Migration: Definitions, Data, and Analysis

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Demographics for Data Users
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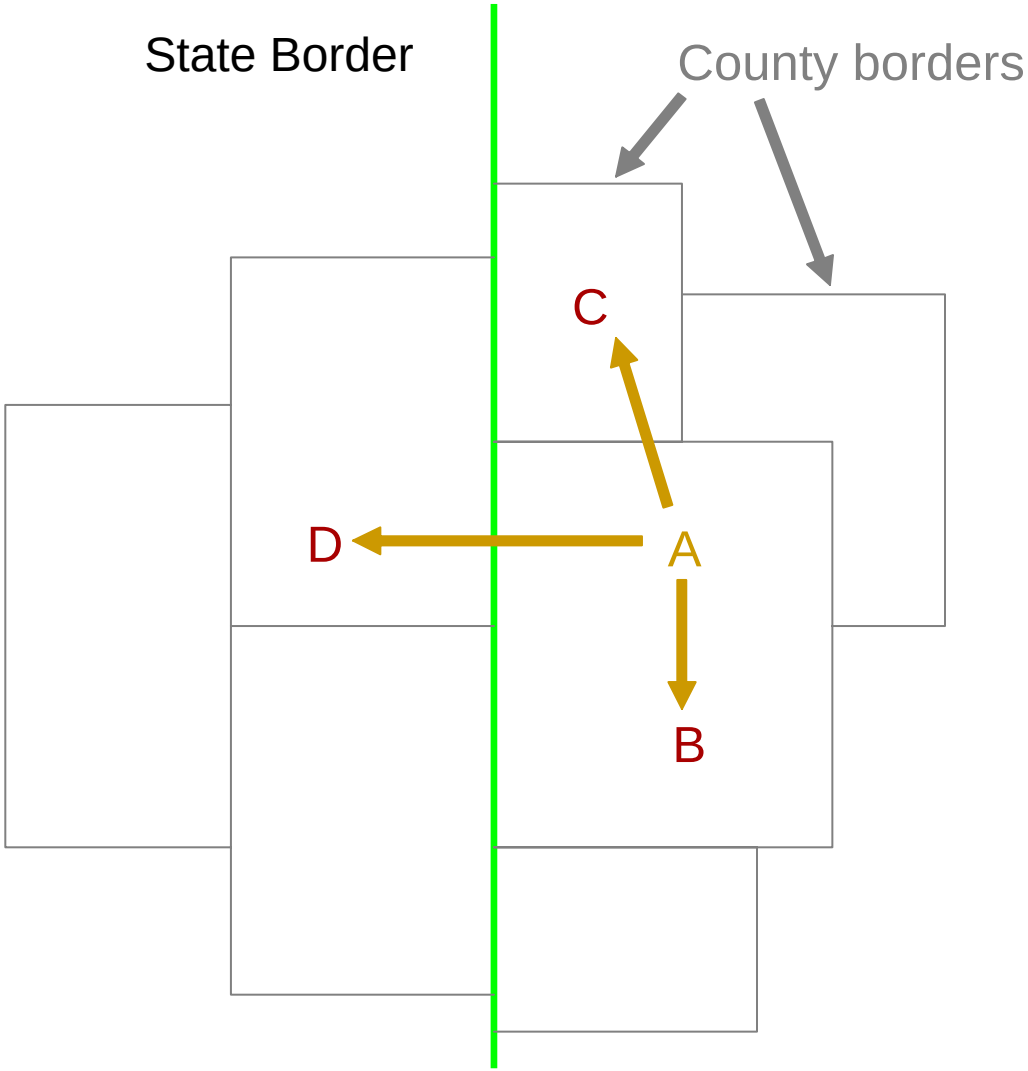
Migration Definitions

- Residential relocation is considered to be MIGRATION if:
  - The move is outside the original labor market.
  - The move is across state (or other administrative) borders.
  - Number 2 may contradict Number 1. If so:
    - Use the best information possible, or
    - Use the state definition to maintain consistency of data.
- Residential relocation is considered to be MOBLILITY if:
  - the move is within the region



A move from A to C or D constitutes migration, while a move to B does not

Question

- The Utah Population Estimates Committee generates components of population change in its annual county level population estimates.
- In these estimates, the sum of the net migration for the counties equals the net migration for the state.
- What is the implicit assumption about the geography of migration?

Migration Research Questions

- Many theories and much research has been done by economists, geographers, sociologists, anthropologists,and other scholars regarding:
  1. Who migrates (to or from) an area?
  2. Why do they migrate?
  3. Why are certain places attractive to migrants?

Migration Motives

- Relative employment opportunities
- Wages versus cost of living
- Evaluations of risks and costs of moving
- Educational institutions
- Retirement amenities
- Other: religious missions, family, quality of life, proximity to needed services (e.g. health care)

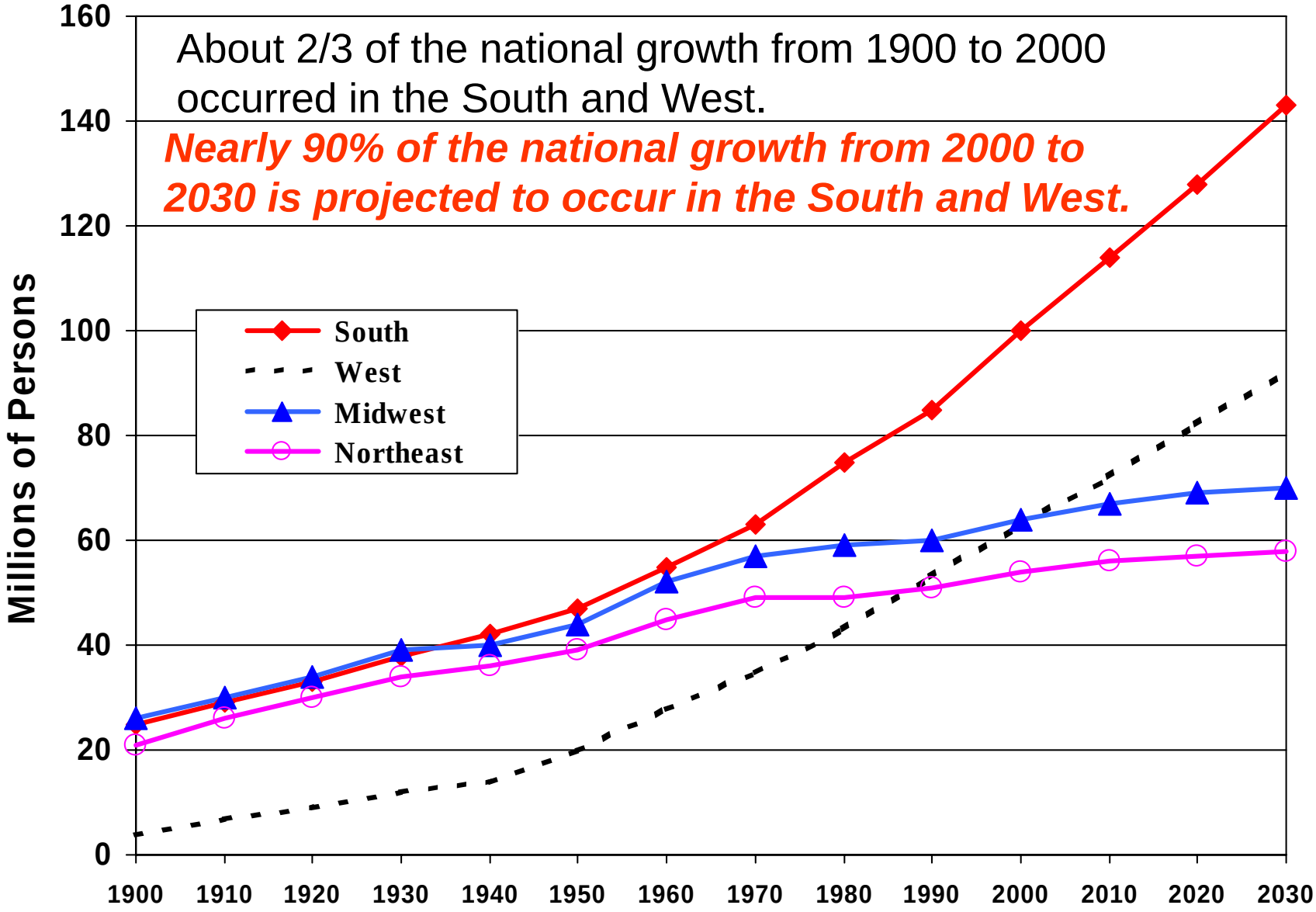
Migration - Data & Indicators

- Migration is flow data – measured over a period of time
- Measurement:
  - Gross flows – in or out (this is preferred)
  - Net flows = gross in minus gross out (contains less information)
- Population change is the sum of
  - Natural increase (births minus deaths)
  - Net in migration (gross in minus gross out)

➔ **Population change is itself an indicator of migration**

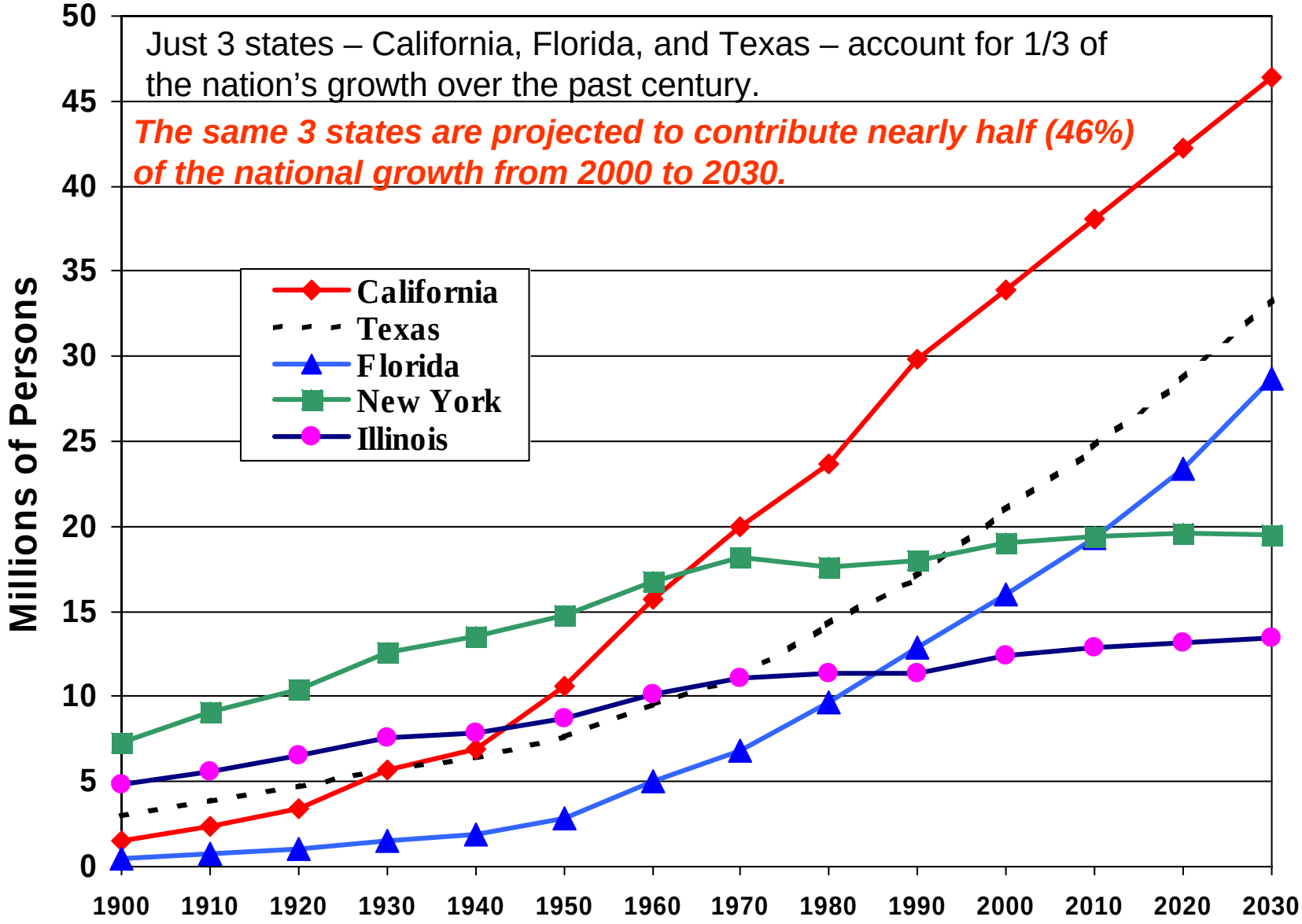
- ➔ ***Compounding effect of in-migration***: Young persons (in child bearing years) have the highest propensities to migrate. Their contribution to the population growth of the receiving region(s) is not captured in the components of change alone.

U.S. Population by Region: 1900-2030



Source: BEBR, University of Utah analysis of Bureau of the Census data.

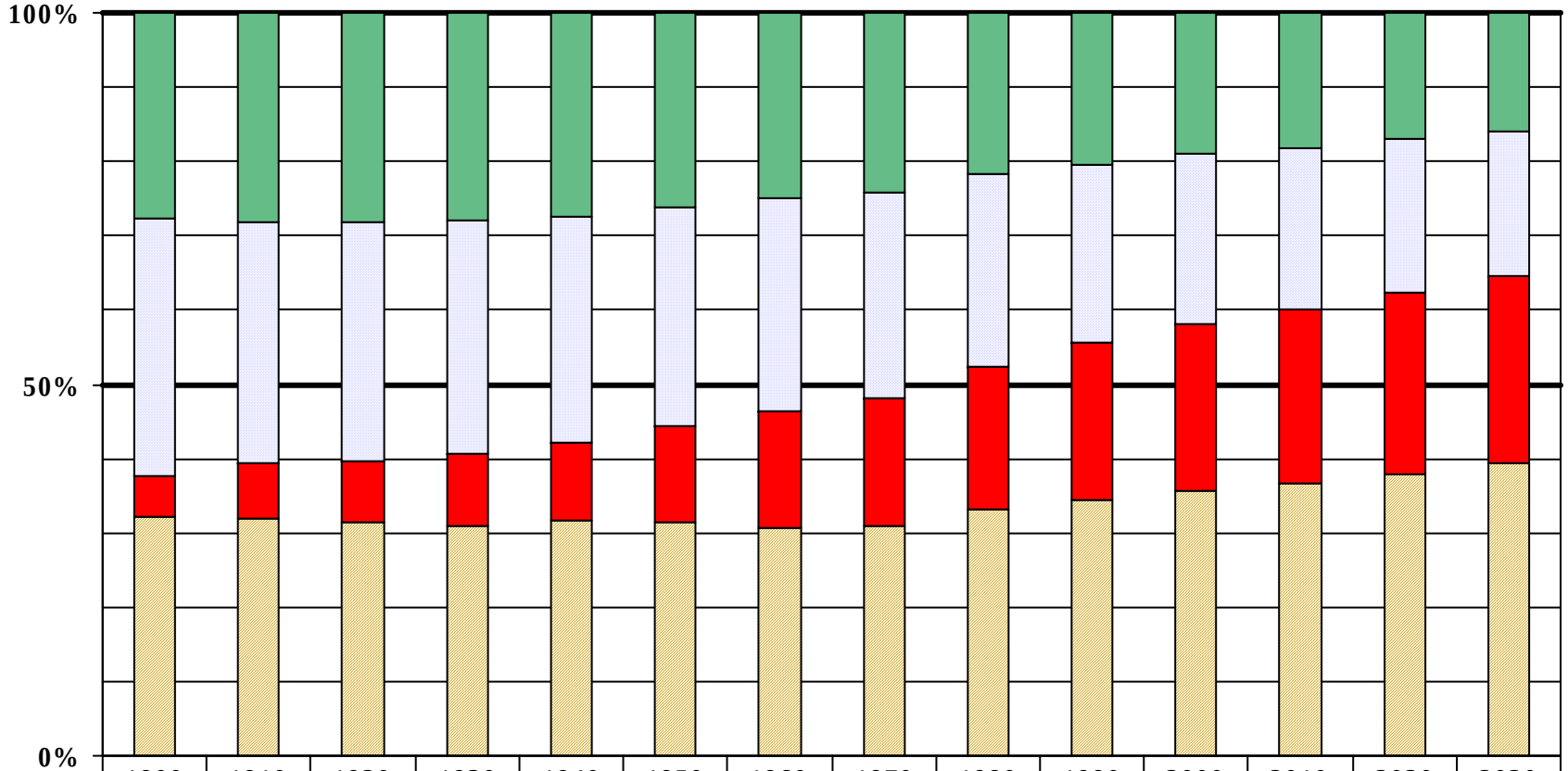
Five Most Populous States in 2000:
Populations for 1900-2030



Source: BEBR, University of Utah analysis of Bureau of the Census data.

