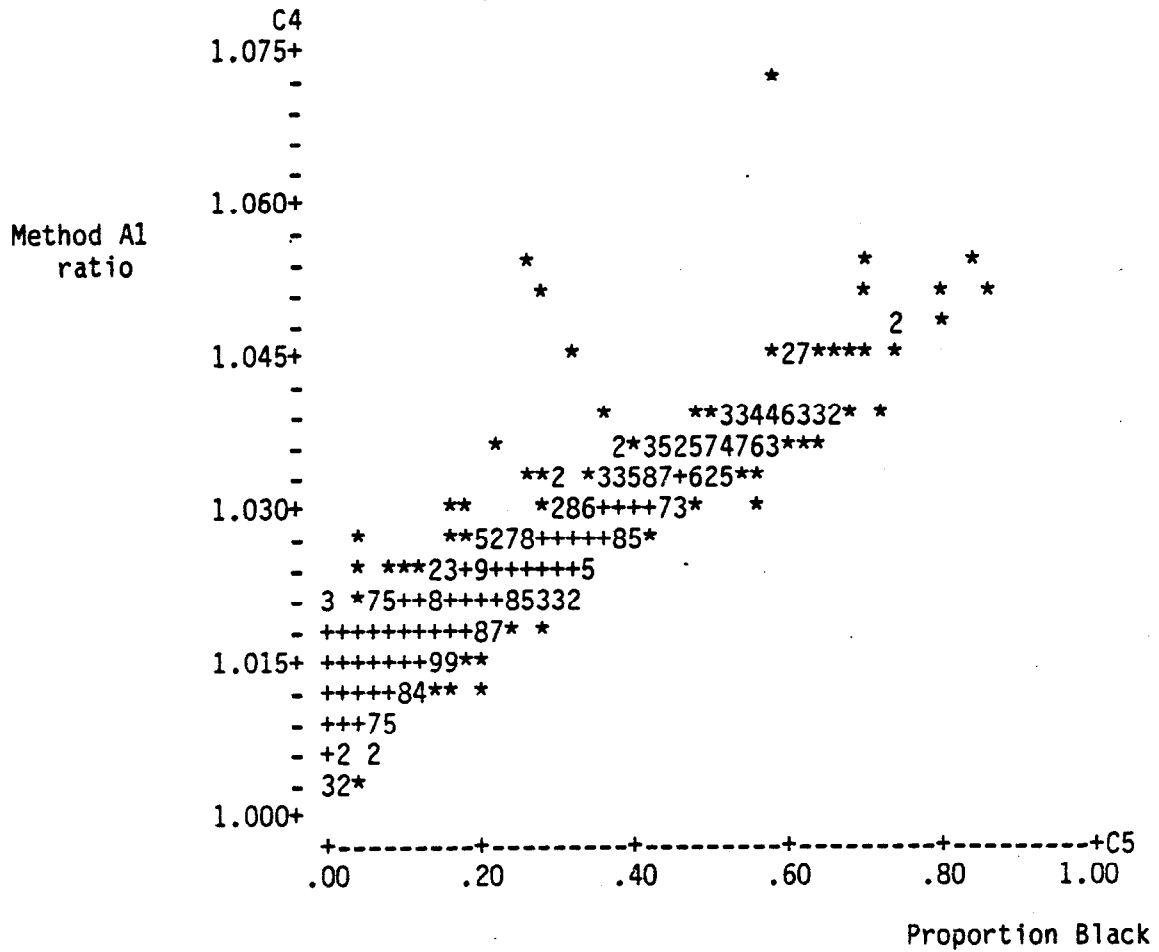B. Frequency distribution of counties by their method A1 ratios*

Interval of ratios	Number
.9875 - .9925	6
.9925 - .9975	2070
.9975 - 1.0025	389
1.0025 - 1.0075	190
1.0075 - 1.0125	158
1.0125 - 1.0175	135
1.0175 - 1.0225	93
1.0225 - 1.0275	48
1.0275 - 1.0325	38
1.0325 - 1.0375	4
1.0375 - 1.0425	5
1.0425 - 1.0475	0
1.0475 - 1.0525	1
	3137

mean = .99943   maximum = 1.0518

standard dev. = .00848   minimum = .99142

median = .99535

* The ratios are method A1 estimates of county total population divided by the 1980 census count for the county (the District of Columbia is treated as a county). Assumes 1.25 million illegal persons.

C. Plot of method A1 county ratios* versus 1980 census proportion Black

```
              ·  PU
           1.065+
                -
                -
                -
                -                                    *
           1.050+
                -
                -                              *     * **
                -                              *
           1.035+                                 3 *
 Method A1      -                          262****
   ratio        -                  *       **236432*
                -                           *258752
                -                     *  26798522
                -                        *258752
                -                  *  26798522
           1.020+                  *2279+93 **
                -              ***2*3++++2
                -                4++++4*
                -            *28++++2*
                -           *9++++5*
           1.005+    *   *29++++2
                -      24+++++5*
                - 4++++++  *
                - ++++6*
                - ++*
            .990+ **
                +---------+---------+---------+---------+---------+PB
                .00       .20       .40       .60       .80      1.00
```

                                              Proportion Black
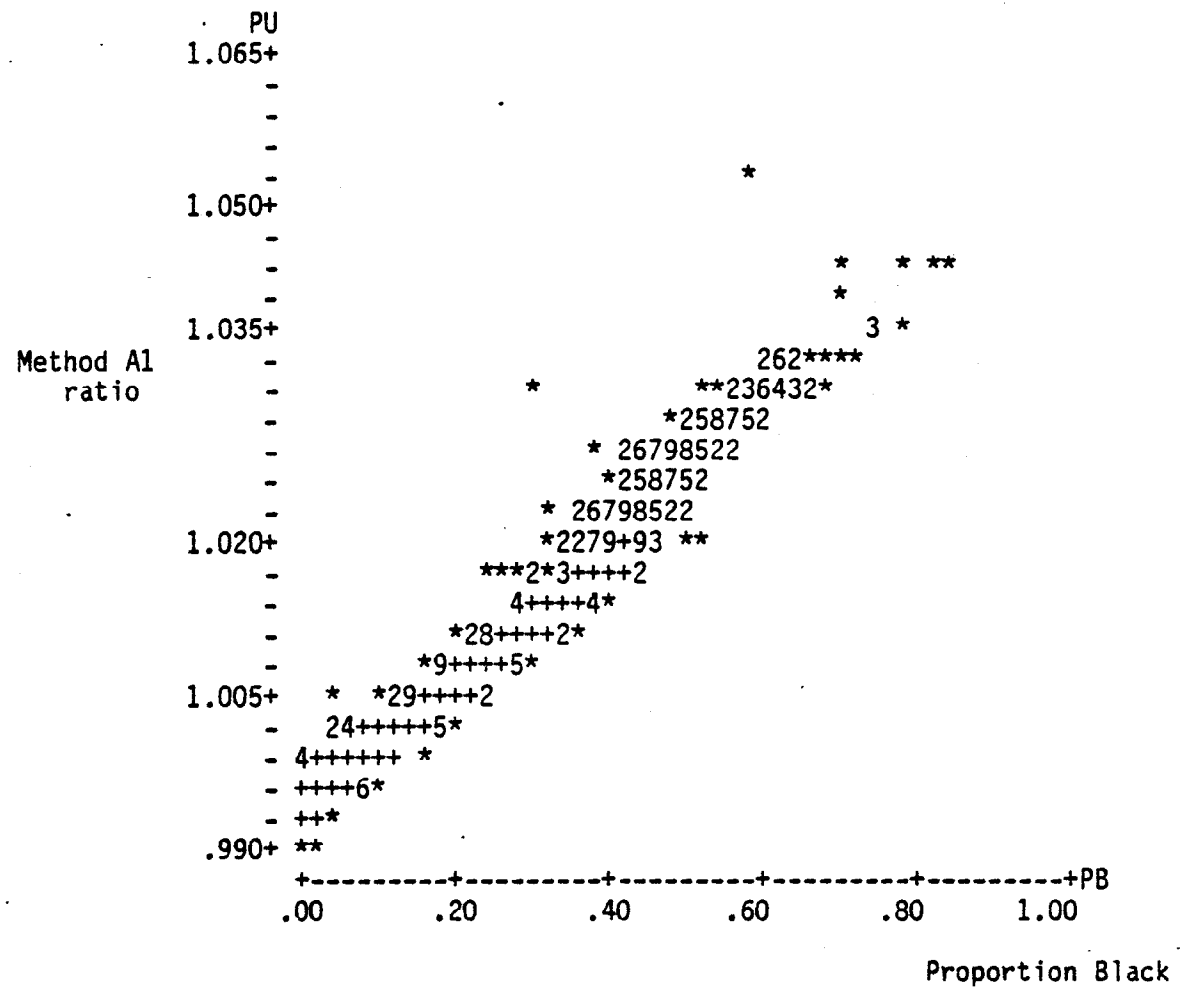
*Assumes 1.25 million illegal persons.

       * -- single point

       + -- ten or more points

In the following, method A1 state summaries are listed and summarized in tabular and graphical form.

D. Alphabetical listing of state data -

Row	1980 Census Population	Method A1 estimate	1980 Census Black pop.	1980 Census Prop. Black
1	3893888.	3930796.	996335.	.255872
2	401851.	401437.	13643.	.033950
3	2718215.	2707180.	74977.	.027583
4	2286435.	2294602.	373768.	.163472
5	23667902.	23663836.	1819281.	.076867
6	2889964.	2882596.	101703.	.035192
7	3107576.	3104170.	217433.	.069969
8	594338.	597062.	95845.	.161263
9	638333.	662664.	448906.	.703247
10	9746324.	9768893.	1342688.	.137764
11	5463105.	5525417.	1465181.	.268196
12	964691.	961138.	17364.	.018000
13	943935.	939069.	2716.	.002877
14	11426518.	11470050.	1675398.	.146624
15	5490224.	5486000.	414785.	.075550
16	2913808.	2899766.	41700.	.014311
17	2363679.	2358519.	126127.	.053360
18	3660777.	3655920.	259477.	.070880
19	4205900.	4258423.	1238241.	.294406
20	1124660.	1118474.	3128.	.002781
21	4216975.	4257278.	958150.	.227213
22	5737037.	5717391.	221279.	.038570
23	9262078.	9287389.	1199023.	.129455
24	4075970.	4057088.	53344.	.013087
25	2520638.	2558127.	887206.	.351977
26	4916686.	4920137.	514276.	.104598
27	786690.	782587.	1786.	.002270
28	1569825.	1564191.	48390.	.030825
29	800493.	800094.	50999.	.063709
30	902610.	915861.	3990.	.004334
31	7364823.	7382590.	925066.	.125606
32	1302894.	1297250.	24020.	.018436
33	17558072.	17610907.	2402006.	.136804
34	5881766.	5930322.	1318857.	.224228
35	652717.	649147.	2568.	.003934
36	10797630.	10804849.	1076748.	.099721
37	3025290.	3020985.	204674.	.067654
38	2633105.	2621332.	37060.	.014075
39	11863895.	11856054.	1046810.	.088235
40	947154.	943102.	27584.	.029123
41	3121820.	3163024.	948623.	.303869
42	690768.	686917.	2144.	..003104
43	4591120.	4609375.	725942.	.158119
44	14229191.	14261355.	1710175.	.120188
45	1461037.	1453598.	9225.	.006314
46	511456.	508693.	1135.	.002219
47	5346818.	5382487.	1008668.	.188648
48	4132156.	4117847.	105574.	.025549
49	1949644.	1941712.	65051.	.033366
50	4705767.	4690760.	182592.	.038802
51	469557.	467498.	3364.	.007164

*Assumes 1.25 million illegal persons

E. Frequency distribution of states by their method A1 ratios*

Interval of ratios	Number
.9925 - .9975	22
.9975 - 1.0025	14
1.0025 - 1.0075	7
1.0075 - 1.0125	5
1.0125 - 1.0175	2
1.0175 - 1.0225	0
1.0225 - 1.0275	0
1.0275 - 1.0325	0
1.0325 - 1.0375	0
1.0375 - 1.0425	1
	51

mean ratio = 1.0009
standard deviation = .00767
median = .9989
maximum = 1.0381
minimum = .99443

*The ratios are method A1 estimates of state total population divided by the 1980 census count for the state. (The District of Columbia is included as a state.) The method A1 state estimate is derived as the sum of method A1 county estimates. Assumes 1.25 million illegal persons.

F. Plot of method A1* state ratios versus 1980 census proportion Black

```
        1.040+                                        *
             -
             -
             -
             -
        1.030+
Method A1    -
  ratio      -
             -
             -
        1.020+
             -
             -
             -                            *    *
        1.010+                          *  *
             -                          *
             -                       *
             -              23
             -              3*
        1.000+        *32
             -       23*
             -    *84
             -    8
             -
         .990+
             +---------+---------+---------+---------+---------+PB
            .00       .20       .40       .60       .80      1.00

                                                    Proportion Black
```

*Assumes 1.25 million illegal persons

A. Table A1. _____ Frequency and mean of county ratios by 1980 census county
population and 1980 census county percent Black*

1980 Census county population	Percent Black							Total
	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	
0 to 5,000	245 1.0000	20 1.0015	10 1.0017	3 1.0074	1 1.0144	2 1.0194	7 1.0279	288 1.0011
5,000 to 10,000	306 0.9997	53 1.0015	20 1.0033	23 1.0068	17 1.0138	25 1.0185	28 1.0298	472 1.0037
10,000 to 25,000	509 0.9998	134 1.0011	54 1.0036	76 1.0074	52 1.0135	62 1.0190	87 1.0280	974 1.0053
25,000 to 50,000	259 1.0002	138 1.0016	44 1.0042	57 1.0082	44 1.0145	30 1.0193	39 1.0273	611 1.0052
50,000 to 100,000	119 1.0005	117 1.0019	45 1.0044	42 1.0093	31 1.0143	16 1.0188	8 1.0270	378 1.0048
100,000 to 250,000	59 1.0009	66 1.0018	45 1.0051	32 1.0094	19 1.0143	10 1.0218	3 1.0269	234 1.0055
250,000 to 500,000	7 1.0011	27 1.0022	25 1.0052	20 1.0089	8 1.0157	6 1.0210	2 1.0249	95 1.0071
500,000 +	2 1.0011	19 1.0024	19 1.0049	27 1.0090	6 1.0141	7 1.0210	5 1.0325	85 1.0091
Total	1506 1.0000	574 1.0016	262 1.0043	280 1.0083	178 1.0141	158 1.0193	179 1.0282	3137 1.0048

*The ratios are method A1 estimates of county total population divided by the 1980
census count for the county. Assumes 2,489,927 illegal persons.

B. Frequency distribution of counties by their method A1 ratios[*]

Interval of ratios	Number
.9925 - .9975	16
.9975 - 1.0025	1952
1.0025 - 1.0075	477
1.0075 - 1.0125	213
1.0125 - 1.0175	171
1.0175 - 1.0225	136
1.0225 - 1.0275	83
1.0275 - 1.0325	55
1.0325 - 1.0375	25
1.0375 - 1.0425	5
1.0425 - 1.0475	3
1.0475 - 1.0525	0
1.0525 - 1.0575	1
	3137

mean ratio = 1.0048   maximum = 1.0565

standard deviation = .00806   minimum = .99480

median = 1.0012

[*]The ratios are method A1 estimates of county total population divided
by the 1980 census count for the county. (The District of Columbia is
included as a county.) Assumes 2,489,927 illegals so that the method
A1 total U.S. count equals that of method B1.

C. Plot of method A1 county ratios versus 1980 census proportion Black*

```
       PU
     1.065+
          -
          -                                            *
          -
          -
     1.050+
Method    -
A1 ratio  -                                    *      **
          -                                    *    *
          -                                      3 *
     1.035+                      *            *2722***
          -                                * 2*34633**
          -                          *        275883**
          -                           *2*59+9352
          -                  ***2**2+++96*   *
     1.020+                  **++++96*   2
          -             ****8+++97
          -             *58++++84*
        - * *   *25++++52*
          -     *8++++++5*
     1.005+ +8+++++83 *
        - +++++4*
        - +++5
        - +2*
          -
      .990+
          +---------+---------+---------+---------+---------+PB
          .00       .20       .40       .60       .80      1.00

                                            Proportion Black
```