Regional Shares of US Population: 1900 - 2030

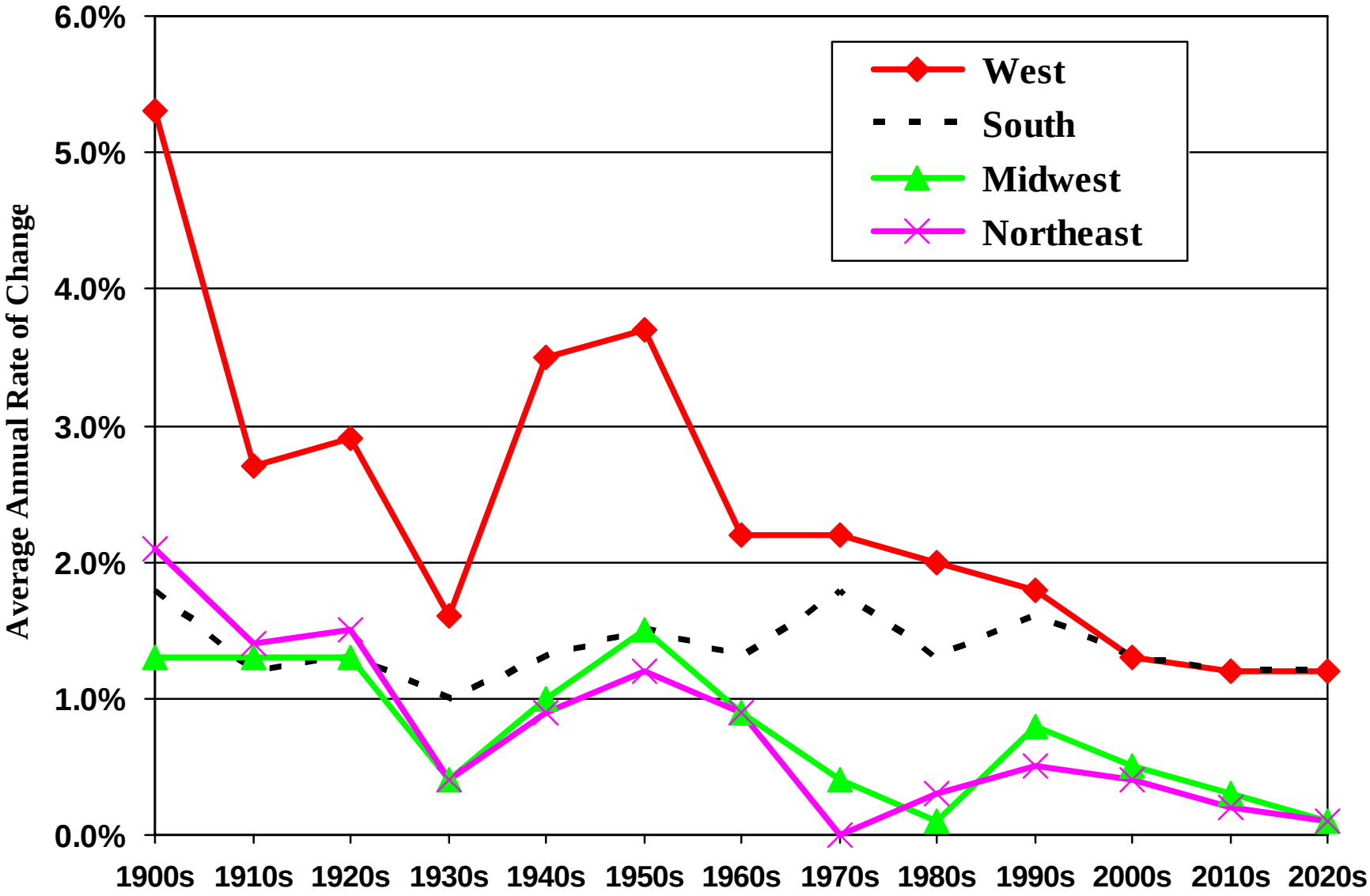
The combined populations of the south and west, which surpassed half that of the nation by 1980, are projected to approach two-thirds of the nation by 2030.



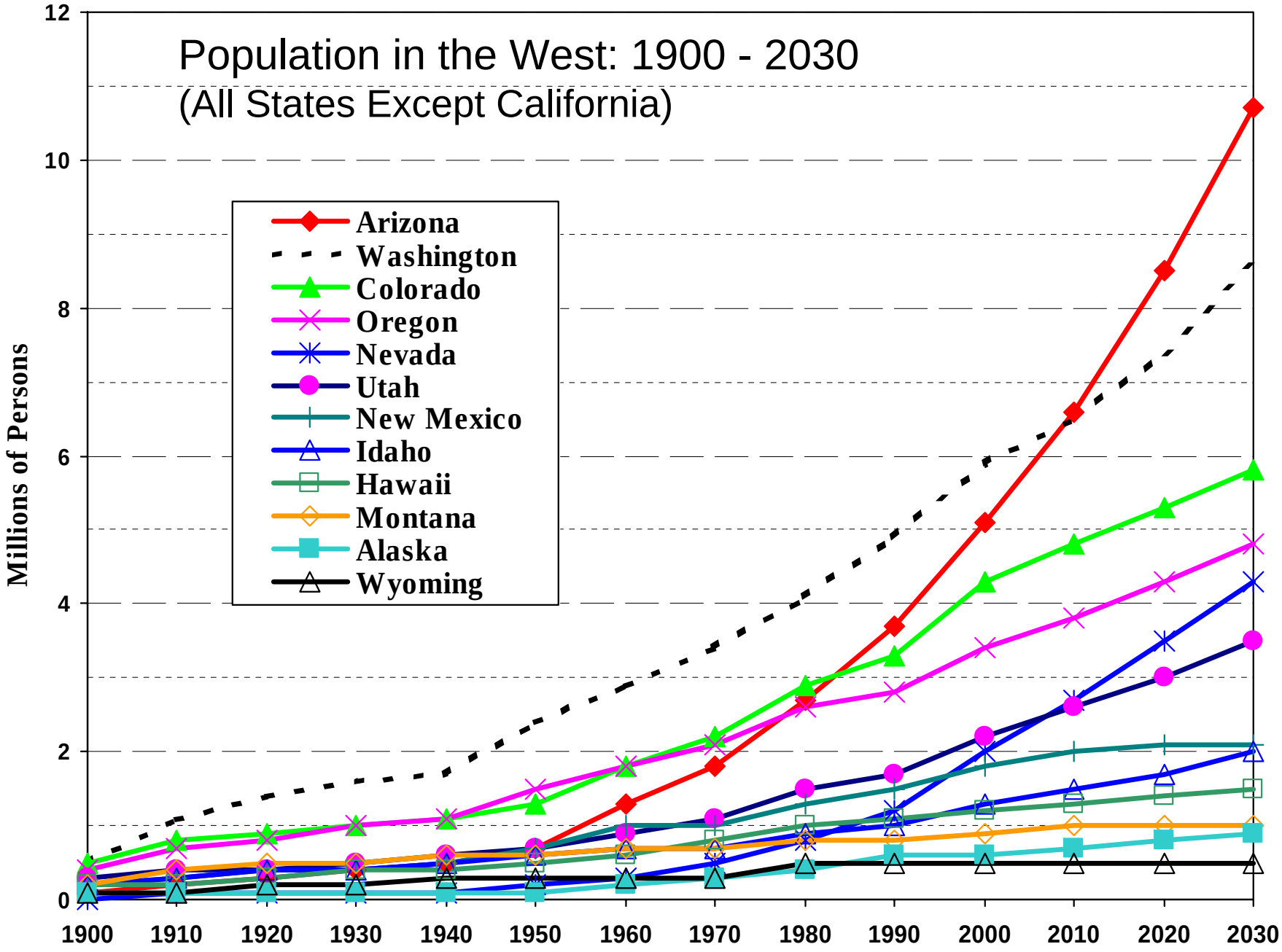
	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020	2030
Northeast	27.7%	28.1%	28.1%	28.0%	27.3%	26.2%	24.9%	24.1%	21.7%	20.4%	19.0%	18.1%	17.0%	15.9%
Midwest	34.7%	32.5%	32.2%	31.4%	30.5%	29.5%	28.8%	27.8%	26.0%	24.0%	22.9%	21.8%	20.7%	19.4%
West	5.4%	7.4%	8.4%	9.7%	10.5%	13.0%	15.6%	17.1%	19.1%	21.2%	22.5%	23.4%	24.3%	25.3%
South	32.3%	32.0%	31.3%	30.8%	31.6%	31.3%	30.7%	30.9%	33.3%	34.4%	35.6%	36.8%	38.0%	39.4%

Source: BEBR, University of Utah analysis of Bureau of the Census data.

Historical and Projected AARC by Region



Source: BEBR, University of Utah analysis of Bureau of the Census data.



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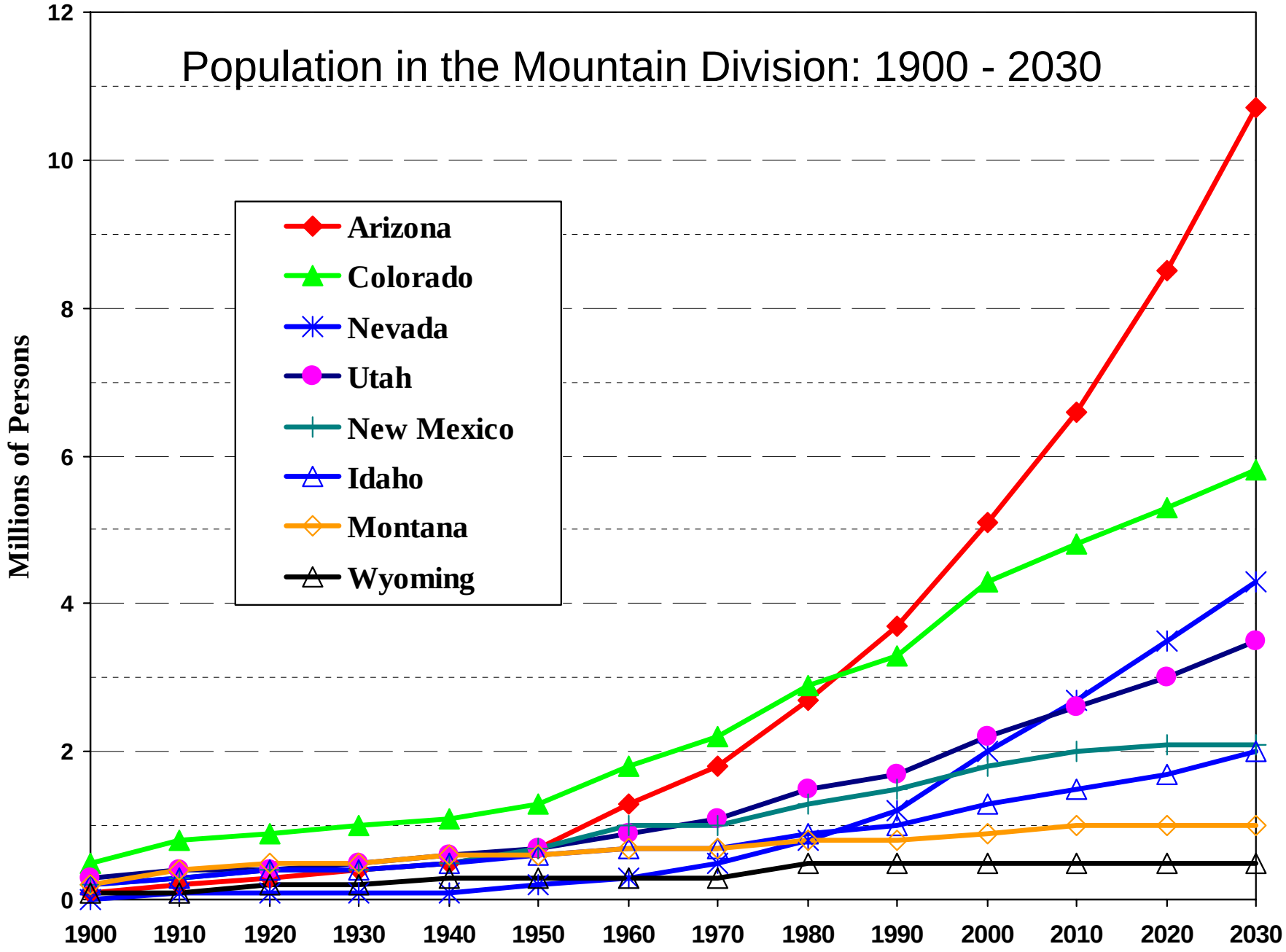
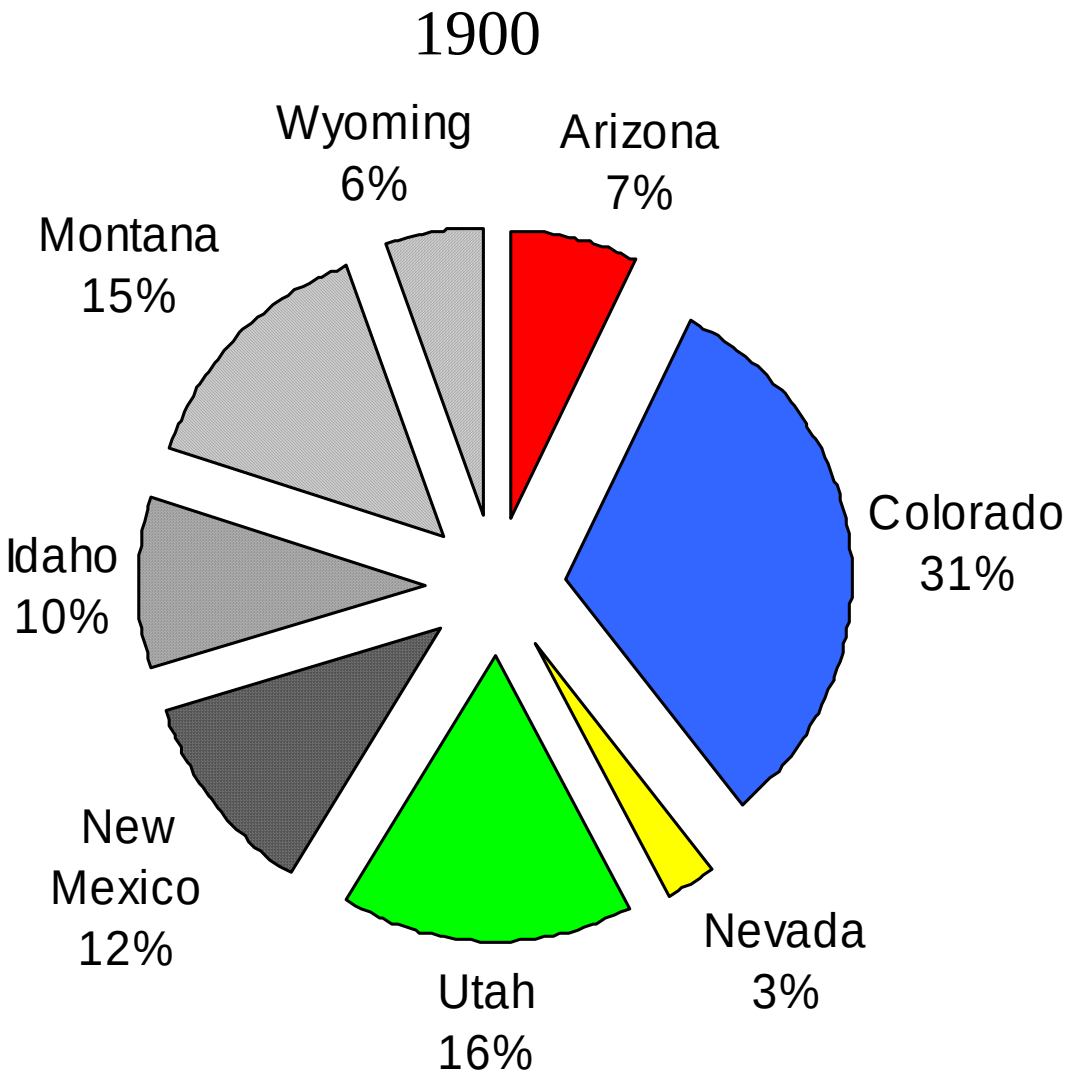


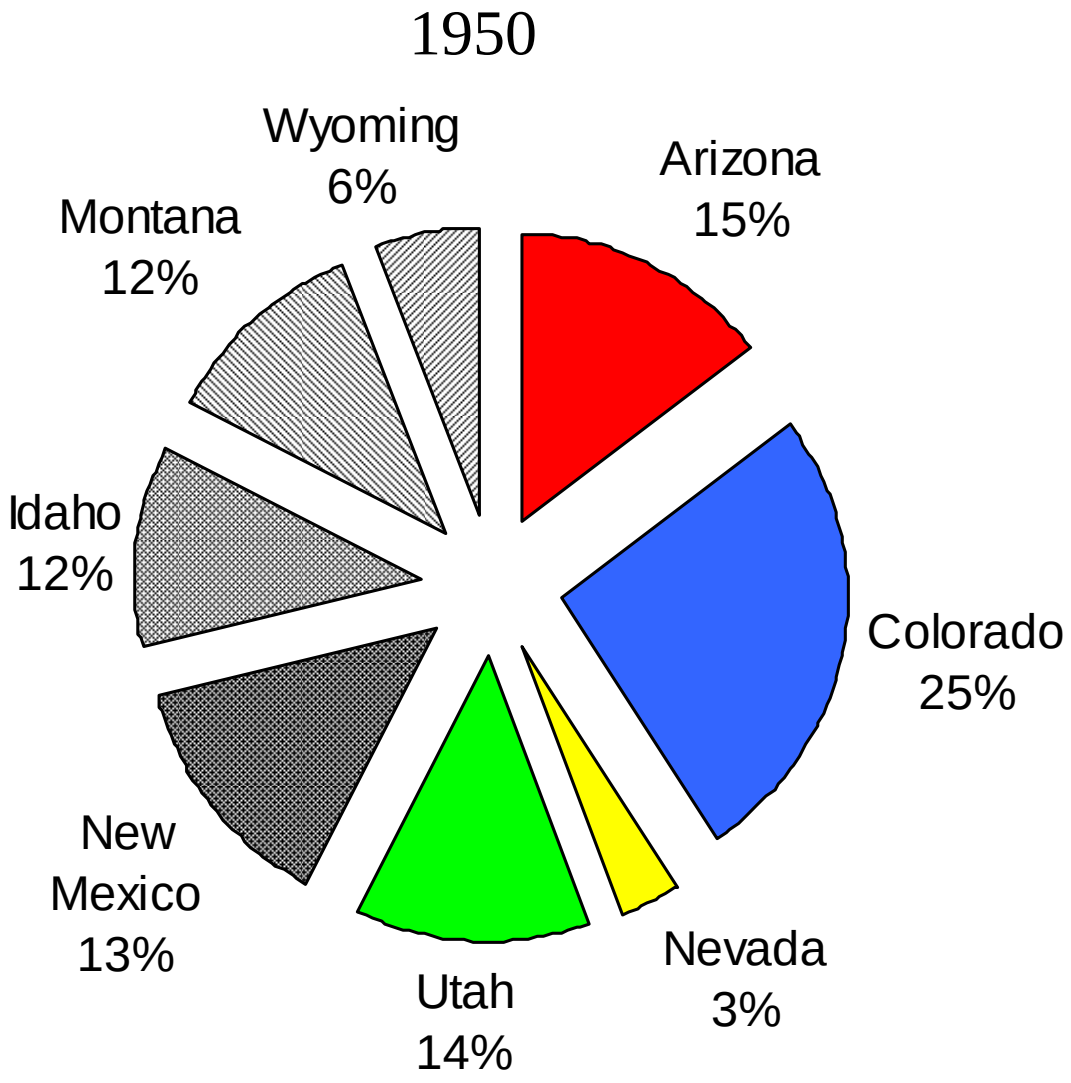
Source: BEBR, University of Utah analysis of Bureau of the Census data.

State Shares of Mountain Region Population



Source: BEBR, University of Utah analysis of Bureau of the Census data.

State Shares of Mountain Region Population



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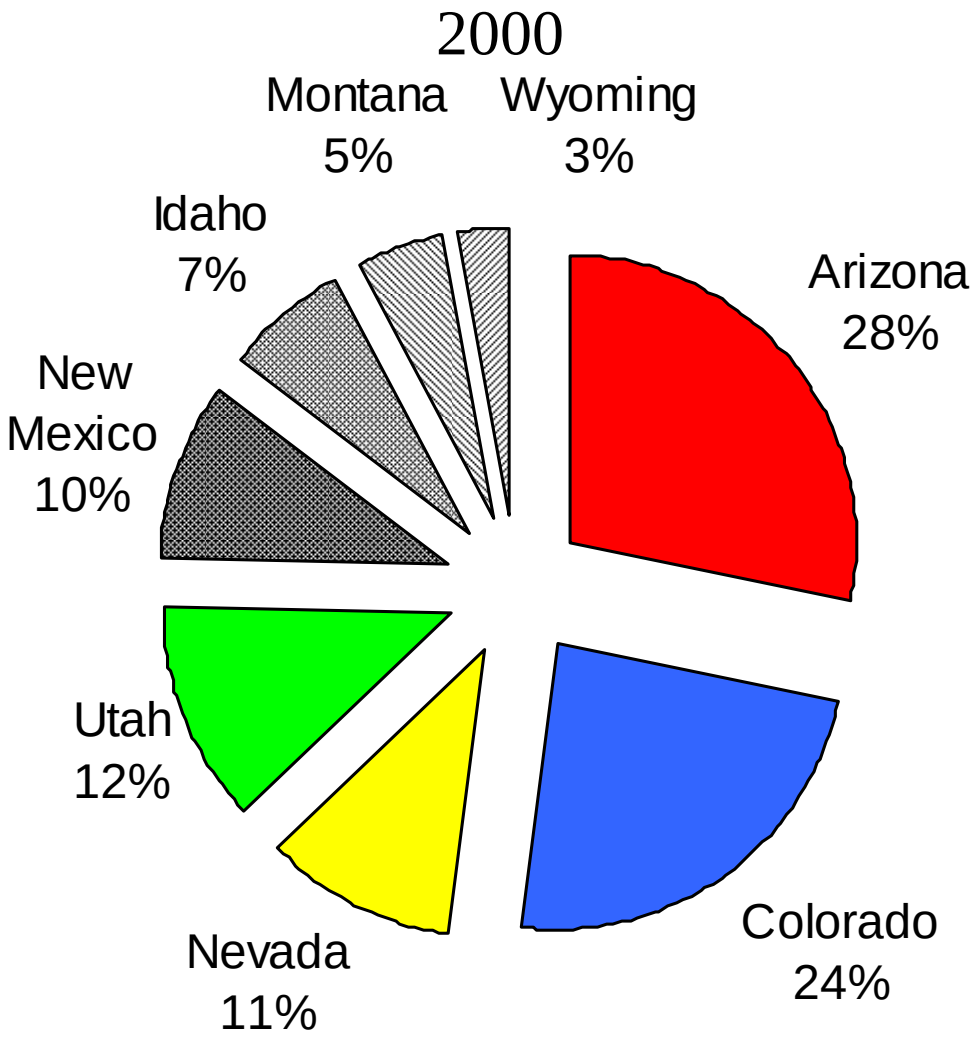
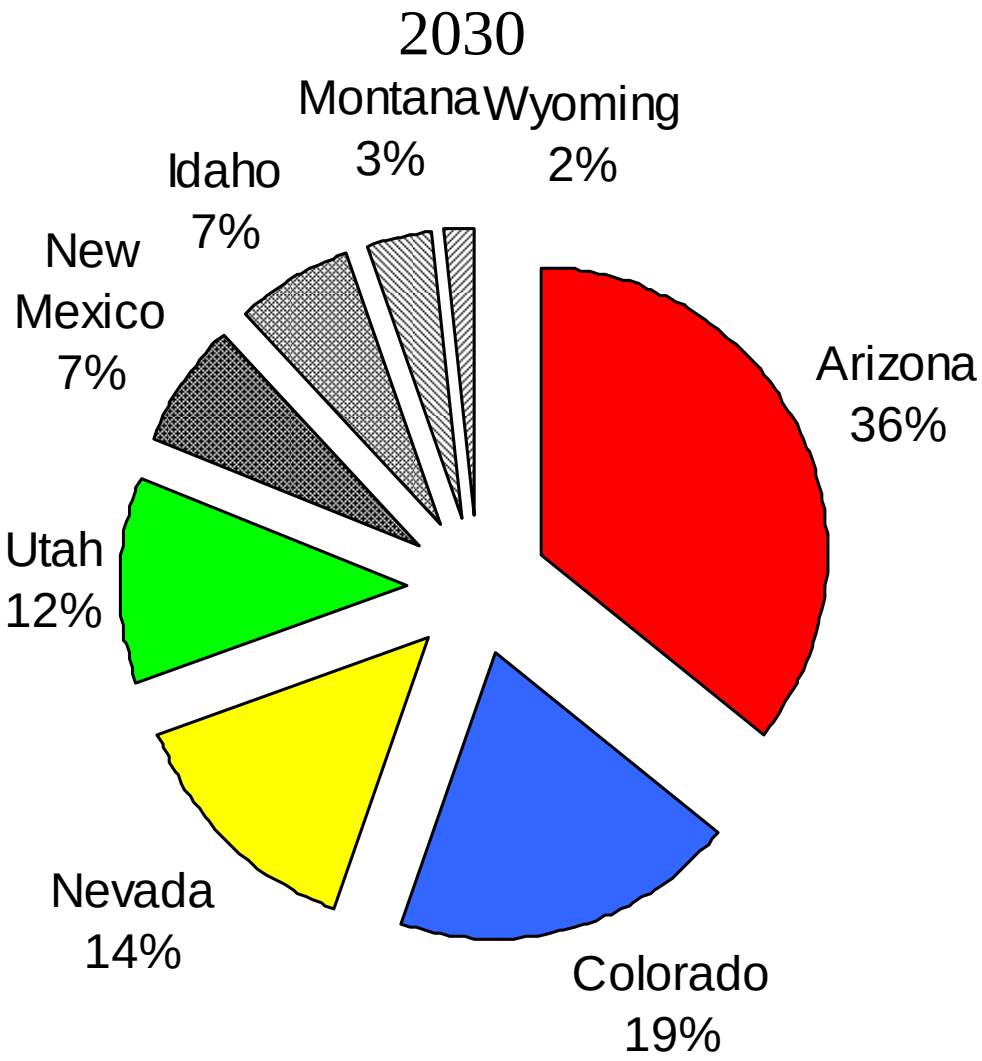
State Shares of Mountain Region Population



Source: BEBR, University of Utah analysis of Bureau of the Census data.