   * -- single point

   + -- ten or more points
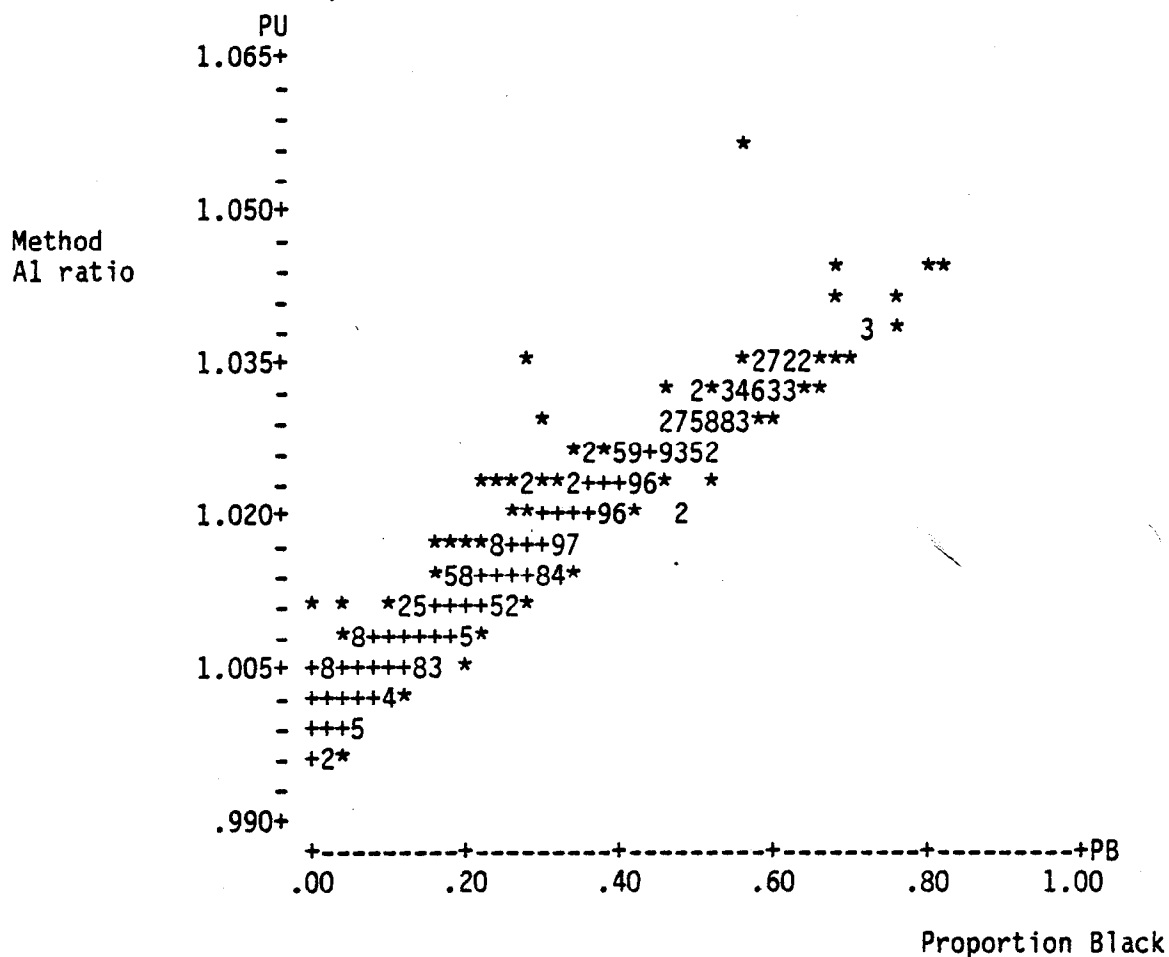
*Assumes 2,489,927 illegal persons.

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3	2718215.	2723035.	74977.	.027583
4	2286435.	2306129.	373768.	.163472
5	23667902.	23801731.	1819281.	.076867
6	2889964.	2900760.	101703.	.035192
7	3107576.	3121336.	217433.	.069969
8	594338.	600252.	95845.	.161263
9	638333.	664895.	448906.	.703247
10	9746324.	9815668.	1342688.	.137764
11	5463105.	5553187.	1465181.	.268196
12	964691.	967190.	17364.	.018000
13	943935.	944721.	2716.	.002877
14	11426518.	11531124.	1675398.	.146624
15	5490224.	5517018.	414785.	.075550
16	2913808.	2916349.	41700.	.014311
17	2363679.	2371755.	126127.	.053360
18	3660777.	3676663.	259477.	.070880
19	4205900.	4279284.	1238241.	.294406
20	1124660.	1124986.	3128.	.002781
21	4216975.	4279160.	958150.	.227213
22	5737037.	5750095.	221279.	.038570
23	9262078.	9338535.	1199023.	.129455
24	4075970.	4081254.	53344.	.013087
25	2520638.	2569593.	887206.	.351977
26	4916686.	4946337.	514276.	.104598
27	786690.	787302.	1786.	.002270
28	1569825.	1573104.	48390.	.030825
29	800493.	804868.	50999.	.063709
30	920610.	921374.	3990.	.004334
31	7364823.	7421213.	925066.	.125606
32	1302894.	1305153.	24020.	.018436
33	17558072.	17702681.	2402006.	.136804
34	5881766.	5960751.	1318857.	.224228
35	652717.	653016.	2568.	.003934
36	10797630.	10864277.	1076748.	.099721
37	3025290.	3037844.	204674.	.067654
38	2633105.	2636997.	37060.	.014075
39	11863895.	11919009.	1046810.	.088235
40	947154.	948391.	27584.	.029123
41	3121820.	3178502.	948623.	.303869
42	690768.	690866.	2144.	.003104
43	4591120.	4633809.	725942.	.158119
44	14229191.	14342034.	1710175.	.120188
45	1461037.	1462632.	9225.	.006314
46	511456.	511782.	1135.	.002219
47	5346818.	5411628.	1008668.	.188648
48	4132156.	4142686.	105574.	.025549
49	1949644.	1952674.	65051.	.033366
50	4705767.	4717764.	182592.	.038802
51	469557.	470497.	3364.	.007164

*Assumes 2,489,927 illegal persons.

E. Frequency distribution of states by their method A1 ratios*

Interval of ratios	Number
.9975 - 1.0025	18
1.0025 - 1.0075	16
1.0075 - 1.0125	9
1.0125 - 1.0175	5
1.0175 - 1.0225	2
1.0225 - 1.0275	0
1.0275 - 1.0325	0
1.0325 - 1.0375	0
1.0375 - 1.0425	1
	51

Mean ratio = 1.0065

standard deviation = .00722   maximum = 1.0416

median = 1.0044   minimum = 1.0001

*The ratios are method A1 estimates of state total population divided by the
1980 census count for the state. (The District of Columbia is included as
a state.) The method A1 state estimate is derived as the sum of method A1
county estimates. Assumes 2,489,927 illegals so that the method A1 total
U.S. count equals that of method B1.

F. Plot of method A1* state ratios versus 1980 census proportion Black

```
                    PU
                1.050+
                     -
                     -
                     -
                     -
                1.040+                                    *
                     -
                     -
                     -
                     -
                1.030+
                     -
                     -
                     -
                     -
Method          1.020+                        *
A1 ratio             -                     2
                     -                   *
                     -                 2 *
                     -               *
                1.010+            *2
                     -           32*
                     -      ***2
                     -       *33
                     -     274
                1.000+ 7*
                     +---------+---------+---------+---------+---------+PB
                    .00       .20       .40       .60       .80      1.00

                                                        Proportion Black
```
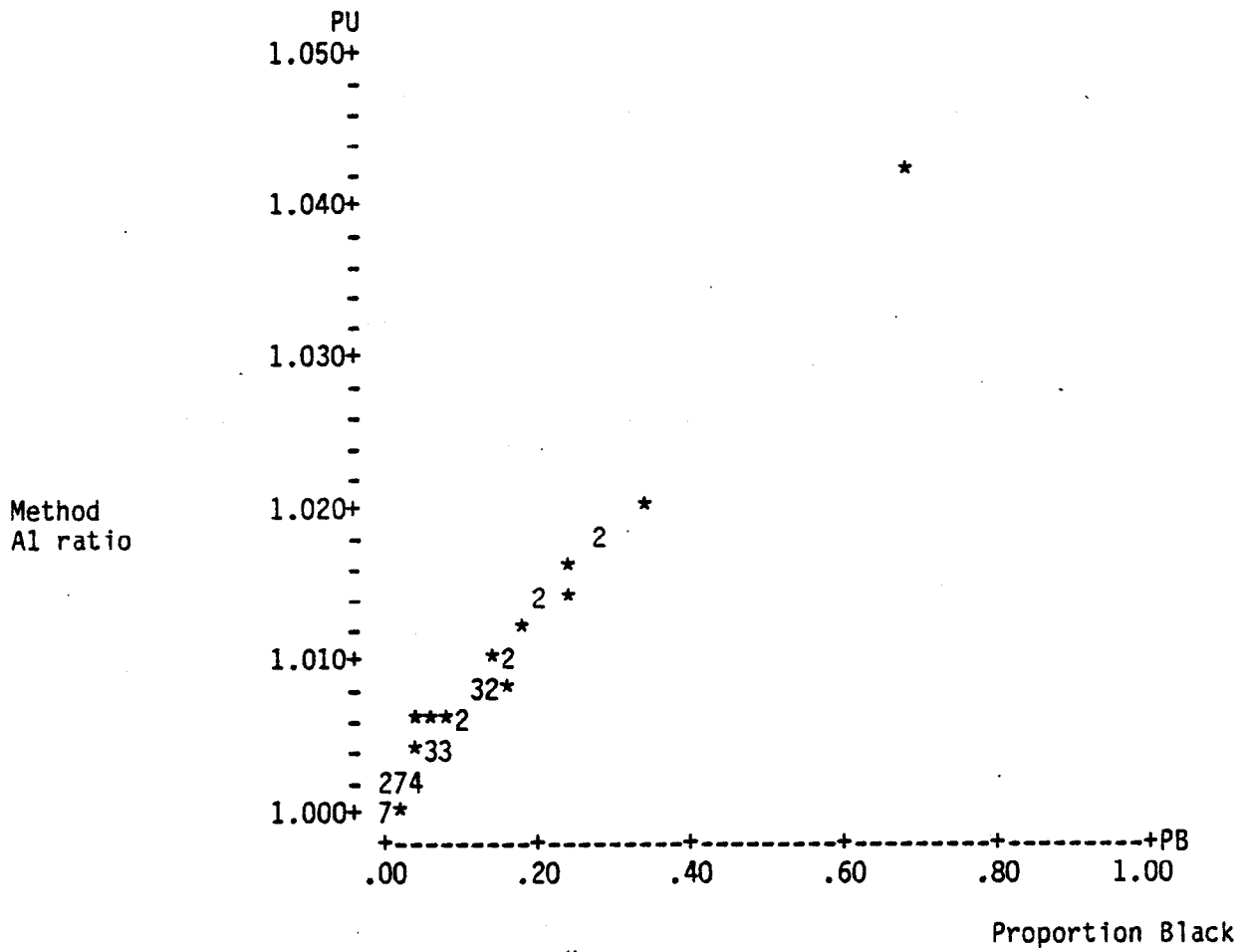
*Assumes 2,489,927 illegal persons.