State Shares of Mountain Region Population



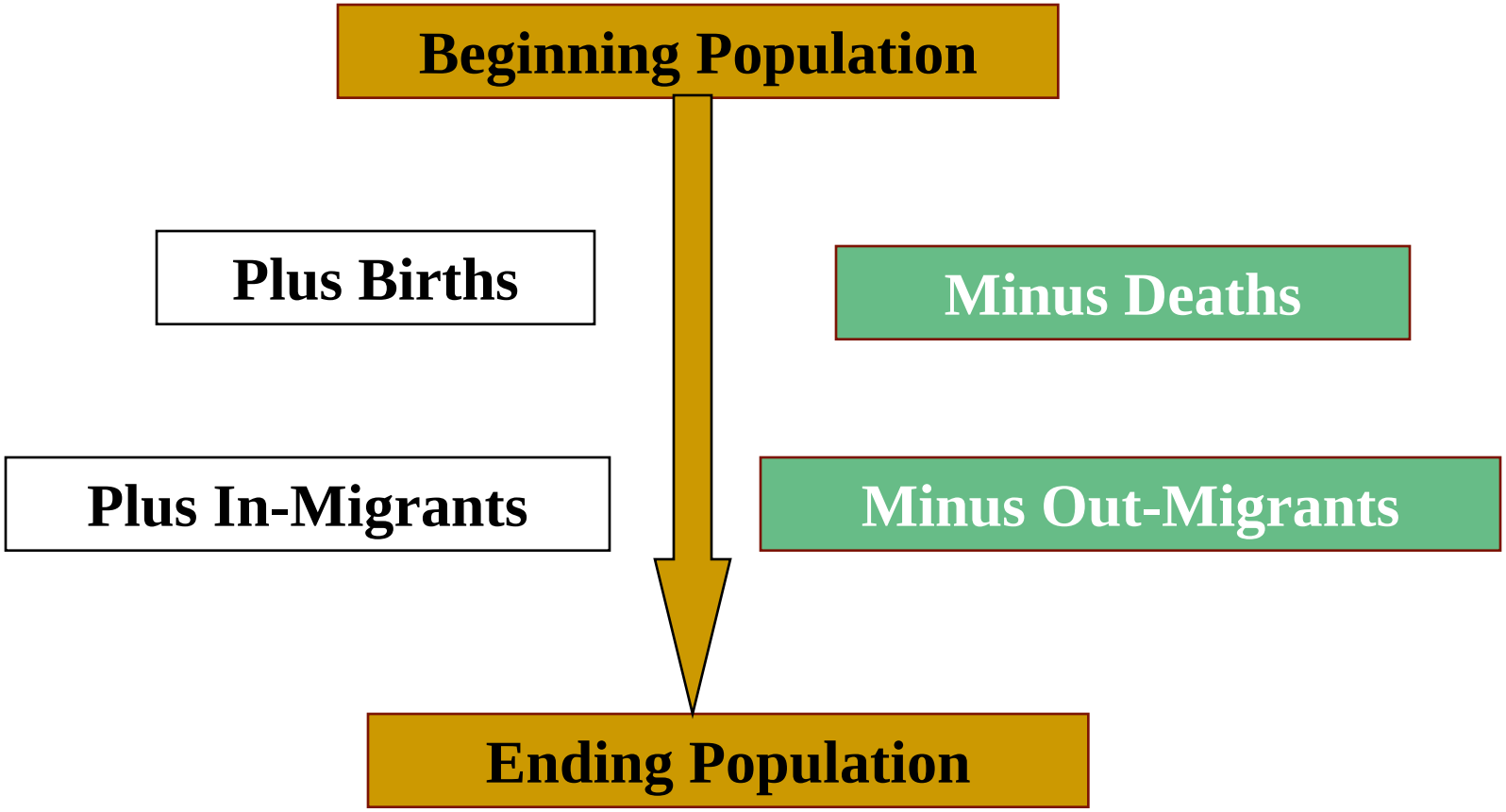
Source: BEBR, University of Utah analysis of Bureau of the Census data.

Data Sources:
Residual Migration Method

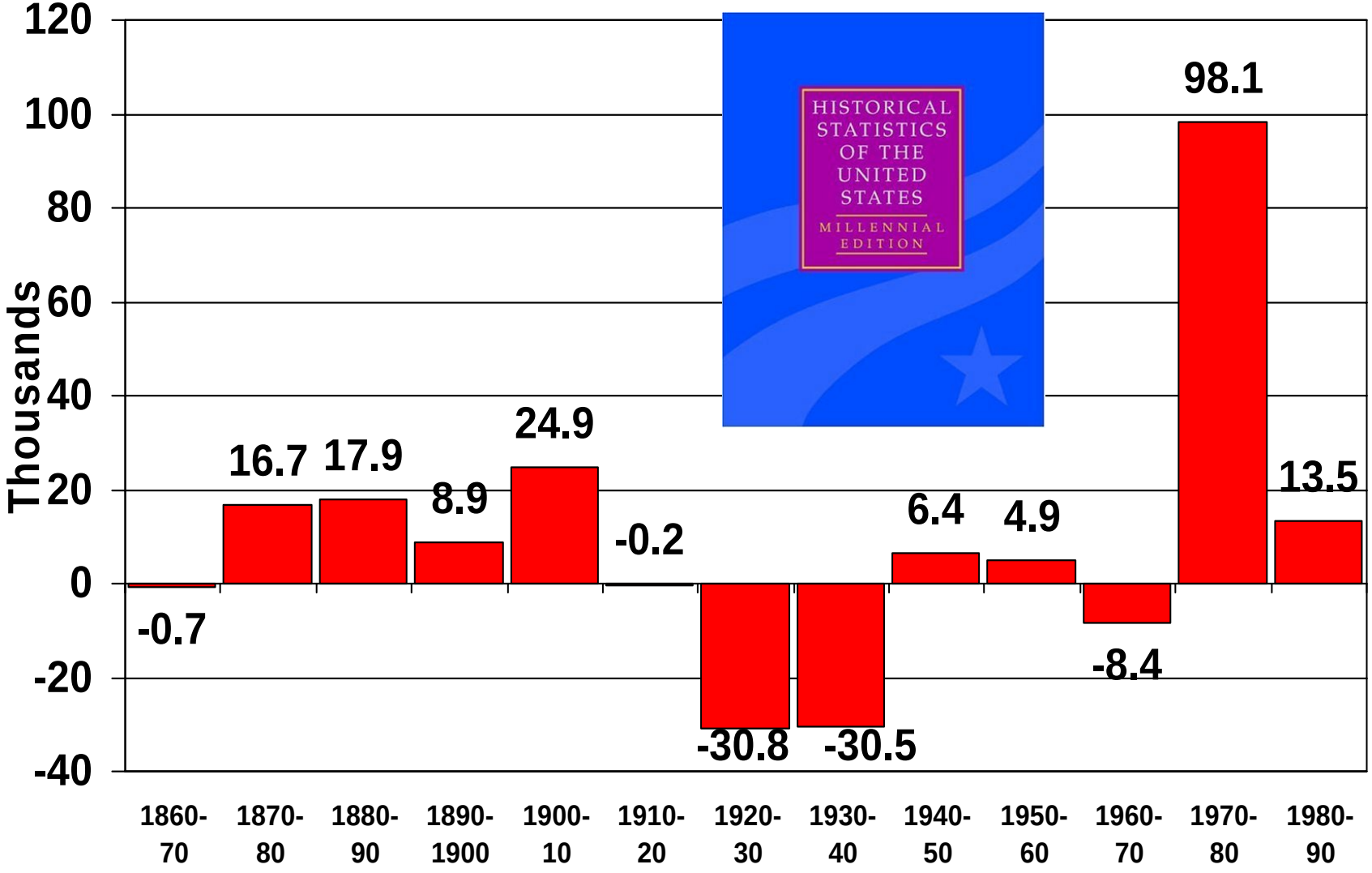
$$P_{t=1} = P_{t=0} + \sum_{t=0}^{1} B_t - \sum_{t=0}^{1} D_t + \sum_{t=0}^{1} NMig_t$$

- Population estimates utilize vital records to account for births and deaths.
- Estimating methods address net migration.
- Net In-migration is a residual calculation

Population Change

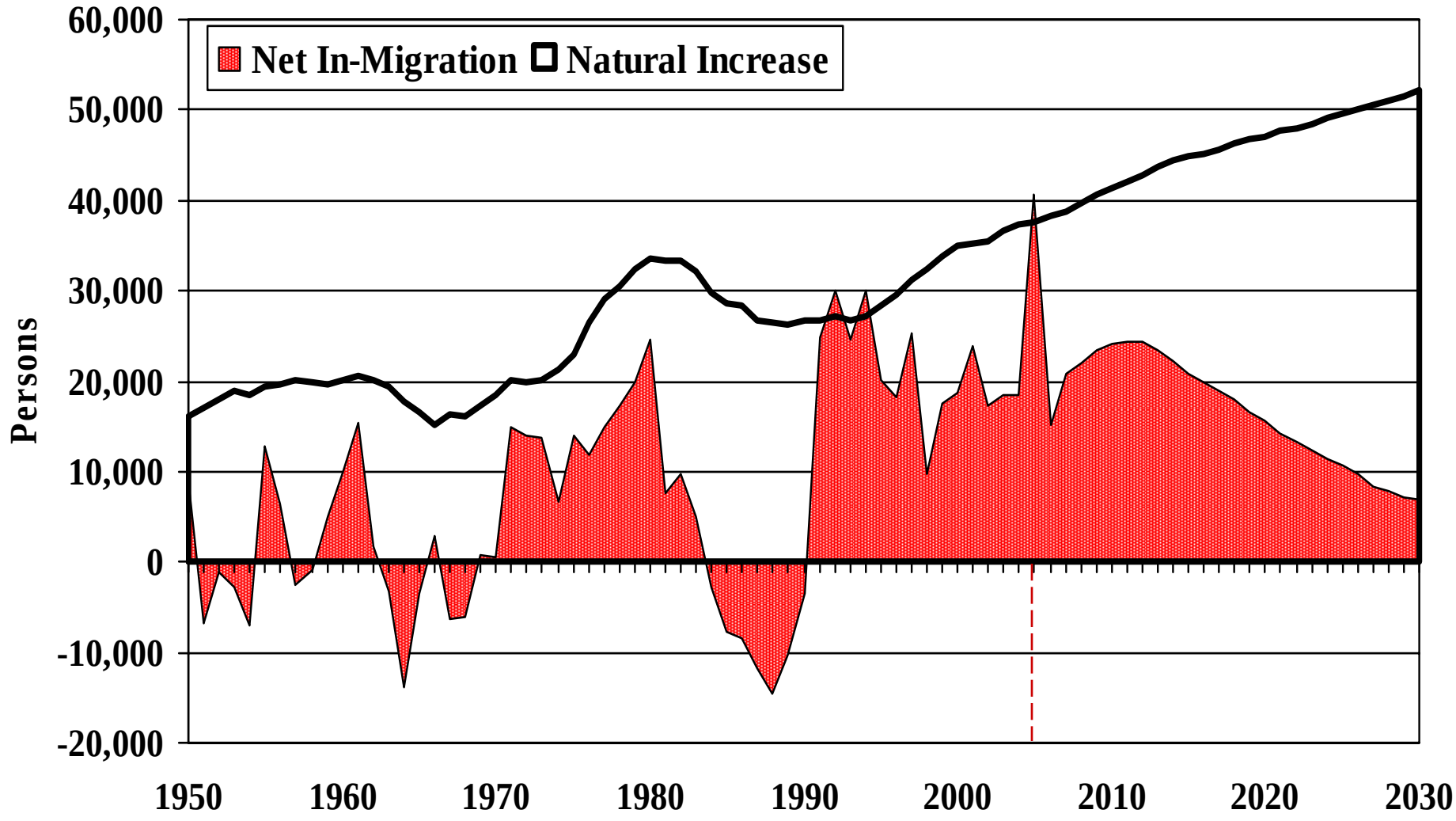


Ten Year Net Migration: Utah



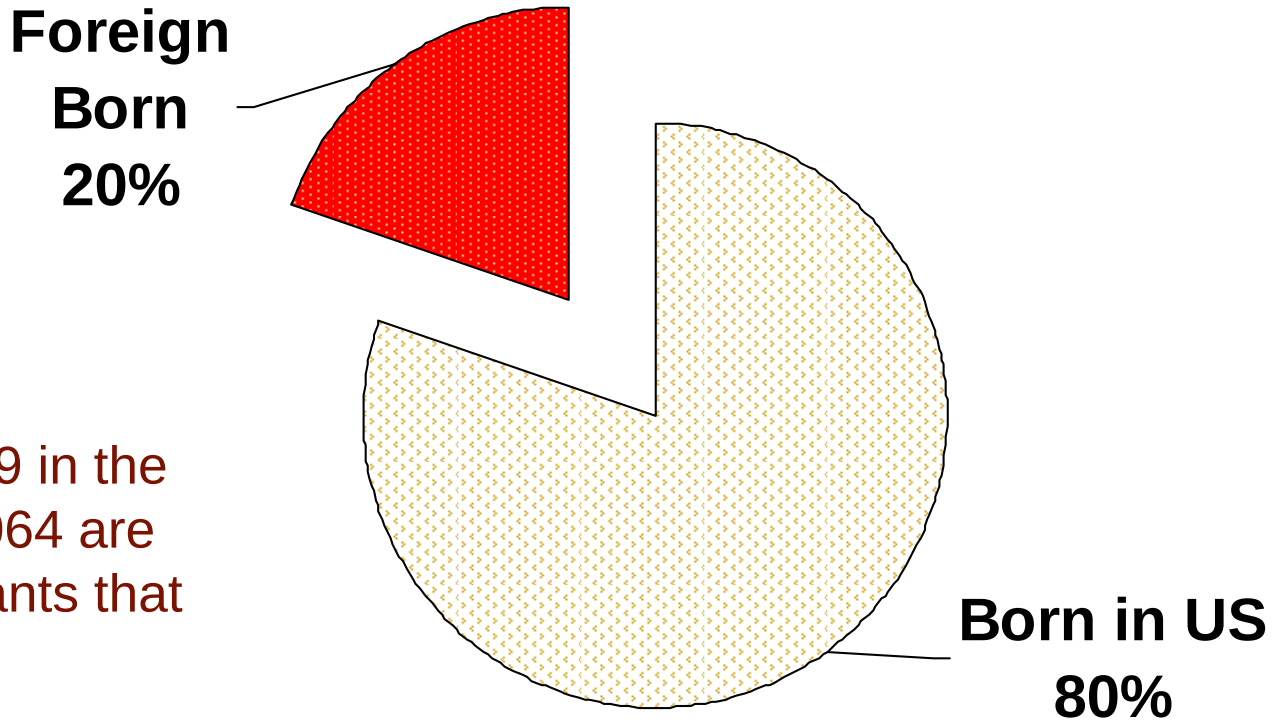
Source: Ferrie, *Historical Statistics of the United States: Millennial Edition (Cambridge University Press, 2006)*

State of Utah: Components of Population Change



Sources: Utah Population Estimates Committee; Utah GOPB, 2005 Baseline Projections

Foreign Born Contribution to Utah Population Increase: 1990-2000



The Utah population increased by 510,319 in the 1990s. Of this 100,064 are international immigrants that arrived since 1990.

Source: Bureau of the Census, 2000 Census, SF3.

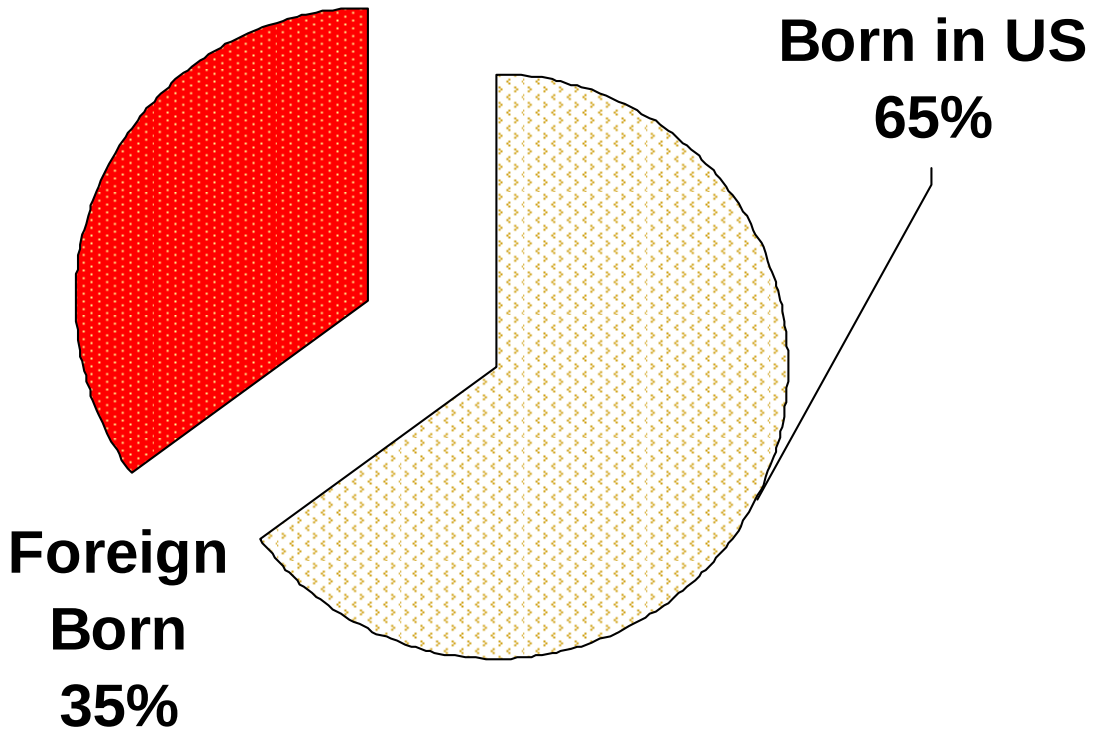
Foreign Born Contribution to U.S. Population Increase: 1990-2000

Immigration accounted for over one-third of the nation's population growth in the 1990s.