A. Table B1. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Black*

	Percent Black							
1980 Census County Population	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	245 1.0014	20 1.0007	10 0.9968	3 0.9930	1 0.9936	2 1.0021	7 0.9942	288 1.0009
5,000 to 10,000	306 0.9997	53 0.9919	20 1.0021	23 0.9920	17 0.9949	25 0.9972	28 0.9987	472 0.9987
10,000 to 25,000	509 0.9993	134 0.9940	54 0.9892	76 0.9938	52 0.9983	62 1.0139	87 0.9990	974 0.9990
25,000 to 50,000	259 0.9995	138 0.9956	44 0.9941	57 0.9937	44 0.9997	30 1.0137	39 1.0230	611 0.9999
50,000 to 100,000	119 1.0002	117 0.9983	45 0.9958	42 0.9958	31 1.0101	16 1.0092	8 1.0388	378 1.0006
100,000 to 250,000	59 1.0036	66 0.9982	45 1.0039	32 1.0032	19 1.0130	10 1.0040	3 0.9941	234 1.0027
250,000 to 500,000	7 1.0027	27 1.0024	25 1.0054	20 1.0070	8 0.9994	6 1.0349	2 1.0122	95 1.0062
500,000 +	2 0.9957	19 1.0086	19 1.0066	27 1.0095	6 1.0114	7 1.0245	5 1.0177	85 1.0102
Total	1506 1.0000	574 0.9967	262 0.9978	280 0.9974	178 1.0024	158 1.0067	179 1.0149	3137 1.0003

*The ratios are method B1 estimates of county total population divided by the 1980 census count for the county.

B. Table B1. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Hispanic*

Percent Hispanic

1980 Census County Population	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	148 / 0.997	68 / 0.9994	24 / 0.9987	19 / 0.9996	9 / 1.0031	7 / 1.0093	13 / 1.0212	288 / 1.0009
5,000 to 10,000	307 / 0.9958	113 / 1.0020	13 / 1.0080	13 / 0.9998	8 / 1.0044	7 / 0.0105	11 / 1.0220	472 / 0.9987
10,000 to 25,000	654 / 0.9954	214 / 1.0053	36 / 1.0023	28 / 1.0042	9 / 1.0096	14 / 1.0093	19 / 1.0247	974 / 0.9990
25,000 to 50,000	403 / 0.9966	163 / 1.0050	18 / 1.0101	7 / 1.0037	8 / 1.0064	3 / 1.0125	9 / 1.0239	611 / 0.9999
50,000 to 100,000	201 / 0.9962	136 / 1.0044	17 / 1.0068	9 / 0.9999	7 / 1.0164	2 / 1.0108	6 / 1.0252	378 / 1.0006
100,000 to 250,000	102 / 1.0018	103 / 1.0017	12 / 1.0052	11 / 1.0100	4 / 1.0171	1 / 1.0107	1 / 1.0307	234 / 1.0027
250,000 to 500,000	17 / 0.9951	59 / 1.0066	7 / 1.0045	6 / 1.0162	2 / 1.0300	1 / 1.0173	3 / 1.0252	95 / 1.0062
500,000 +	17 / 1.0007	32 / 1.0067	15 / 1.0058	12 / 1.0260	6 / 1.0243	2 / 1.0379	1 / 1.0177	85 / 1.0102
Total	1849 / 0.9966	888 / 1.0039	142 / 1.0045	105 / 1.0062	53 / 1.0111	37 / 1.0117	63 / 1.0235	3137 / 1.0003

*The ratios are method B1 estimates of county total population divided by the 1980 census count for the county.

C. Frequency distribution of counties by their method B1 ratios*

Interval of ratios	Number
.935 - .945	2
.945 - .955	0
.955 - .965	5
.965 - .975	93
.975 - .985	237
.985 - .995	859
.995 - 1.005	1070
1.005 - 1.015	535
1.015 - 1.025	149
1.025 - 1.035	115
1.035 - 1.045	15
1.045 - 1.055	9
1.055 - 1.065	6
1.065 - 1.075	11
1.075 - 1.085	7
1.085 - 1.095	10
1.095 - 1.105	9
1.105 - 1.115	5
	3137

mean = 1.0003   maximum = 1.1124

standard dev. = .01653   minimum = .93949

median = .99817

* The ratios are method B1 estimates of county total population divided by the 1980 census count for the county (the District of Columbia is treated as a county).

D. Plot of method B1 county ratios versus 1980 census proportion Black.
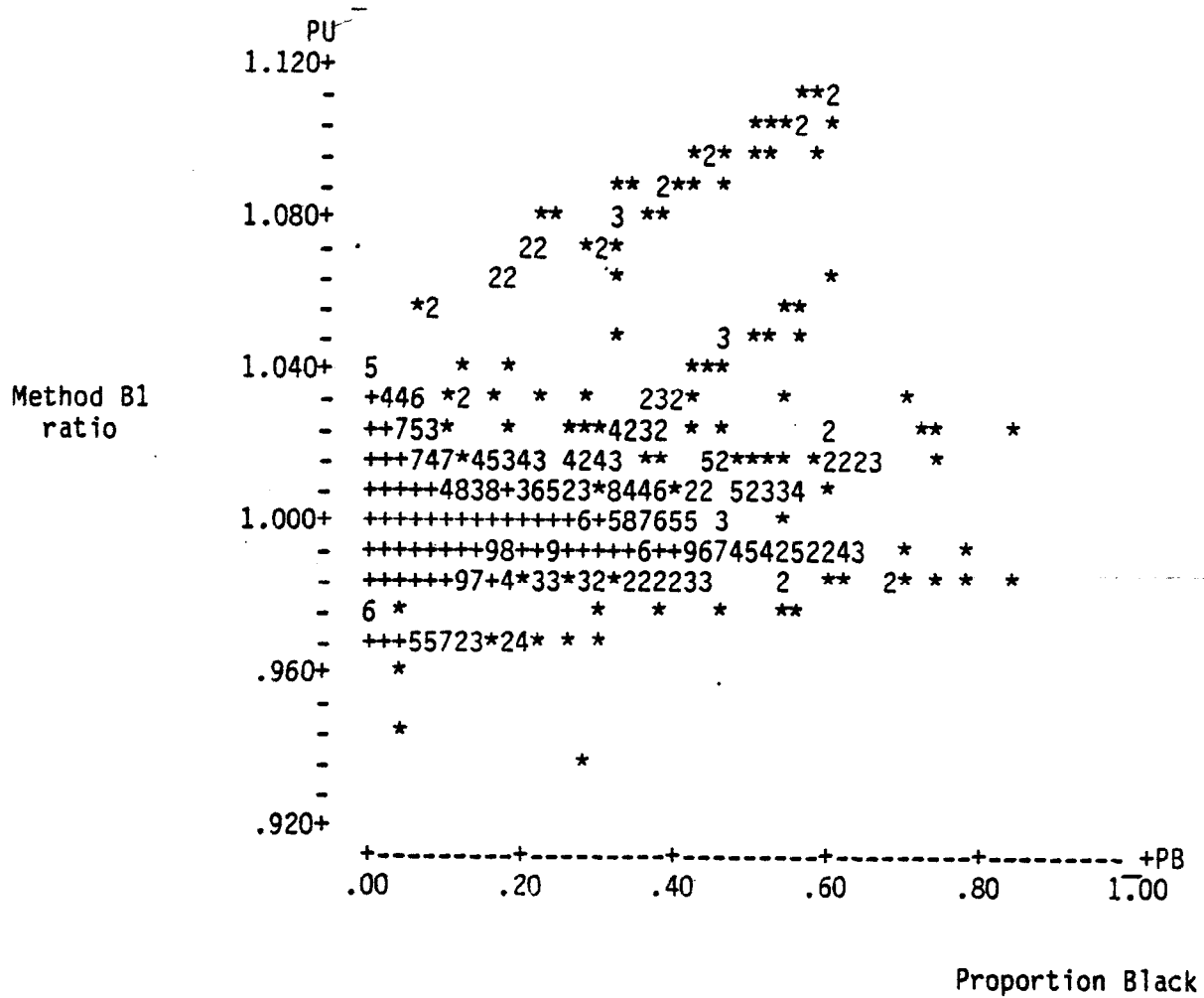
```
                 PU
            1.120+
                -                                        **2
                -                                     ***2 *
                -                                  *2* **   *
                -                          ** 2** *
            1.080+                  **    3 **
                - .                22  *2*
                -              22      *              *
                -      *2                          **
                -                   *      3 ** *
            1.040+   5      *   *           ***
Method B1       -   +446 *2 *   *   *    232*      *         *
  ratio         -   ++753*    *   ***4232 * *       2      **      *
                -   +++747*45343 4243 **   52**** *2223    *
                -   +++++4838+36523*8446*22 52334 *
            1.000+  +++++++++++++++6+587655 3     *
                -   ++++++++98++9+++++6++967454252243   *    *
                -   +++++97+4*33*32*222233     2  **  2* * *   *
                -   6 *            *    *    *   **
                -   +++55723*24* * *
             .960+    *
                -
                -      *
                -              *
                -
             .920+
                 +---------+---------+---------+---------+--------- +PB
                .00       .20       .40       .60       .80      1.00
```

Proportion Black

* -- single point

+ -- ten or more points

E. Plot of method B1 county ratios versus 1980 census proportion Hispanic

```
             PU
          1.120+
             -  *3
             -  33
             -  *6
             -  25
          1.080+ 43
             -  7*
             -  4*                    *
             -  3**
             -  *5        *
          1.040+ 3      *        *              *    *   2   *
Method B1    -  5+92432    . *3 *       **    *           *3*3 3 **
  ratio      -  +++355535*5*2 * *      2 2 3 *   3* 2* 2*
             -  +++632*2 3****4223322445    *2
             -  ++++8854*34637653732* 2          *
          1.000+ ++++++988464223 2*    *
             -  +++++96323   *
             -  ++76*   *
             -  75
             -  +7 *
           .960+ *
             -    *
             -    *
             -
           .920+
             +----------+----------+----------+----------+----------+PH
             .00       .20       .40       .60       .80      1.00
```

Proportion Hispanic
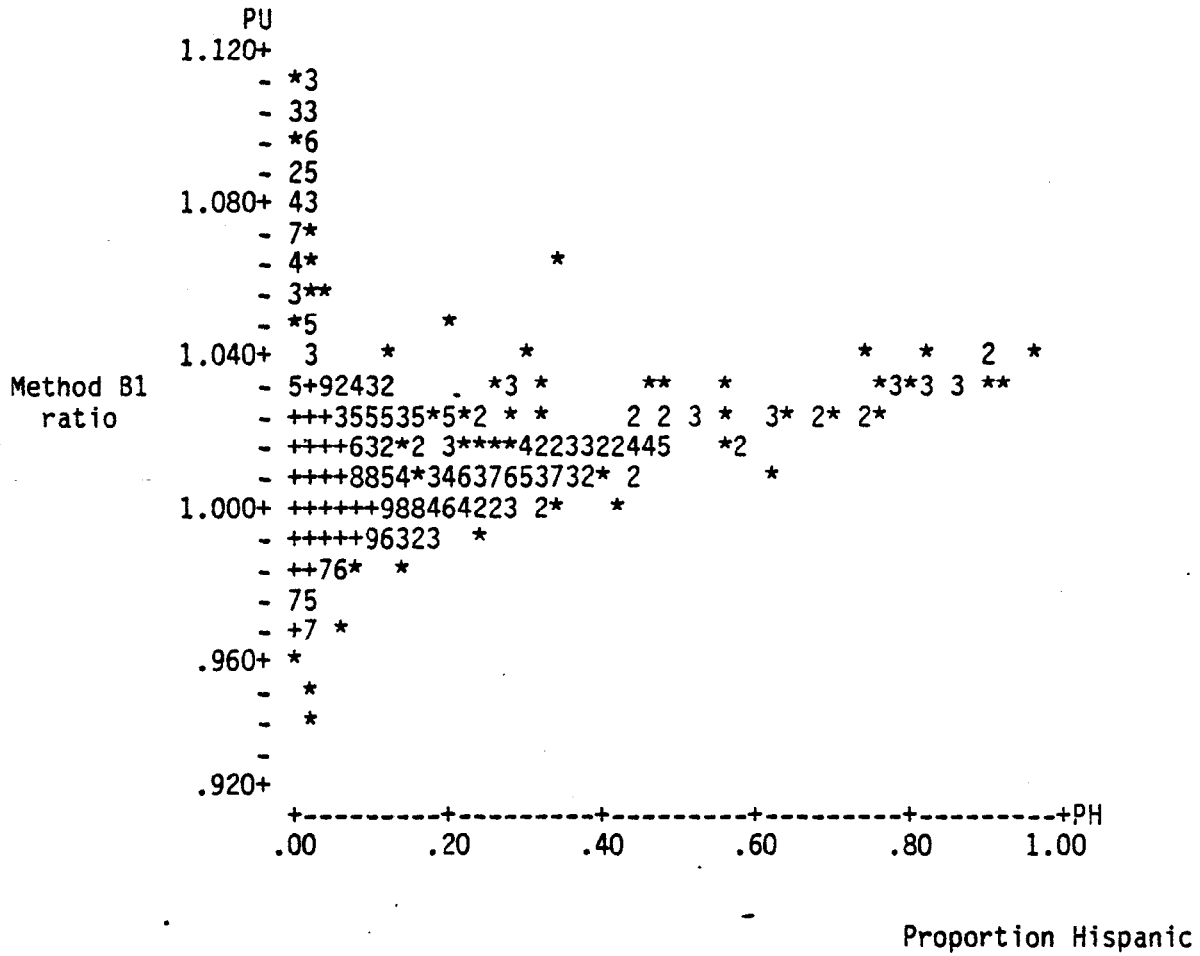
* -- single point

+ -- ten or more points

In the following, method B1 state summaries are listed and summarized in tabular and graphical form.

F. Alphabetical listing of state data -

Row	1980 Census Population	Method B1 estimate	1980 Census Black pop.	1980 Census Hispanic pop.	1980 Census prop. Black	1980 Census prop. Hispanic
1	3893888.	3829645.	996335.	33299.	.255872	.008552
2	401851.	413629.	13643.	9507.	.033950	.023658
3	2718215.	2749370.	74977.	440701.	.027583	.162129
4	2286435.	2270248.	373768.	17904.	.163472	.007831
5	23667902.	24376495.	1819281.	4544331.	.076867	.192004
6	2889964.	2882294.	101703.	339717.	.035192	.117551
7	3107576.	3064627.	217433.	124499.	.069969	.040063
8	594338.	595251.	95845.	9661.	.161263	.016255
9	638333.	656610.	448906.	17679.	.703247	.027696
10	9746324.	9755143.	1342688.	858158.	.137764	.088049
11	5463105.	5426381.	1465181.	61260.	.268196	.011213
12	964691.	976021.	17364.	71263.	.018000	.073871
13	943935.	956303.	2716.	36615.	.002877	.038790
14	11426518.	11633250.	1675398.	635602.	.146624	.055625
15	5490224.	5460689.	414785.	87047.	.075550	.015855
16	2913808.	2891410.	41700.	25536.	.014311	.008764
17	2363679.	2374338.	126127.	63339.	.053360	.026797
18	3660777.	3603339.	259477.	27406.	.070880	.007486
19	4205900.	4285978.	1238241.	99134.	.294406	.023570
20	1124660.	1146303.	3128.	5005.	.002781	.004450
21	4216975.	4281024.	958150.	64746.	.227213	.015354
22	5737037.	5664889.	221279.	141043.	.038570	.024585
23	9262078.	9278459.	1199023.	162440.	.129455	.017538
24	4075970.	4098731.	53344.	32123.	.013087	.007881
25	2520638.	2518334.	887206.	24731.	.351977	.009811
26	4916686.	4950800.	514276.	51653.	.104598	.010506
27	786690.	794736.	1786.	9974.	.002270	.012678
28	1569825.	1566764.	48390.	28025.	.030825	.017852
29	800493.	824218.	50999.	53879.	.063709	.067307
30	920610.	909734.	3990.	5587.	.004334	.006069