The results:

•US population is younger compared to other developed countries.

•US population growth is more rapid than other developed countries.



Source: Bureau of the Census, 2000 Census, SF3

Data Sources: Administrative Records
Internal Revenue Service

- IRS uses tax returns to generate data
  - County to county migration from tax returns
  - Returns and exemptions
- Limitations
  - Not everybody files a tax return
  - International movements are likely to be missed
  - Address on tax return may not be residence
  - Coverage is estimated to be 90 percent

Data Sources: Administrative Records Immigration and Naturalization Service

- Immigration and Naturalization Service (INS) provides data on international migration
- Annual data on legal immigrants: type, country of origin, place of intended residence, age, sex, marital status, occupation, and others.
- Limitations:
  - Data is for the year of legal immigrant status, not the year the person entered the country => 1989-1992 statistics were impacted by legal changes.
  - There are many undocumented migrants.

Data Sources: Other Sample Surveys

- National surveys with no small area data
  - Survey of Income and Program Participation
  - American Housing Survey
- American Community Survey
  - Intended to replace the long form
  - More frequent data
  - Should have sub-state data

Data Sources: Sample Surveys
Current Population Survey

- CPS is a monthly national survey conducted by the Census Bureau in cooperation with the Bureau of Labor Statistics
- The March Supplement includes questions on geographic mobility.
- Reporting geography: census regions, state, and large metropolitan areas (no county data)
- Problem: confidence intervals for small state are large

Migration Data Sources: Decennial Census

- Since 1940, the decennial census long form has included a question about place of residence 5 years ago*
- This is the most comprehensive and commonly used gross migration data.
- It provides data on numbers of migrants, their origins, destinations, age, sex race, ethnicity, income, education and other characteristics.
  - Public Use Microdata Sample (PUMS) is used
- *Geography:* *State* and *county* data for in and out migration and *tract* data for in-migration only
  - Special “to-from” matrix files

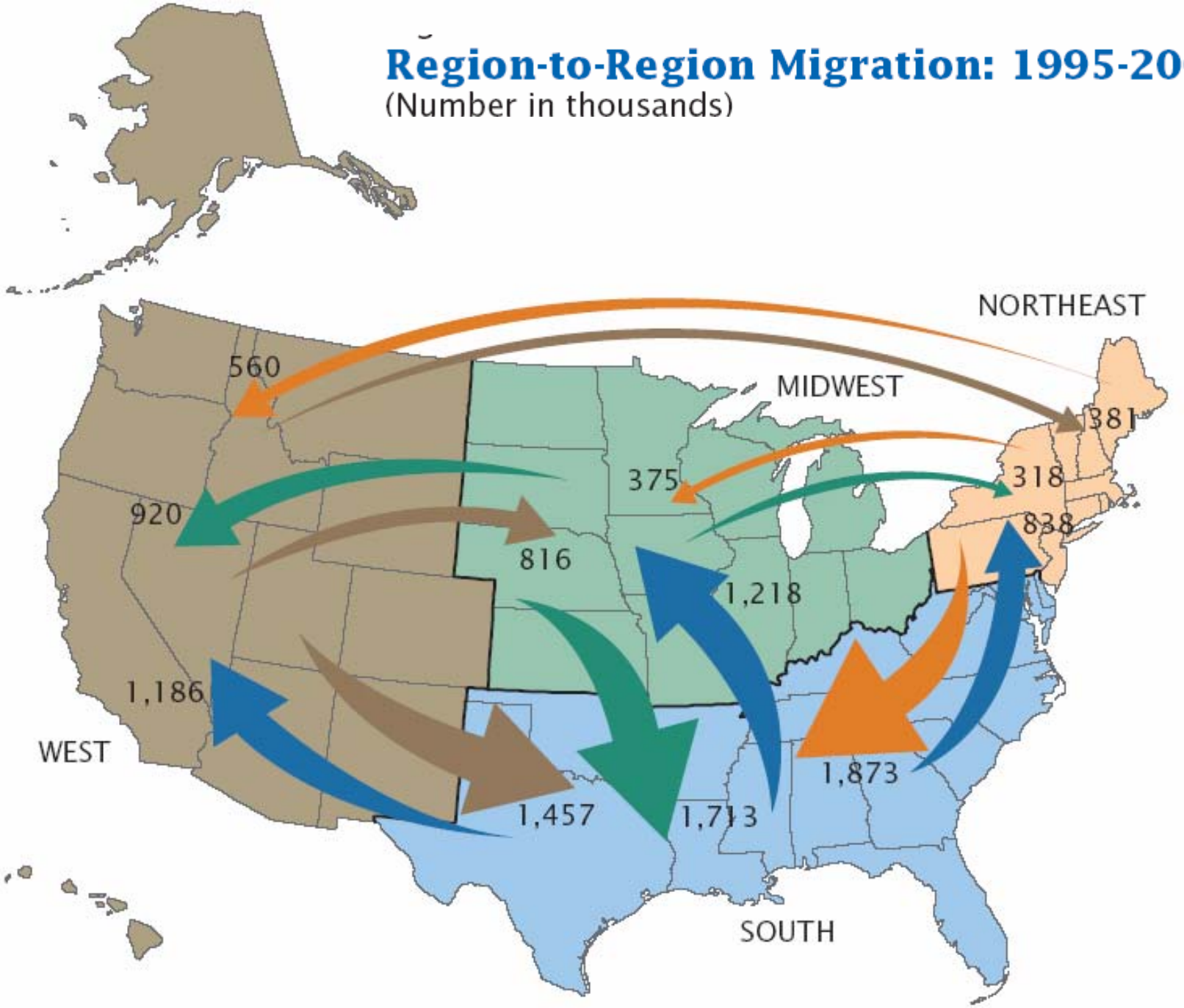
Note: In 1950 the question was place of residence last year.

Decennial Census Data - Limitations

- Will not pick up multiple moves
- It is only sample data (long form)
- Data for both in and out migration are only available to the county level.
- Emigration to another country is not reported.
- Undercount is not proportionately distributed

Region-to-Region Migration: 1995-2000

(Number in thousands)



Source: U.S. Census Bureau, Census 2000 Summary File 3.

Net Migration for Regions for the Population 5 Years and Older: 1995 to 2000

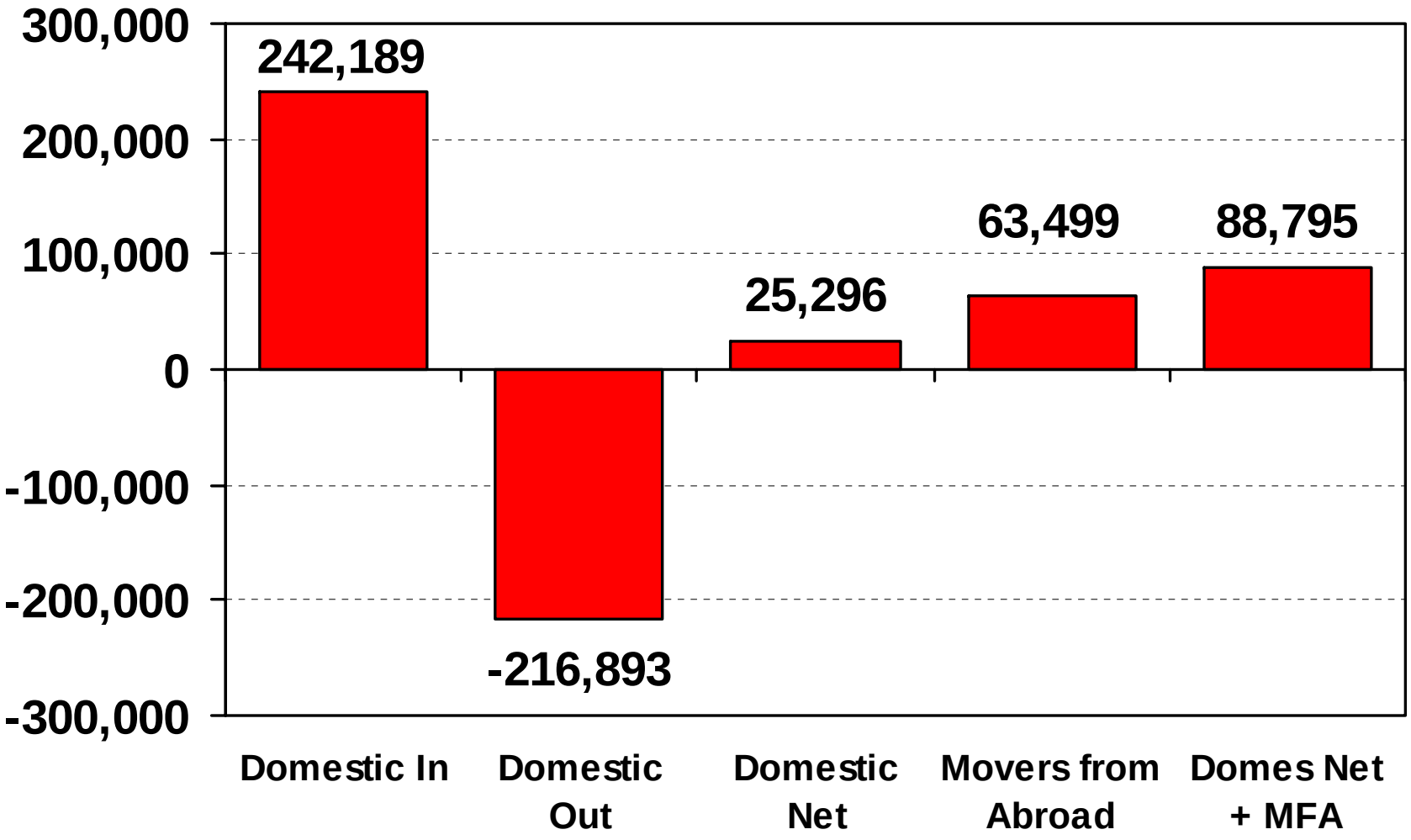
(Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see *www.census.gov/prod/cen2000/doc/sf3.pdf)*

Region	Internal migration			Movers from abroad*
	Inmigrants	Outmigrants	Net	
Total	**11,655,373**	**11,655,373**	**0**	**7,495,846**
Northeast	1,537,293	2,807,951	-1,270,658	1,567,331
Midwest	2,409,578	2,950,767	-541,189	1,057,870
South	5,042,453	3,242,654	1,799,799	2,615,279
West	2,666,049	2,654,001	12,048	2,255,366

* This category includes movers from foreign countries or at sea (for example, people living on a boat), as well as movers from Puerto Rico, U.S. Island Areas, and U.S. minor outlying areas.

Source: U.S. Census Bureau, Census 2000 Summary File 3.

Utah: In Migration, Out Migration, Net Migration, & Movers from Abroad (1995 to 2000)



Source: BEBR, University of Utah analysis of Bureau of the Census data.

Public Use Microdata Sample

- Decennial Census data
- Allows customize estimates
- Long form is 1 in 6 household
- 5% PUMS and 1% PUM
- Household ID links
  - Household records
  - Person records

Record Layouts

- Rectangular files
- Fixed lengths for variables
- Write code to read files

PERSON RECORD

DATA	SIZE	BEGIN	END
D RECTYPE	1	1	1
T Record Type			
V		P . Person record	
D SERIALNO	7	2	8
T Housing/Group Quarters (GQ) Unit Serial No.			
R	0000001..9999999	. Unique identifier assigned within state	
D PNUM	2	9	10
T Person Sequence Number			
R	01..97	. Person Number	

Data View - SPSS

PUMS_5_UT1.sav - SPSS Data Editor

File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

1 : WEEKSA 0

	RECTYPE	HSRIALNO	SAMPLE	STATE	REGION	DIVISION	PUMA5	PUMA1	MSACMSA5	MSAPMSA5	MSACMSA1	MSAPMSA1	AREATYP5	AREATYP1	TOTPUMA5
1	P	0001051	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
2	P	0001051	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
3	P	0001051	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
4	P	0001051	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
5	P	0001051	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
6	P	0001270	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
7	P	0001270	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
8	P	0001270	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
9	P	0005749	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
10	P	0005749	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
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12	P	0005913	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
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15	P	0005913	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
16	P	0005913	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
17	P	0007405	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
18	P	0007405	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
19	P	0007405	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
20	P	0007866	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
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35	P	0011938	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
36	P	0016657	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
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41	P	0016683	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
42	P	0016683	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133
43	P	0020893	5	49	4	8	00100	49100	9999	9999	9997	9997	90	70	4215339133

Data View / Variable View

SPSS Processor is ready

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Variable View - SPSS

PUMS_5_UT1.sav - SPSS Data Editor

File Edit View Data Transform Analyze Graphs Utilities Add-ons Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
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2	HSRIALNO	String	7	0	HU Record Housing/GQ Unit Serial Number	None	None	8	Left	Nominal
3	SAMPLE	String	1	0	Sample Identifier	{1, 1% sample}...	None	8	Left	Nominal
4	STATE	String	2	0	State (FIPS)	{10, Delaware}...	None	8	Left	Nominal
5	REGION	String	1	0	Region	{0, Region not identified}...	None	8	Left	Nominal
6	DIVISION	String	1	0	Division	{0, Division not identified}...	None	8	Left	Nominal
7	PUMA5	String	5	0	Public Use Microdata Area Code (PUMA)	None	None	11	Left	Nominal
8	PUMA1	String	5	0	Super Public Use Microdata Area Code (SuperPUMA)	None	None	9	Left	Nominal
9	MSACMSA	String	4	0	Metropolitan Area(MA):MSA/CMSA for PUMA	{9997, Mixed MSA/CMSA:nonmetro t	None	8	Left	Nominal
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14	AREATYP1	String	2	0	Metropolitan Area:SuperPUMA Relationship to MA	{70, Both metro and nonmetro territor	None	8	Left	Nominal
15	TOTPUMA5	Numeric	14	0	Total Area of PUMA	None	None	14	Right	Scale
16	LNDPUMA	Numeric	14	0	Land Area of PUMA	None	None	14	Right	Scale
17	TOTPUMA1	Numeric	14	0	Total Area of SuperPUMA	None	None	14	Right	Scale
18	LNDPUMA	Numeric	14	0	Land Area of SuperPUMA	None	None	14	Right	Scale
19	SUBSAMP	String	2	0	Subsample Number	None	None	8	Left	Nominal
20	HWEIGHT	Numeric	4	0	Housing Unit Weight	None	None	7	Right	Scale
21	PERSONS	String	2	0	Number of Person Records	{00, = 'Vacant unit'}...	None	7	Left	Nominal
22	UNITTYPE	String	1	0	Type of Unit	{0, Housing unit}...	None	8	Left	Nominal
23	HSUB	String	1	0	Substitution Flag	{0, Not substituted or GQ}...	None	4	Left	Nominal
24	HAUG	String	1	0	Augmentation Flag	{0, Not augmented or GQ}...	None	4	Left	Nominal
25	VACSTAT	String	1	0	Vacancy Status	{0, Not in universe}...	0	7	Left	Nominal
26	VACSTATA	String	1	0	Vacancy Status Allocation Flag	{0, Not allocated or GQ}...	None	8	Left	Nominal
27	TENURE	String	1	0	Home Ownership	{0, Not in universe}...	0	6	Left	Nominal
28	TENUREA	String	1	0	Home Ownership Allocation Flag	{0, Not allocated or GQ}...	None	7	Left	Nominal
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30	BLDGSZA	String	1	0	Size of Building Allocation Flag	{0, Not allocated or GQ}...	None	7	Left	Nominal
31	YRBUILT	String	1	0	Year Building Built	{, Not in universe}...		7	Left	Nominal
32	YRBUILTA	String	1	0	Year Building Built Allocation Flag	{0, Not allocated or GQ}...	None	8	Left	Nominal
33	YRMOVED	String	1	0	Year Moved In	{, Not in universe}...		7	Left	Nominal
34	YRMOVED	String	1	0	Year Moved In Allocation Flag	{0, Not allocated or GQ}...	None	8	Left	Nominal
35	ROOMS	String	1	0	Number of Rooms	{, Not in universe}...		5	Left	Nominal
36	ROOMSA	String	1	0	Number of Rooms Allocation Flag	{0, Not allocated or GQ}...	None	6	Left	Nominal
37	BEDRMS	String	1	0	Number of Bedrooms	{, Not in universe}...		6	Left	Nominal
38	BEDRMSA	String	1	0	Number of Bedrooms Allocation Flag	{0, Not allocated or GQ}...	None	7	Left	Nominal
39	CPLUMB	String	1	0	Complete Plumbing Facilities	{, Not in universe}...		6	Left	Nominal
40	CPLUMBA	String	1	0	Complete Plumbing Facilities Allocation Flag	{0, Not allocated or GQ}...	None	7	Left	Nominal
41	CKITCH	String	1	0	Complete Kitchen Facilities	{, Not in universe}...		6	Left	Nominal
42	CKITCHA	String	1	0	Complete Kitchen Facilities Allocation Flag	{0, Not allocated or GQ}...	None	7	Left	Nominal
43	PHONE	String	1	0	Telephone Availability	{, Not in universe}...		5	Left	Nominal
44	PHONEA	String	1	0	Telephone Availability Allocation Flag	{0, Not allocated or GQ}...	None	6	Left	Nominal
45	FUEL	String	1	0	Heating Fuel	{, Not in universe}...		4	Left	Nominal

Data View | Variable View

SPSS Processor is ready

Start U... P... ht... Mi... A... P... 10:28 AM

Estimates from PUMS

- Extract data – may require linking person and household files
- Apply person or household weights
- Calculate estimate
- Calculate standard error
  - Unadjusted SE
  - Design factors

Unadjusted Standard Errors

Table A. Unadjusted Standard Errors for Estimated Totals from Census 2000 5-Percent PUMS

Estimated total[1]	Size of geographic area tabulated[2]							
	100,000	250,000	500,000	750,000	1,000,000	5,000,000	10,000,000	25,000,000
1,000	137	138	138	138	138	138	138	138
2,500	215	217	217	218	218	218	218	218
5,000	300	305	307	307	307	308	308	308
10,000	414	427	432	433	434	435	436	436
15,000	492	518	526	528	530	533	533	534
25,000	597	654	672	678	681	687	688	689
75,000	597	999	1,101	1,132	1,148	1,185	1,189	1,192
100,000		1,068	1,233	1,283	1,308	1,365	1,371	1,376
250,000			1,541	1,780	1,887	2,124	2,152	2,169
500,000				1,780	2,179	2,924	3,004	3,051
750,000					1,887	3,480	3,631	3,718
1,000,000						3,899	4,135	4,271
5,000,000							6,892	8,718
10,000,000								10,677

[1]For estimated totals larger than 10,000,000, the standard error is somewhat larger than the table values. The formula (1) given below should be used to calculate the standard error.

[2]Total count of people, housing units, households, or families in the area if the estimated total is a person, housing unit, household, or family characteristic, respectively.

$$SE(\hat{Y}) = \sqrt{19(\hat{Y})\left(1 - \frac{\hat{Y}}{N}\right)} \qquad (1)$$

N = Size of geographic area

$\hat{Y}$ = Estimate of characteristic total

Design Factors

Table E. Census 2000 PUMS Standard Error Design Factors—United States

Characteristic	Design factor
POPULATION	
Age	1.3
Sex	1.2
Race	2.2
Hispanic or Latino	2.1
Marital status	1.1
Household type and relationship	1.1
Disabled and employment disability	1.4
Ancestry	1.8
Place of birth	1.5
Citizenship status	1.6
Residence in 1995	2.0
Year of entry	1.7
Language spoken at home and ability to speak English	1.5
Educational attainment	1.2
School enrollment	1.5
Type of residence (urban/rural)	1.6
Household type	1.1
Family type	2.2
Subfamily type and presence of children	1.3
Grandparent status and responsibility for grandchild	1.4
Employment status	1.2

Reporting Confidence Levels

- Example: Report the 95% confidence interval (+ and - 2 SEs)
- Example: Estimate = 24,104

  Computed Unadjusted SE: 658

  Design Factor: 1.1

  Adjusted SE = 742

  95% CI = 2 x 742 = 1,447

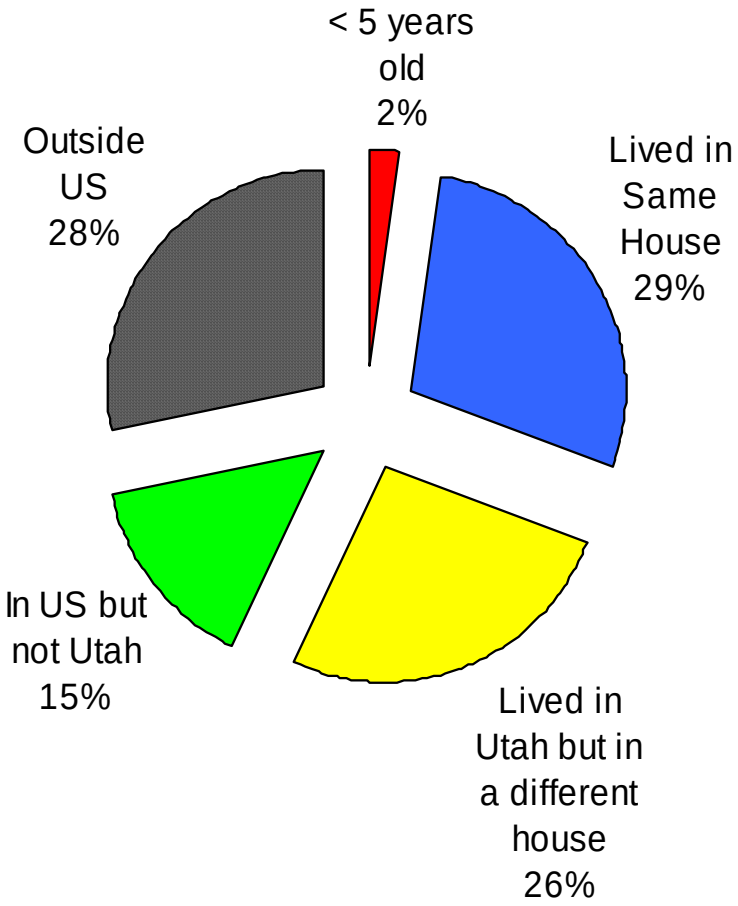
  LB: 22,657 UB: 25,551

PUMAs: Geography

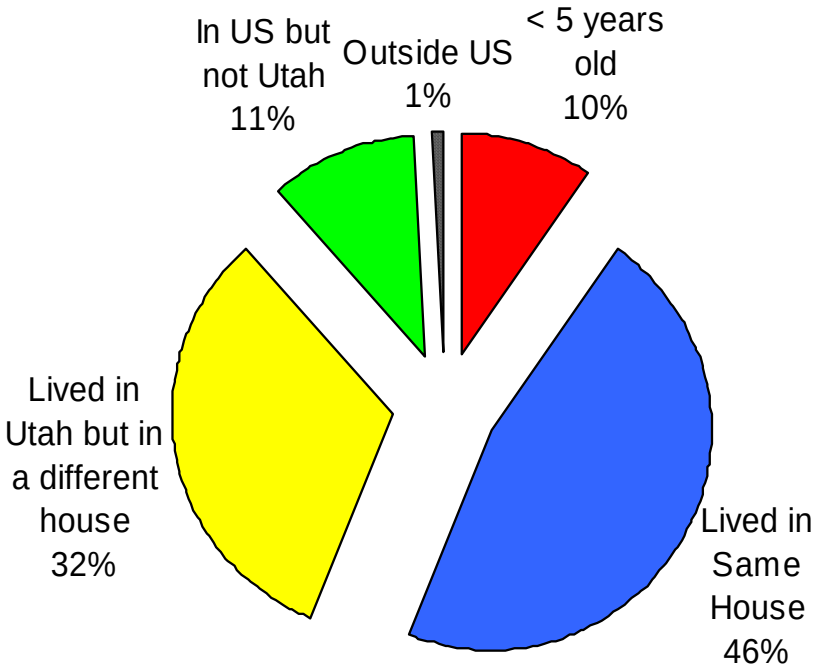
- PUMA = Public Use Microdata Area
- Super PUMAs
  - 1% PUMS
  - 400,000+ population
  - Utah has 4 Super PUMAs
- PUMAs
  - 5% PUMS
  - Nested within Super PUMAs

Migrants to Utah: 1995 to 2000

Foreign Born

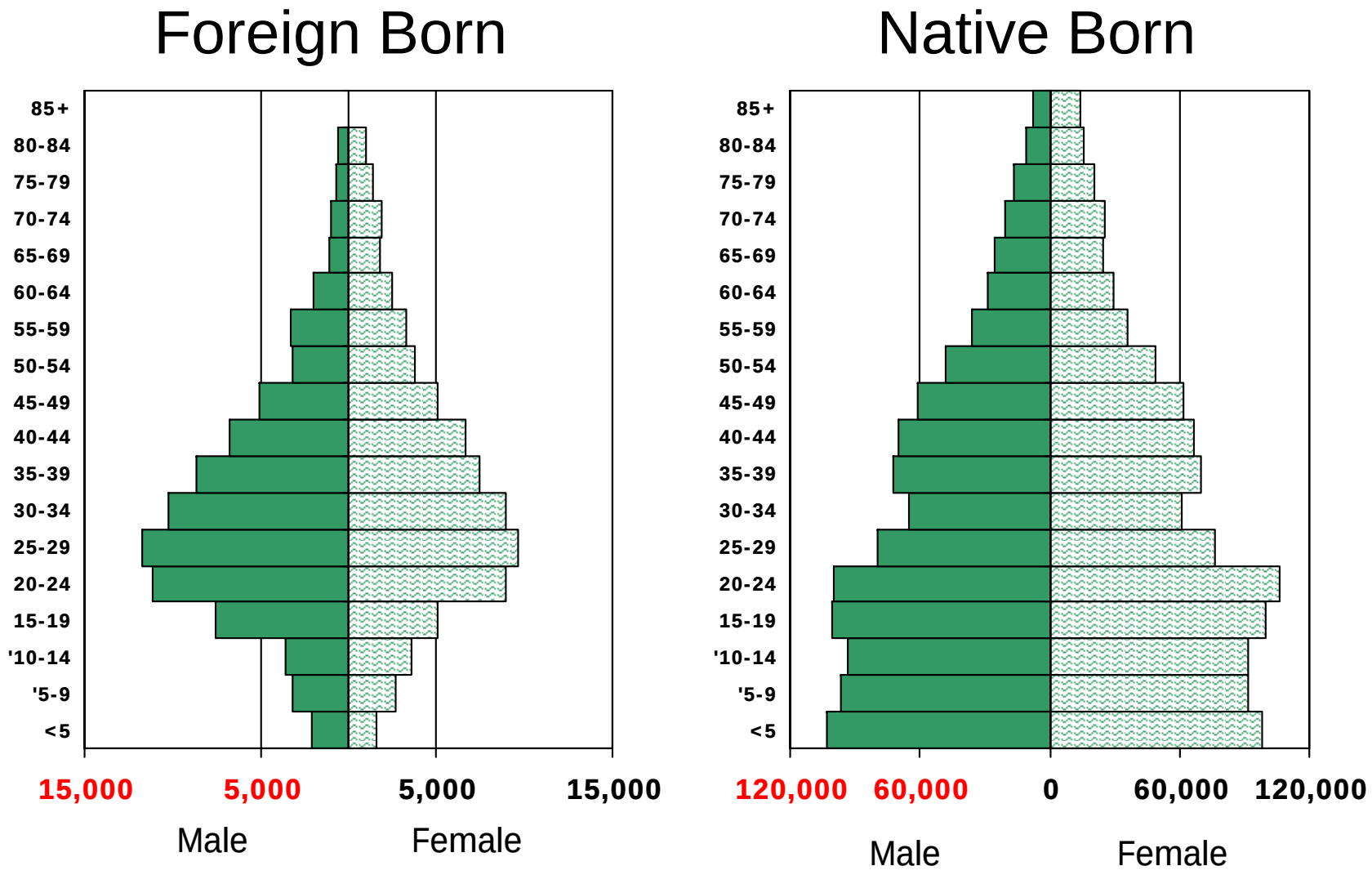


Native Born



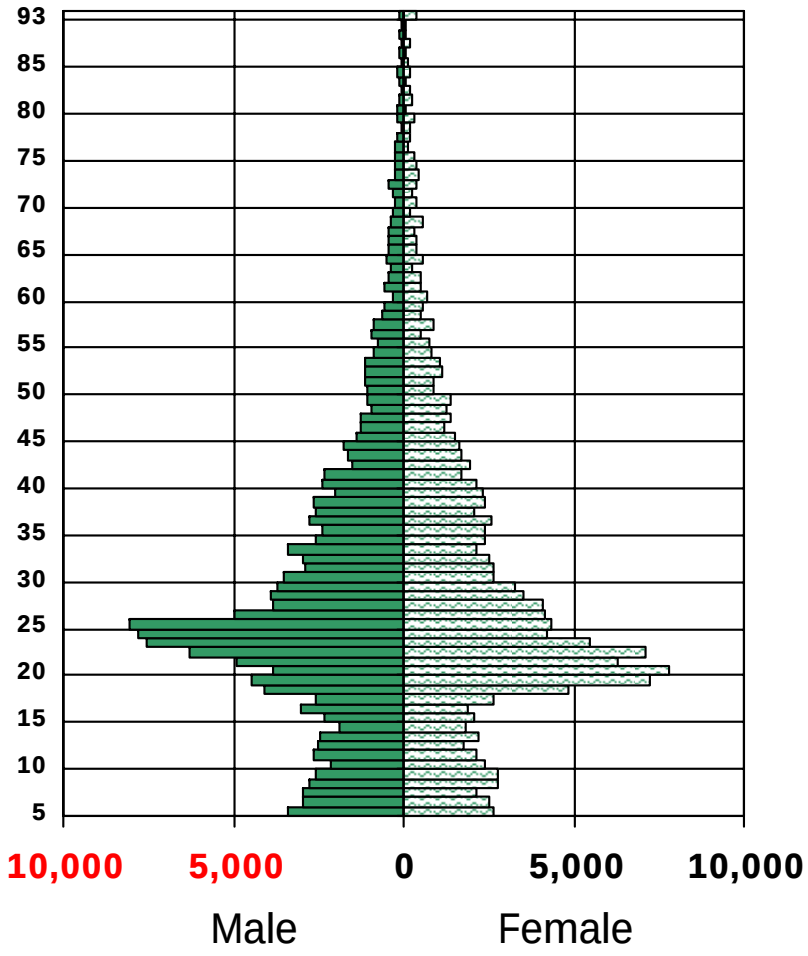
Source: BEBR, University of Utah analysis of Bureau of the Census data.