Row	1980 Census Population	Method B1 estimate	1980 Census Black pop.	1980 Census Hispanic pop.	1980 Census prop. Black	1980 Census prop. Hispanic
31	7364823.	7450759.	925066.	491883.	.125606	.066788
32	1302894.	1321307.	24020.	477222.	.018436	.366278
33	17558072.	17797766.	2402006.	1659300.	.136804	.094504
34	5881766.	5861465.	1318857.	56667.	.224228	.009634
35	652717.	649233.	2568.	3902.	.003934	.005978
36	10797630.	10922580.	1076748.	119883.	.099721	.011103
37	3025290.	3017553.	204674.	57419.	.067654	.018980
38	2633105.	2636600.	37060.	65847.	.014075	.025007
39	11863895.	11767807.	1046810.	153961.	.088235	.012977
40	947154.	952682.	27584.	19707.	.029123	.020807
41	3121820.	3365887.	948623.	33426.	.303869	.010707
42	690768.	692896.	2144.	4023.	.003104	.005824
43	4591120.	4451145.	725942.	34077.	.158119	.007422
44	14229191.	14330716.	1710175.	2985824.	.120188	.209838
45	1461037.	1462629.	9225.	60302.	.006314	.041273
46	511456.	507365.	1135.	3304.	.002219	.006460
47	5346818.	5335842.	1008668.	79868.	.188648	.014937
48	4132156.	4193958.	105574.	120016.	.025549	.029044
49	1949644.	1928842.	65051.	12707.	.033366	.006518
50	4705767.	4778333.	182592.	62972.	.038802	.013382
51	469557.	482936.	3364.	24499.	.007164	.052175

G. Frequency distribution of states by their method B1 ratios*

Interval of ratios	Number
.965 - .975	1
.975 - .985	2
.985 - .995	11
.995 - 1.005	13
1.005 - 1.015	13
1.015 - 1.025	5
1.025 - 1.035	5
1.035 - 1.045	0
1.045 - 1.055	0
1.055 - 1.065	0
1.065 - 1.075	0
1.075 - 1.085	1
	51

mean ratio = 1.0057
standard deviation = .0169
median = 1.0031
maximum = 1.0782
minimum = .9695

*The ratios are method B1 estimates of state total population divided by
 the 1980 census count for the state. (The District of Columbia is included
 as a state.)

H. Plot of method 81 state ratios versus 1980 census proportion Black

```
                   1.080+                    *
                        -
                        -
                        -
                        -
                   1.050+
 Method 81              -
    ratio              -
                        -           ***
                        -     *
                   1.020+     *          *        *                *
                        -     *4*    ***      *
                        -     *2      **
                        -     2*  *   ***           *
                        -     *  2**      *  *  *
                    .990+     2*2    *    *
                        -          **        *
                        -
                        -
                        -           *
                        -
                    .960+
                          +---------+---------+---------+---------+---------+PB
                         .00       .20       .40       .60       .80      1.00
```

Proportion Black

I. Plot of method B1 state ratios versus 1980 census proportion Hispanic

```
                      PU
              1.080+   *
                   -
                   -
                   -
                   -
              1.050+
                   -
Method B1          -
  ratios           -     *      *           *
                   -       *  *
              1.020+  *  *     *
                   -   2***  2  *        *
                   -   3*                      *
                   -   222*      *
                   -   43          *
               .990+  6*
                   -   2   *
                   -
                   -   *
                   -
               .960+
                    +----------+----------+----------+----------+----------+PH
                    .00       .10        .20        .30        .40        .50
```

Proportion Hispanic

A. Table B4. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Black*

Percent Black

1980 Census County Population	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	245 0.9995	20 1.0011	10 0.9990	3 1.0005	1 0.9920	2 1.0009	7 0.9917	288 0.9994
5,000 to 10,000	306 0.9994	53 0.9918	20 1.0030	23 0.9945	17 0.9937	25 0.9970	28 1.0040	472 0.9984
10,000 to 25,000	509 0.9989	134 0.9946	54 0.9912	76 0.9958	52 1.0005	62 1.0017	87 1.0119	974 0.9991
25,000 to 50,000	259 0.9992	138 0.9959	44 0.9944	57 0.9950	44 1.0005	30 1.0129	39 1.0206	611 0.9999
50,000 to 100,000	119 0.9992	117 0.9991	45 0.9967	42 0.9968	31 1.0107	16 1.0090	8 1.0375	378 1.0008
100,000 to 250,000	59 1.0039	66 0.9988	45 1.0046	32 1.0063	19 1.0141	10 1.0055	3 0.9953	234 1.0037
250,000 to 500,000	7 0.9991	27 1.0025	25 1.0068	20 1.0085	8 1.0012	6 1.0349	2 1.0128	95 1.0068
500,000 +	2 0.9963	19 1.0095	19 1.0066	27 1.0087	6 1.0134	7 1.0220	5 1.0200	85 1.0102
Total	1506 0.9994	574 0.9971	262 0.9988	280 0.9991	178 1.0035	158 1.0062	179 1.0129	3137 1.0002

*The ratios are method B4 estimates of county total population divided by the 1980 census count for the county.

B. Table B4. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Hispanic*

Percent Hispanic

1980 Census County Population	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	148 0.9986	68 0.9982	24 0.9988	19 1.0010	9 1.0042	7 1.0083	13 1.0052	288 0.9994
5,000 to 10,000	307 0.9958	113 1.0011	13 1.0095	13 1.0035	8 1.0088	7 1.0069	11 1.0107	472 0.9984
10,000 to 25,000	654 0.9957	214 1.0050	36 1.0034	28 1.0082	9 1.0136	14 1.0078	19 1.0131	974 0.9991
25,000 to 50,000	403 0.9964	163 1.0055	18 1.0104	7 1.0078	8 1.0043	3 1.0189	9 1.0122	611 0.9999
50,000 to 100,000	201 0.9962	136 1.0050	17 1.0085	9 0.9919	7 1.0216	2 1.0214	6 1.0203	378 1.0008
100,000 to 250,000	102 1.0022	103 1.0031	12 1.0072	11 1.0119	4 1.0199	1 1.0134	1 1.0131	234 1.0037
250,000 to 500,000	17 0.9955	59 1.0076	7 1.0055	6 1.0180	2 1.0333	1 1.0272	3 1.0120	95 1.0068
500,000 +	17 1.0012	32 1.0072	15 1.0064	12 1.0256	6 1.0240	2 1.0292	1 1.0104	85 1.0102
Total	1849 0.9966	888 1.0041	142 1.0054	105 1.0078	53 1.0133	37 1.0112	63 1.0115	3137 1.0002

*The ratios are method B4 estimates of county total population divided by the 1980 census count for the county.

C. Frequency distribution of counties by their method B4 ratios*

Interval of ratios	Number
.89 - .91	1
.91 - .93	1
.93 - .95	2
.95 - .97	97
.97 - .99	565
.99 - 1.01	1911
1.01 - 1.03	444
1.03 - 1.05	64
1.05 - 1.07	13
1.07 - 1.09	21
1.09 - 1.11	18
	3137

mean = 1.0002
standard deviation = .01686
median = .99844

maximum = 1.1057
minimum = .90834

*The ratios are method B4 estimates of county total population divided by the 1980 census count for the county. (The District of Columbia is included as a county.)