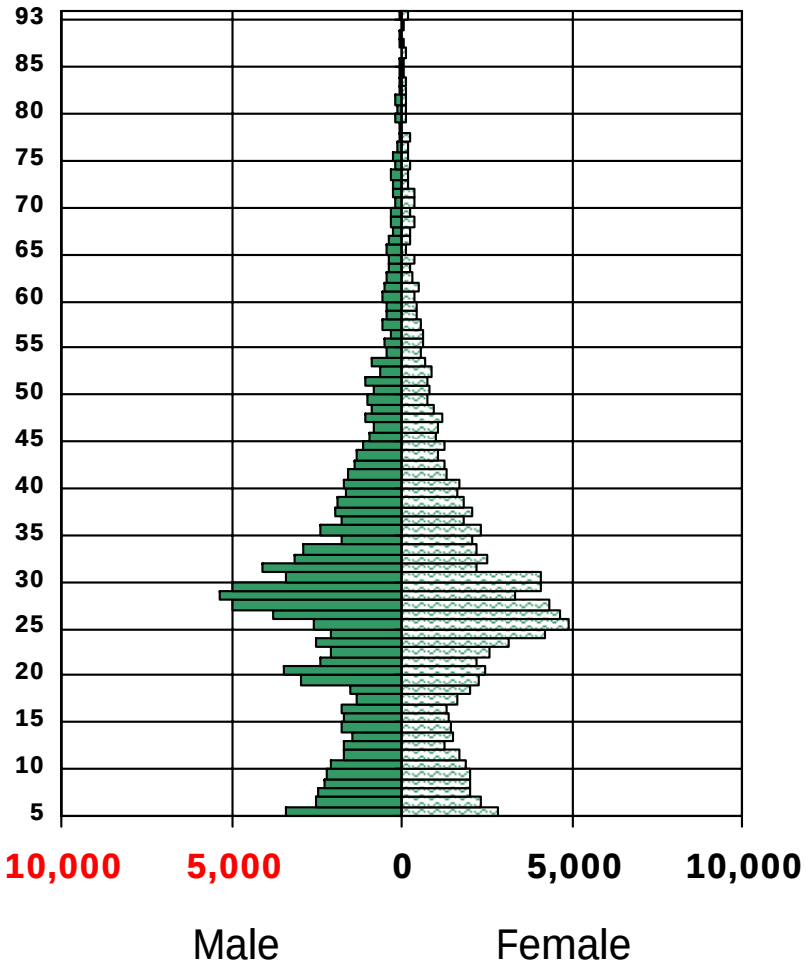
Utah Age & Sex Distributions x Nativity (2000)



Source: U.S. Bureau of the Census, Census 2000, 5% PUMS.

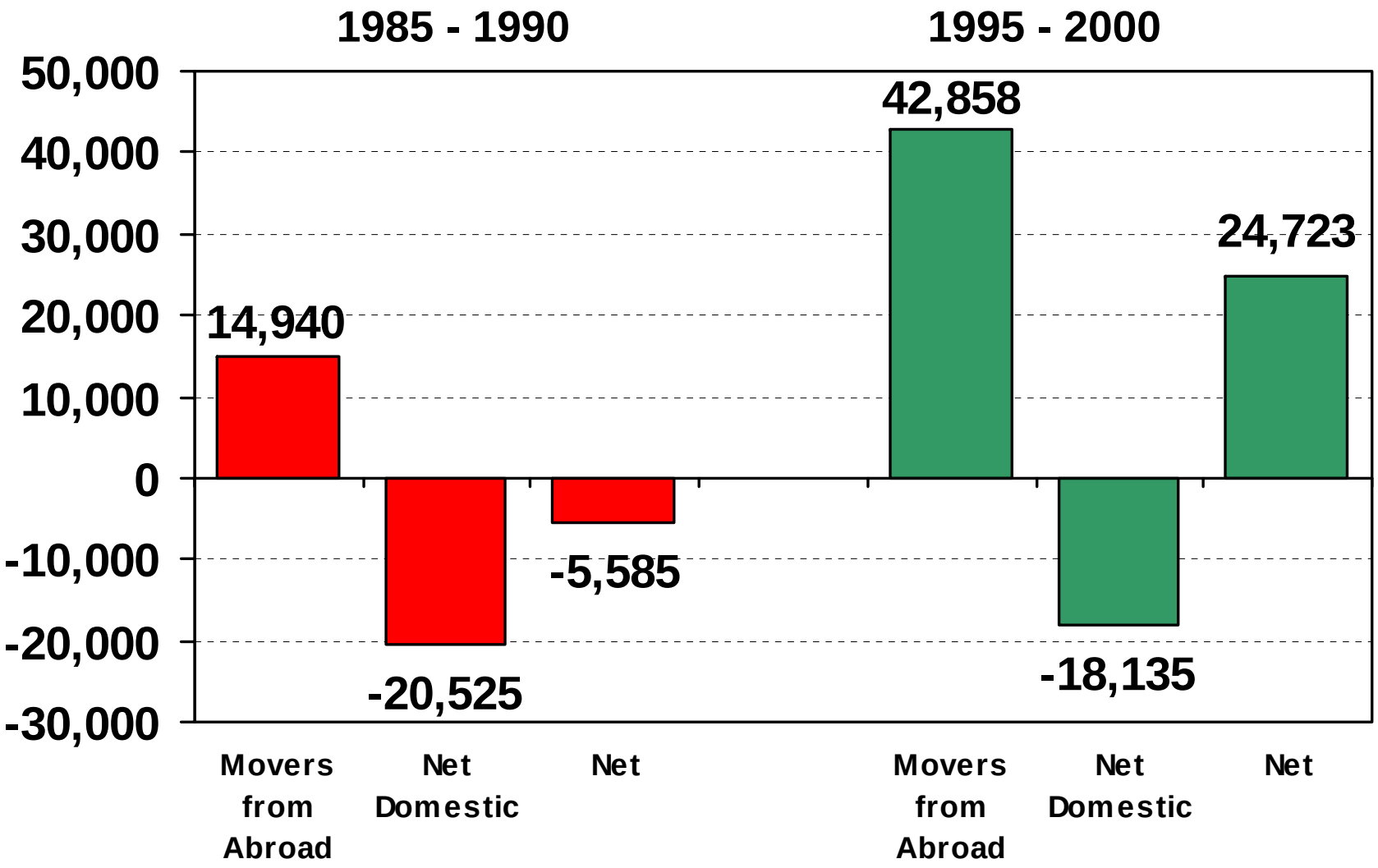
Utah In and Out Migrant x Age & Sex (1995 – 2000)





Source: U.S. Bureau of the Census, Census 2000, 5% PUMS.

Salt Lake – Ogden MSA: Net Migration, & Movers from Abroad for 1985 to 1990 and 1995 to 2000



Source: BEBR, University of Utah analysis of Bureau of the Census data. Census 2000, 5% PUMS

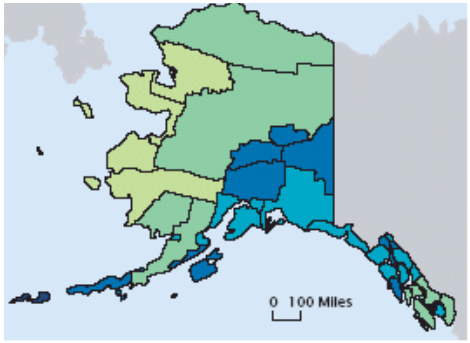
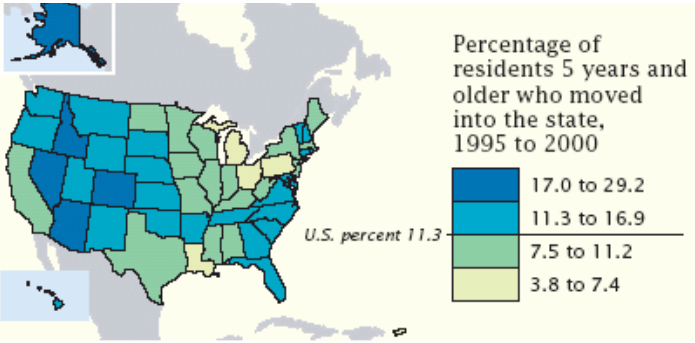
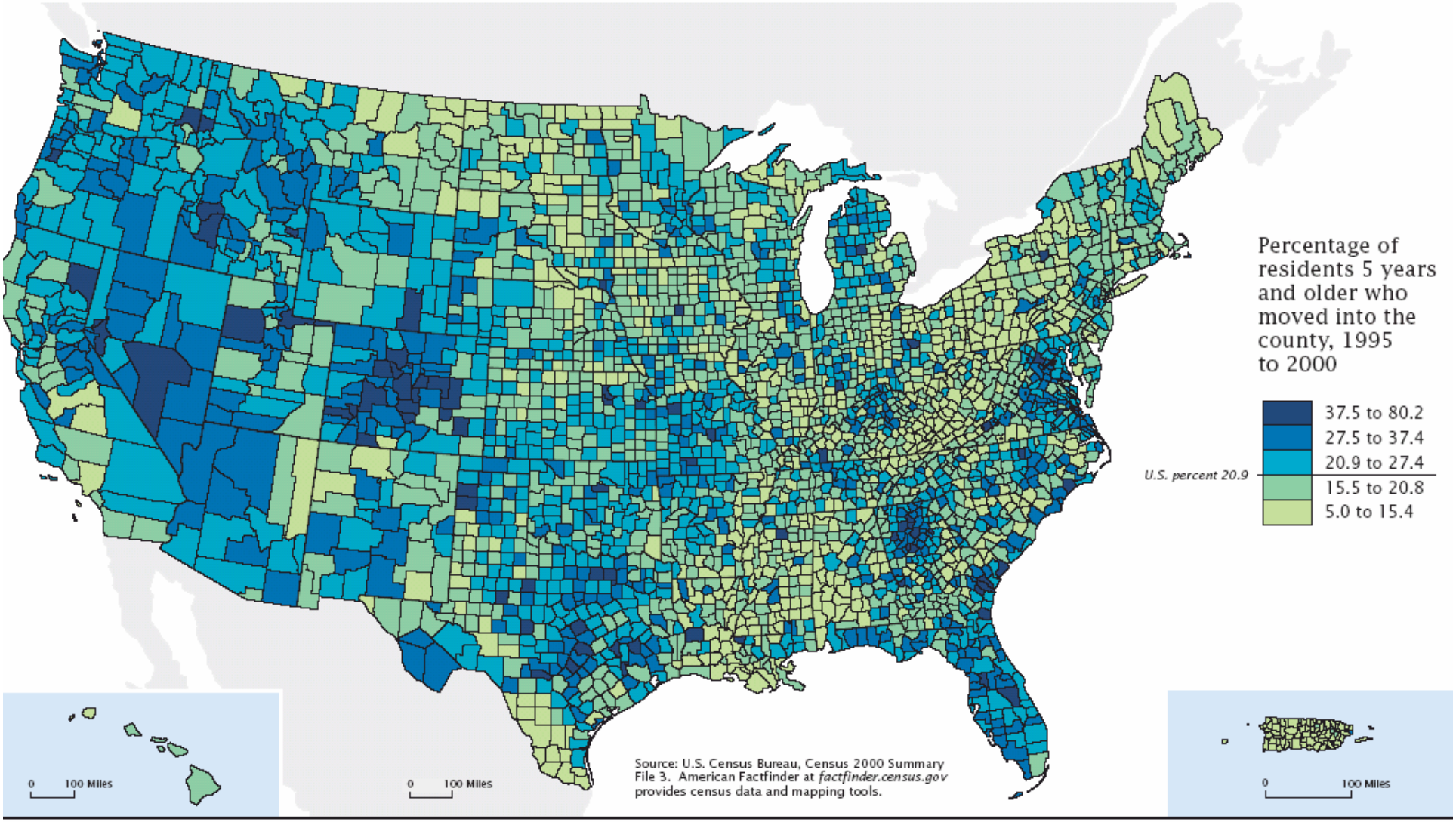


Figure 3.

Geographical Mobility: 1995 to 2000

(Data based on sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see *www.census.gov/prod/cen2000/doc/sf3.pdf*)





Source: U.S. Census Bureau, Census 2000 Summary File 3. American Factfinder at *factfinder.census.gov* provides census data and mapping tools.