D. Plot of method B4 county ratios versus 1980 census proportion Black
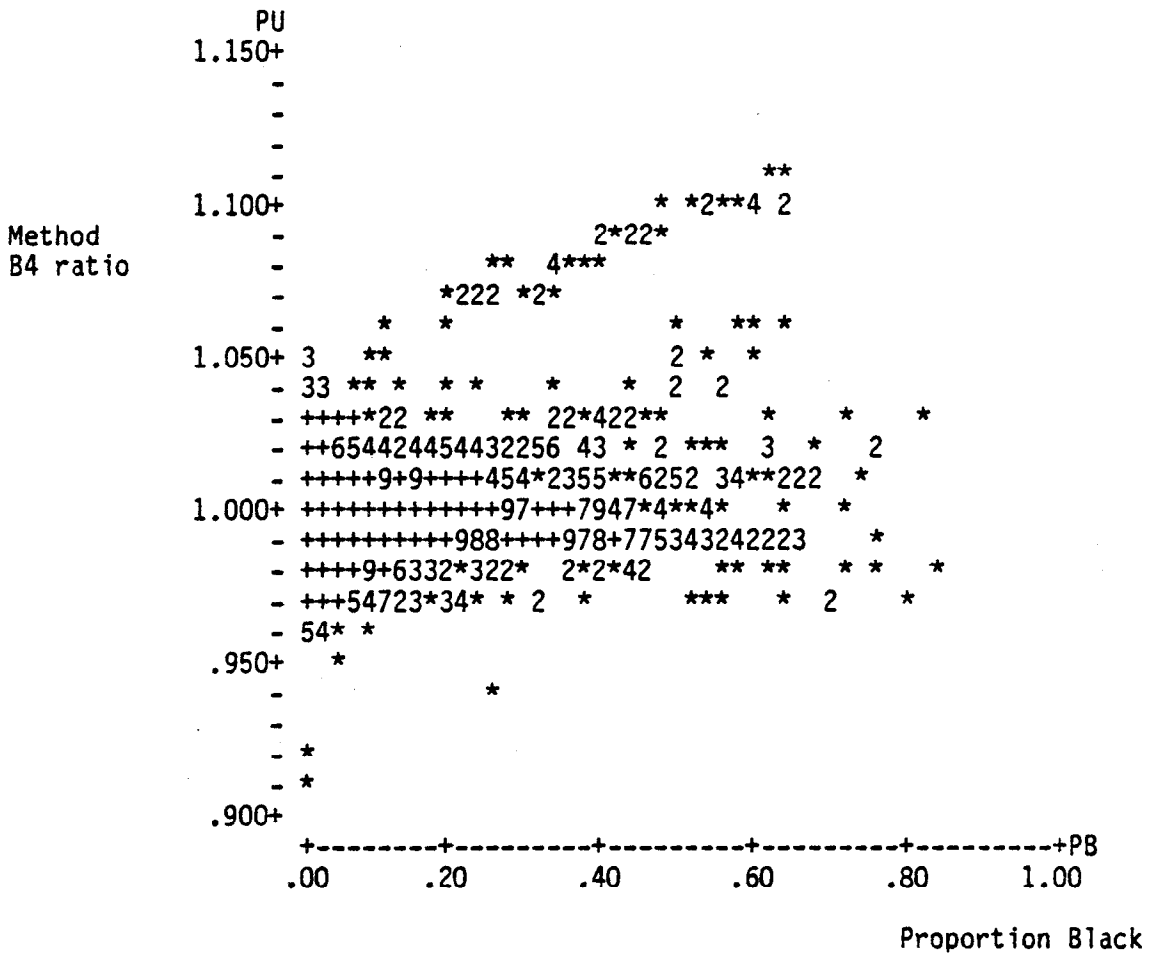
```
                    PU
              1.150+
                   -
                   -
                   -
                   -                                      **
              1.100+                          * *2**4 2
Method             -                      2*22*
B4 ratio           -                 **  4***
                   -               *222 *2*
                   -         *    *          *    ** *
              1.050+ 3     **              2 *   *
                   - 33 ** *  * *      *    * 2  2
                   - ++++*22 **    ** 22*422**     *     *      *
                   - ++654424454432256 43 * 2 ***   3  *    2
                   - +++++9+9++++454*2355**6252 34**222   *
              1.000+ +++++++++++++++97+++7947*4**4*    *    *
                   - ++++++++++988++++978+775343242223      *
                   - ++++9+6332*322*  2*2*42    ** **   * *   *
                   - +++54723*34* * 2  *        ***   *  2    *
                   - 54* *
               .950+    *
                   -
                   -
                   - *
                   - *
               .900+
                   +---------+---------+---------+---------+---------+PB
                  .00       .20       .40       .60       .80      1.00
```

                                              Proportion Black

        * -- single point

        + -- ten or more points

E. Plot of method B4 county ratios versus 1980 census proportion Hispanic

```
                 PU
             1.150+
                 -
                 -
                 -
                 -  2
             1.100+ 57
Method           - 26
B4 ratio         - 45
                 - +*
                 - 22*                    *
             1.050+ 34*                              *
                 - 53 **** ** **                *
                 - 6++355552*523 6*4  *  *   ** * **      *     *
                 - +++99343* 32***** *  ** *       2      * *  2 *
                 - ++++7+362345*43638*3 *535 2 ** *  2  **3 *   2* *
             1.000+ +++++++99752535 22322 * *          *
                 - ++++632*         *      ***         *        2
                 - ++5                            *              *
                 - ++ 2           *
                 - 82      *
              .950+ *
                 -    *
                 -
                 -    *
                 -      *
              .900+
                 +----------+----------+----------+----------+----------+PH
                .00       .20       .40       .60       .80      1.00

                                                   Proportion Hispanic
```
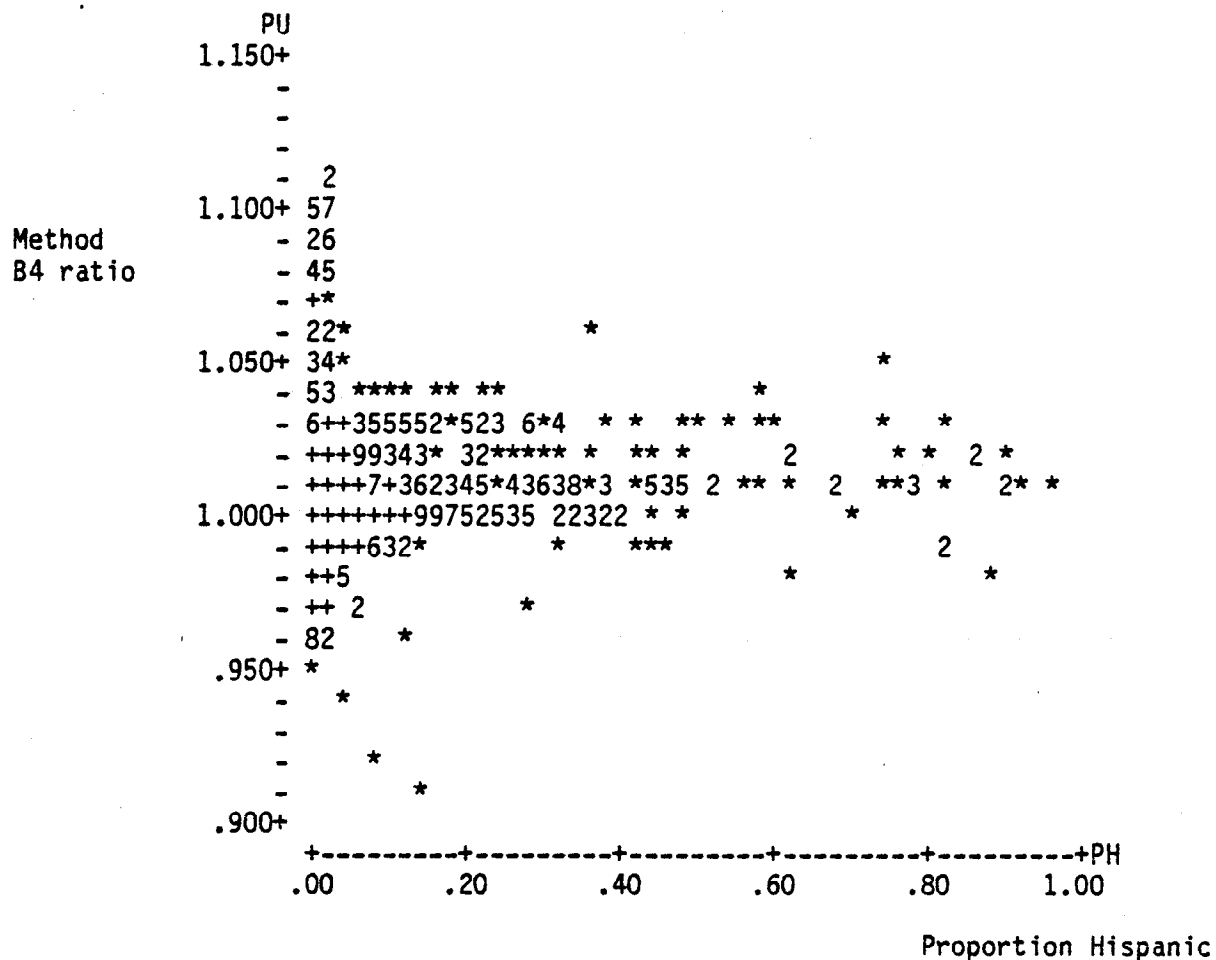
* -- single point

+ -- ten or more points

A. Table C1. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Black*

1980 census county Population	Percent Black							
	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	237 / 0.9950	19 / 0.9978	10 / 0.9775	3 / 0.9724	1 / 0.9604	2 / 0.9770	7 / 0.9770	279 / 0.9921
5,000 to 10,000	301 / 0.9907	51 / 1.0025	19 / 0.9861	23 / 0.9912	17 / 0.9852	25 / 0.9835	28 / 0.9957	464 / 0.9915
10,000 to 25,000	505 / 0.9945	134 / 0.9867	54 / 0.9951	76 / 0.9864	52 / 0.9951	62 / 0.9958	87 / 0.9963	970 / 0.9931
25,000 to 50,000	258 / 0.9979	138 / 0.9916	44 / 0.9879	57 / 0.9908	44 / 0.9952	30 / 1.0057	39 / 1.0080	610 / 0.9959
50,000 to 100,000	119 / 1.0048	117 / 0.9992	44 / 0.9952	42 / 0.9971	31 / 1.0139	16 / 1.0061	8 / 1.0450	377 / 1.0028
100,000 to 250,000	59 / 1.0084	66 / 1.0034	44 / 1.0053	32 / 1.0031	19 / 1.0360	10 / 1.0131	3 / 1.0358	233 / 1.0085
250,000 to 500,000	7 / 1.0044	27 / 1.0064	25 / 1.0136	20 / 1.0122	8 / 1.0089	6 / 1.0434	2 / 1.0122	95 / 1.0120
500,000 +	2 / 0.9928	19 / 1.0141	19 / 1.0043	27 / 1.0093	6 / 1.0086	7 / 1.0131	5 / 1.0008	85 / 1.0086
Total	1488 / 0.9958	571 / 0.9953	259 / 0.9968	280 / 0.9951	178 / 1.0086	158 / 1.0000	179 / 1.0011	3113 / 0.9966

*The ratios are method C1 estimates of county total population divided by the 1980 census count for the county. Table does not include all 23 counties in Alaska while two counties in Hawaii have been combined.

B. Table C1. _____ Frequency and mean of county ratios by 1980 census county population and 1980 census county percent Hispanic*

1980 census county Population	Percent Hispanic							
	0 to 1	1 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 100	Total
0 to 5,000	142 0.9887	66 0.9973	23 0.9916	19 0.9920	9 0.9785	7 0.9991	13 1.0099	279 0.9921
5,000 to 10,000	306 0.9880	106 1.0000	13 0.9901	13 0.9917	8 0.9887	7 0.9995	11 1.0058	464 0.9915
10,000 to 25,000	653 0.9898	211 0.9980	36 0.9901	28 1.0003	9 0.9927	14 1.0047	19 1.0193	970 0.9931
25,000 to 50,000	403 0.9927	162 0.9997	18 1.0080	7 1.0041	8 0.9968	3 1.0014	9 1.0391	610 0.9959
50,000 to 100,000	201 0.9964	135 1.0091	17 1.0134	9 1.0083	7 1.0177	2 0.9876	6 1.0231	377 1.0028
100,000 to 250,000	102 1.0059	102 1.0097	12 1.0059	11 1.0230	4 1.0127	1 0.9799	1 1.0312	233 1.0085
250,000 to 500,000	17 1.0081	59 1.0111	7 1.0123	6 1.0177	2 1.0320	1 1.0200	3 1.0239	95 1.0120
500,000 +	17 0.9993	32 1.0033	15 1.0112	12 1.0259	6 1.0224	2 1.0150	1 0.9979	85 1.0086
Total	1841 0.9919	873 1.0027	141 1.0026	105 1.0050	53 1.0000	37 1.0018	63 1.0183	3113 0.9966

*The ratios are method C1 estimates of county total population divided by the 1980 census count for the county. Table does not include all 23 counties in Alaska while two counties in Hawaii have been combined.

C. Frequency distribution of counties by their method C1 ratios*

Interval of ratios	Number
.775 - .825	1
.825 - .875	2
.875 - .925	23
.925 - .975	579
.975 - 1.025	2133
1.025 - 1.075	311
1.075 - 1.125	48
1.125 - 1.175	8
1.175 - 1.225	3
1.225 - 1.275	2
1.275 - 1.325	1
1.325 - 1.375	1
1.375 - 1.425	0
1.425 - 1.475	0
1.475 - 1.525	0
1.525 - 1.575	0
1.575 - 1.625	0
1.625 - 1.675	0
1.675 - 1.725	1
	3113

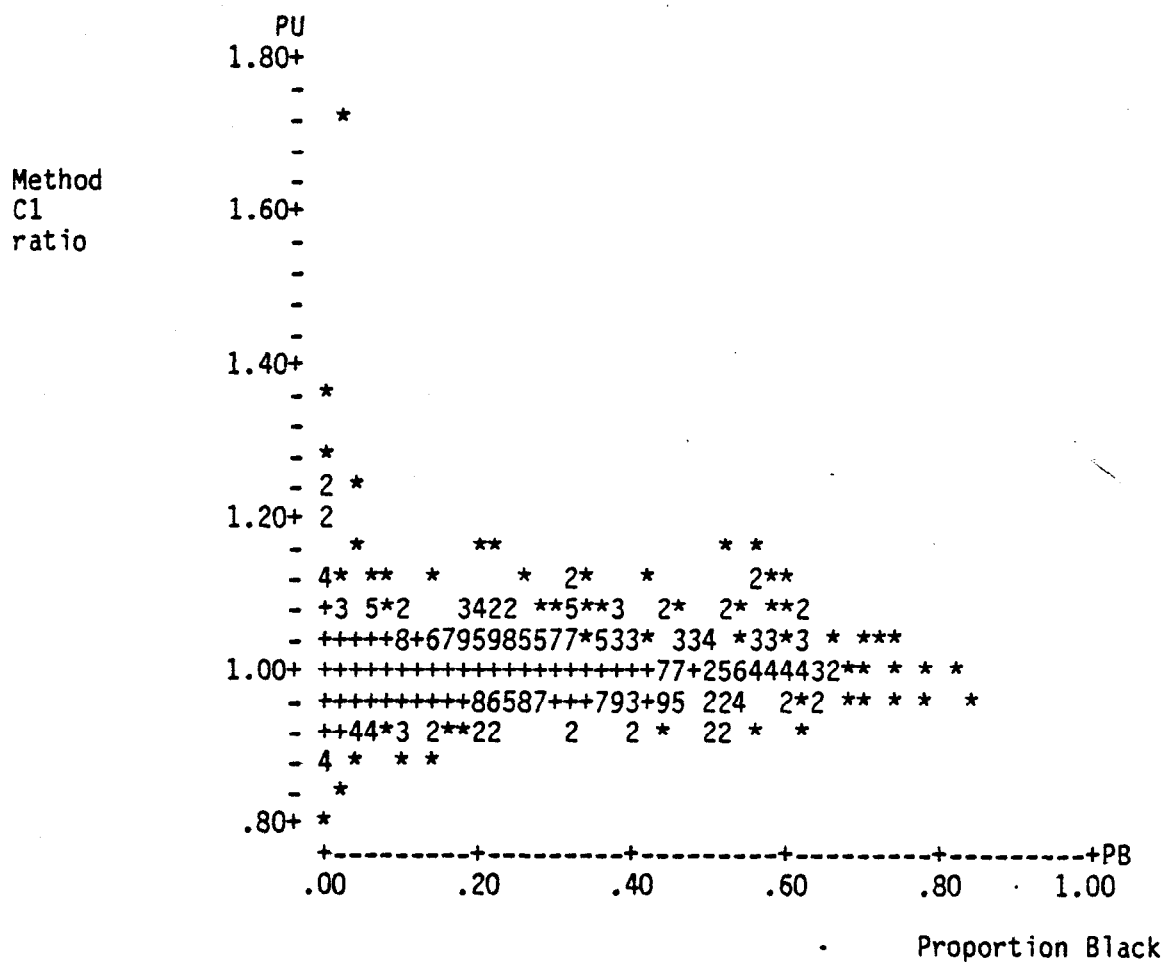mean = .99665

standard deviation = .03431

median = .99428

maximum = 1.7048

minimum = .80727

*The ratios are method C1 estimates of county total population divided by the 1980 census count for the county. (The District of Columbia is included as a county.) All counties in Alaska have been omitted and two counties in Hawaii combined into one due to data difficulties.

D. Plot of method C1 county ratios versus 1980 census proportion Black

```
                    PU
                  1.80+
                     -
                     -  *
                     -
   Method          -
   C1             1.60+
   ratio            -
                     -
                     -
                     -
                  1.40+
                     -  *
                     -
                     -  *
                     -  2 *
                  1.20+ 2
                     -    *          **              * *
                     - 4* **   *       *  2*   *        2**
                     - +3 5*2    3422 **5**3  2*  2* **2
                     - +++++8+6795985577*533* 334 *33*3 * ***
                  1.00+ +++++++++++++++++++++++77+256444432** * * *
                     - +++++++++++86587+++793+95 224   2*2 ** * *   *
                     - ++44*3 2**22     2   2 *  22 *   *
                     - 4 *  * *
                     -  *
                   .80+ *
                      +---------+---------+---------+---------+---------+PB
                     .00       .20       .40       .60       .80  · 1.00

                                                    Proportion Black
```

        * -- single point

        + -- ten or more points