Population Born in State of Residence: 2000

(Data based on sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see *www.census.gov/prod/cen2000/doc/sf3.pdf*)

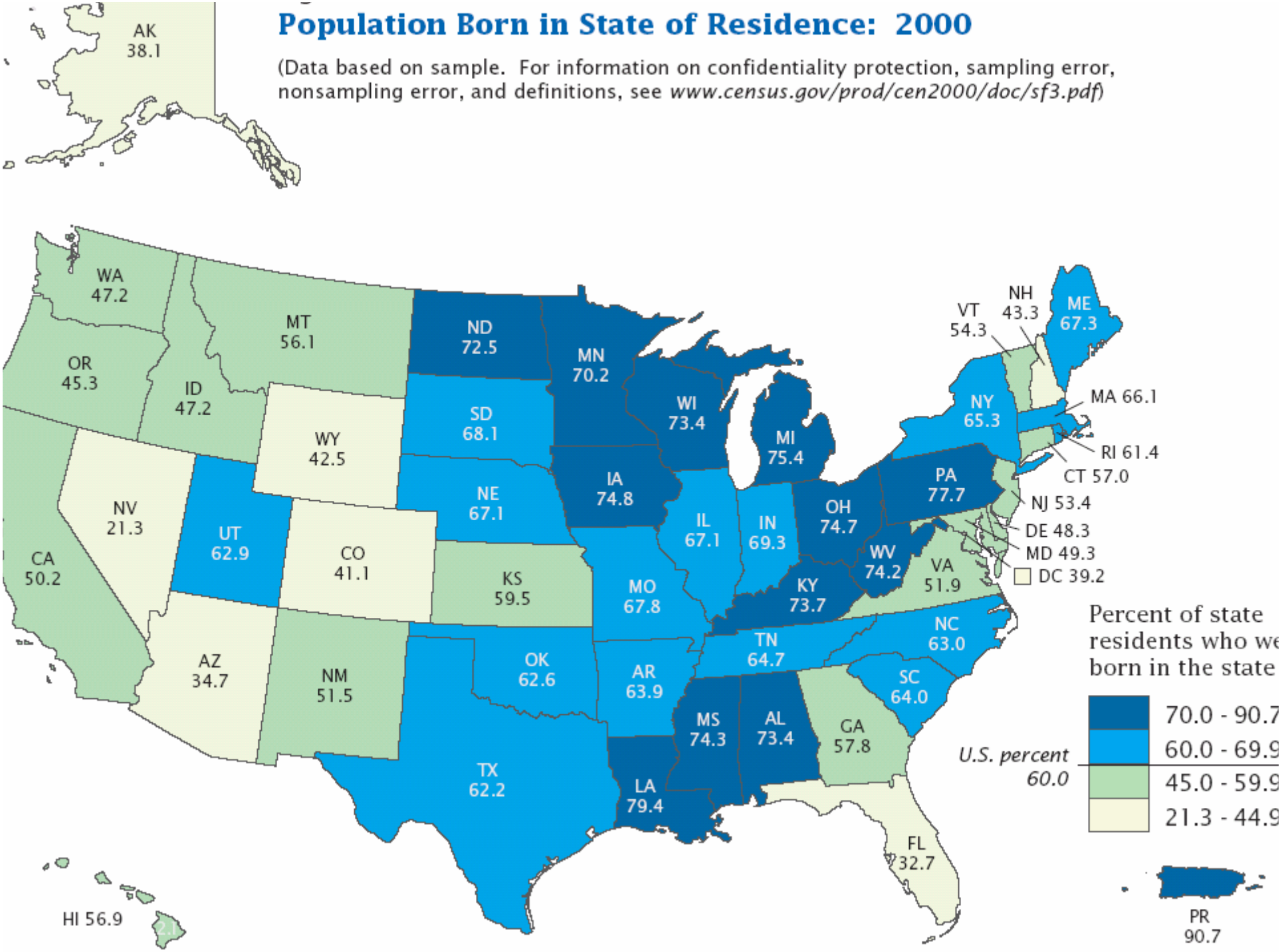
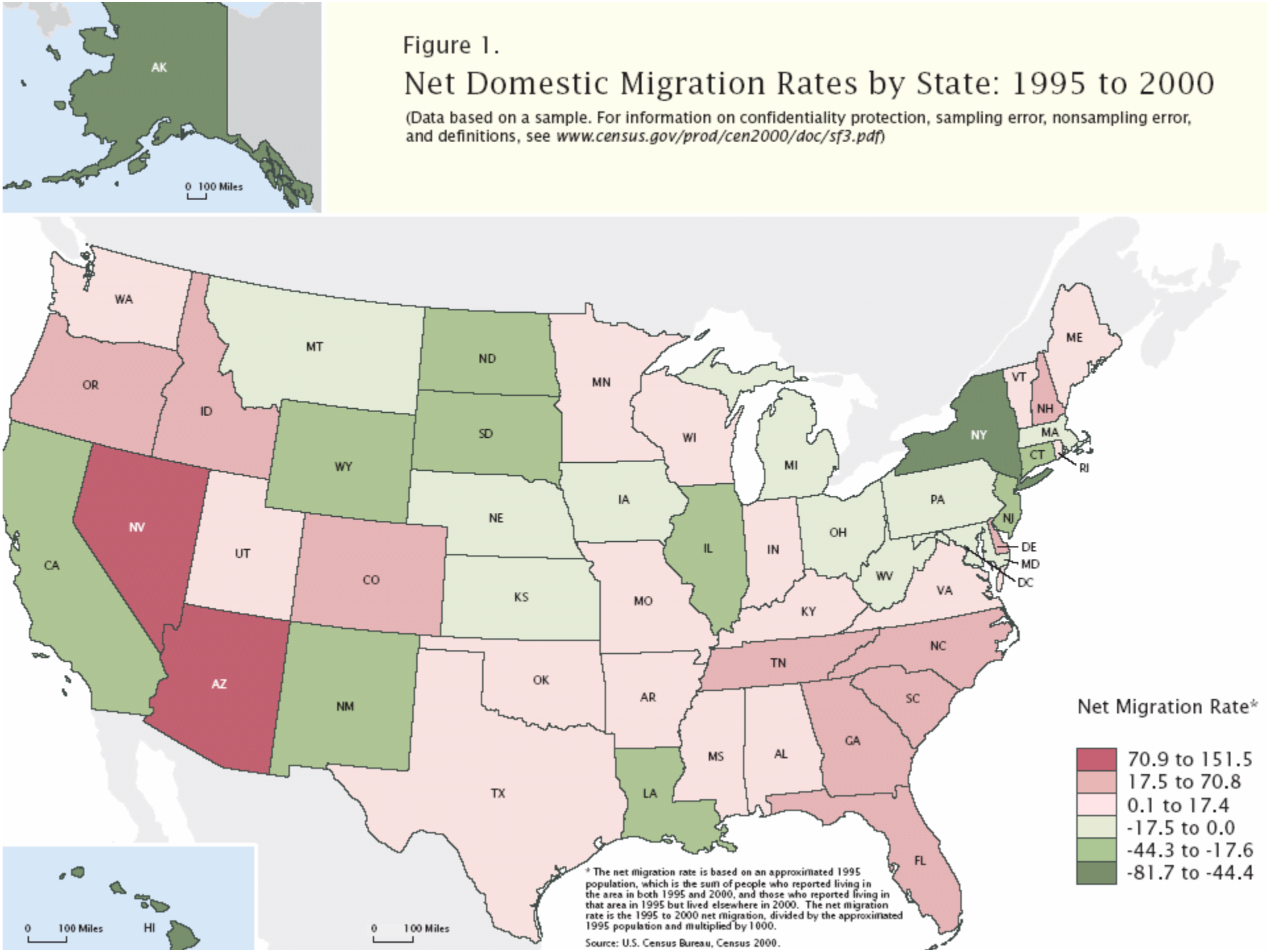


Figure 1.

Net Domestic Migration Rates by State: 1995 to 2000

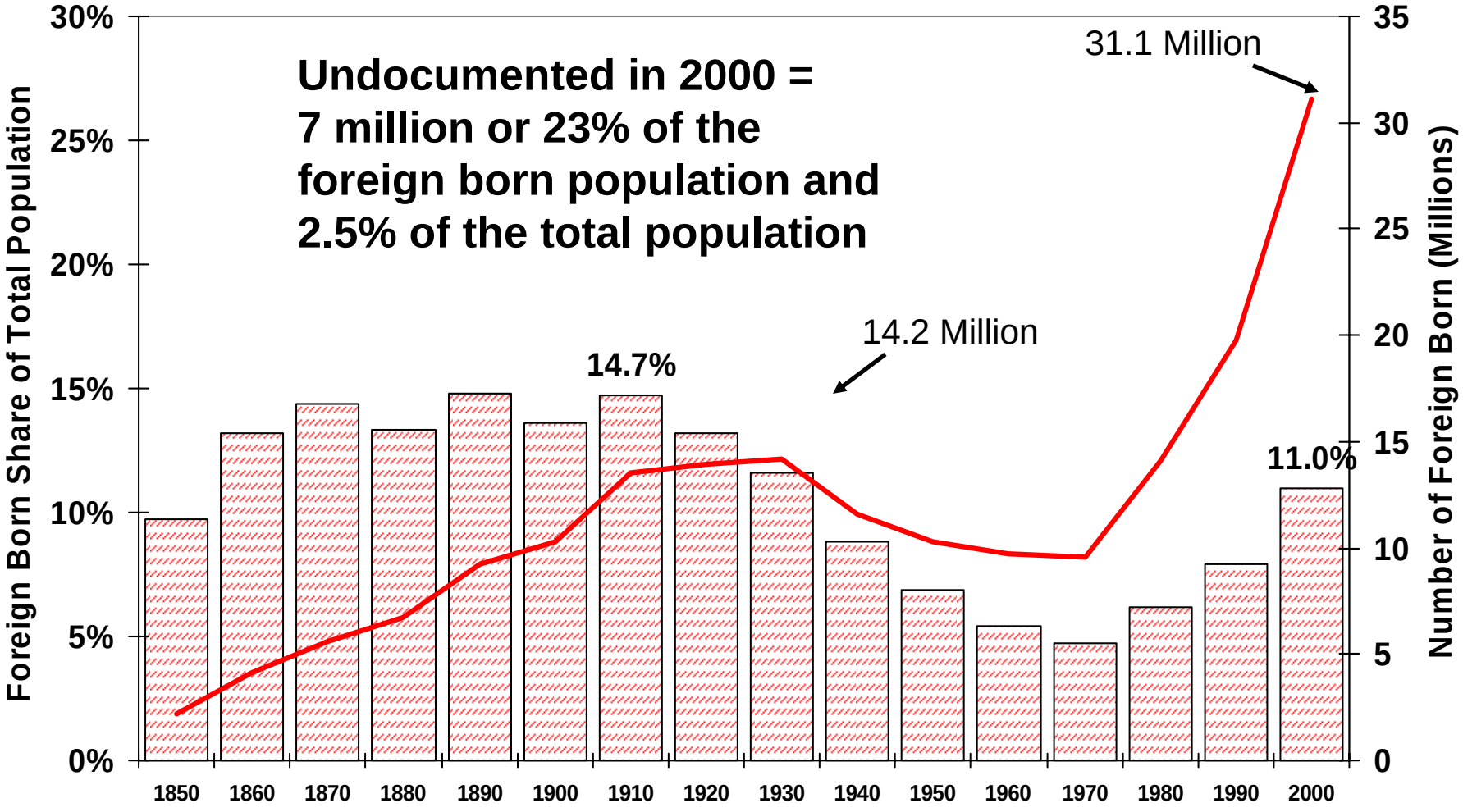
(Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see *www.census.gov/prod/cen2000/doc/sf3.pdf*)



* The net migration rate is based on an approximated 1995 population, which is the sum of people who reported living in the area in both 1995 and 2000, and those who reported living in that area in 1995 but lived elsewhere in 2000. The net migration rate is the 1995 to 2000 net migration, divided by the approximated 1995 population and multiplied by 1000.

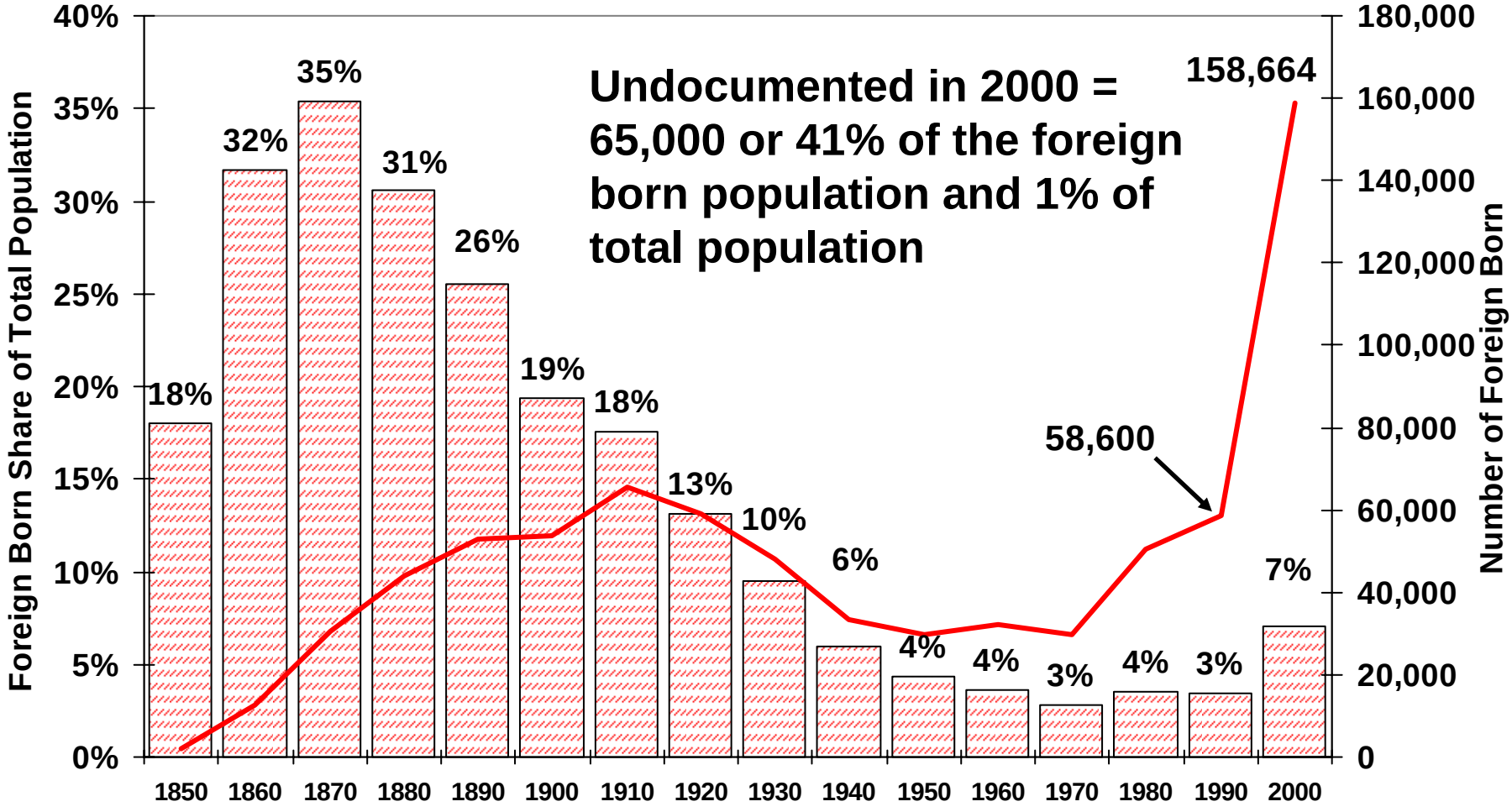
Source: U.S. Census Bureau, Census 2000.

U.S. Foreign Born Population: 1850 – 2000



Sources: Bureau of the Census, Immigration and Naturalization Service, BEBR Calculations.

Utah Foreign Born Population: 1850 – 2000



Sources: Bureau of the Census, Immigration and Naturalization Service, BEBR Calculations.

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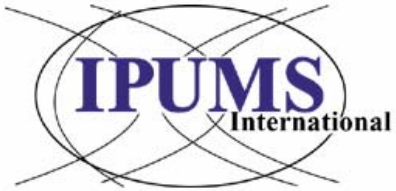

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http://www.ipums.umn.edu/usa/ Internet

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To be continued . . .