




# Foundations of Demography

URBPL 5/6010: Urban Analysis, University of Utah

Pam Perlich

Reading: Siegel, Chapter 1

Rev. 09/05/2006



# Applied Demography – Introduction to Scope & Methods

- Description of the discipline of applied demography
  - Examples of subject areas
  - Relevance to planners
- Overview of selected techniques, measures, and approaches
- Note: Chapter One provides a useful reference for terms, measures, and techniques. Many of these will be covered later in the course.



# Demography Defined

- “Demography is the scientific study of human population, or more specifically, the study of the size, geographic distribution, age-sex structure, and socioeconomic composition of populations and the factors that effect change in these dimensions of population, namely, fertility, mortality, and migration.”
- Siegel, page 1



# Socioeconomic Characteristics

- Household composition
- Marital Status
- Race and ethnicity
- Educational attainment
- Economic status
- Health status



# Applied Demography

- “The subfield of demography concerned with the materials and methods of demography to the **analysis and solution of the problems** of business, private nonprofit organizations, and government, at the local, national, and international levels, with a primary orientation toward particular areas and the present and future.” (Siegel, p. 2.)
- Most are not academics.



# What Applied Demographers Do

- Design, process, and analyze censuses and surveys
- Data analysis – administrative, survey, and other sources
- Population estimates and projections
- Marketing, site selection, human resources
- Labor force analysis
- Population dynamics – changes over time



# What Applied Demographers Do (continued)

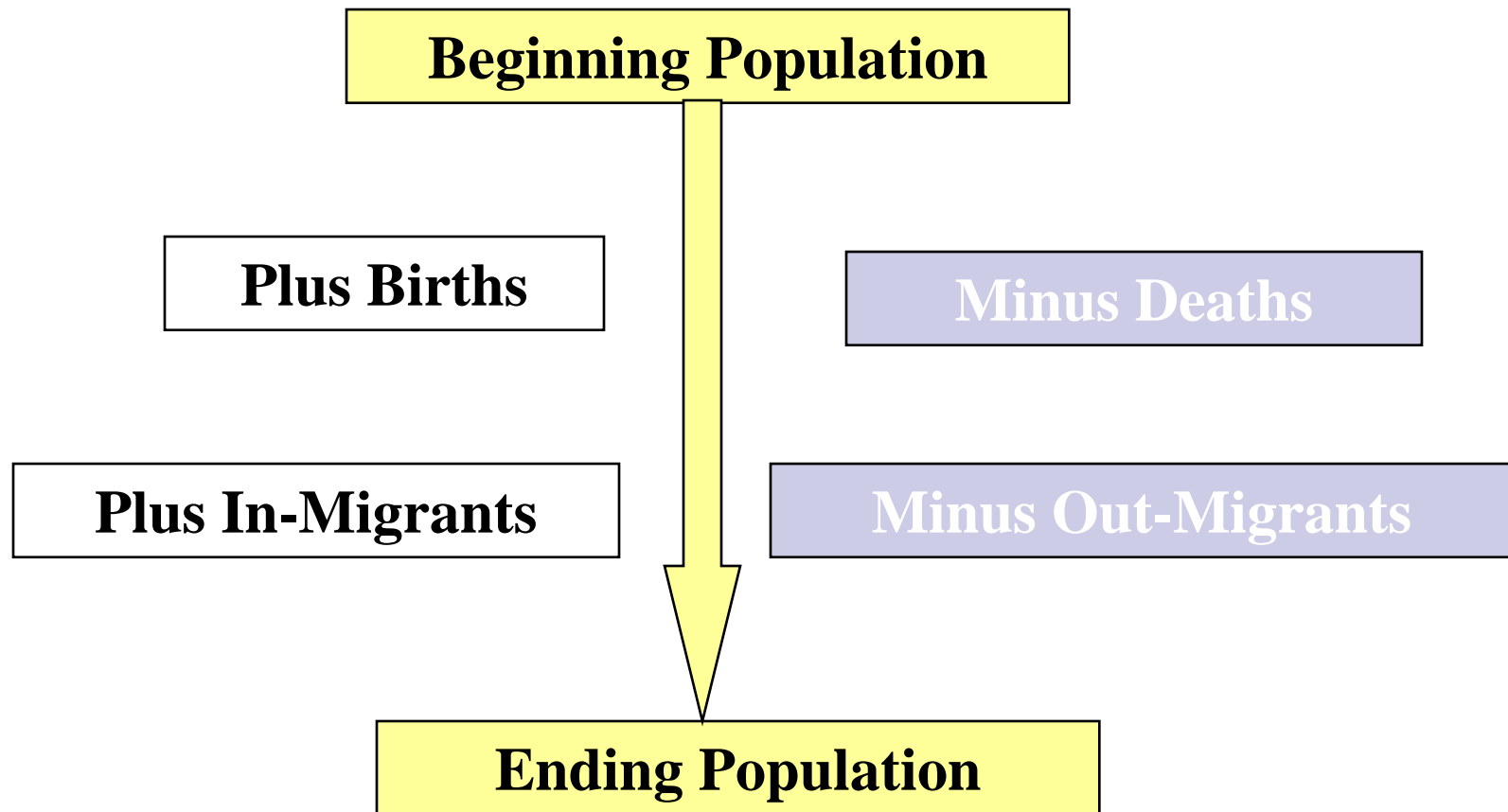
- State and local government planning applications, budgets, services, etc.
- Legal and political applications (school districts, political boundaries)
- Public policy analysis (social security, health care, etc.)
- Application of demographic methods to non-human populations (life tables for products or structures, etc.)



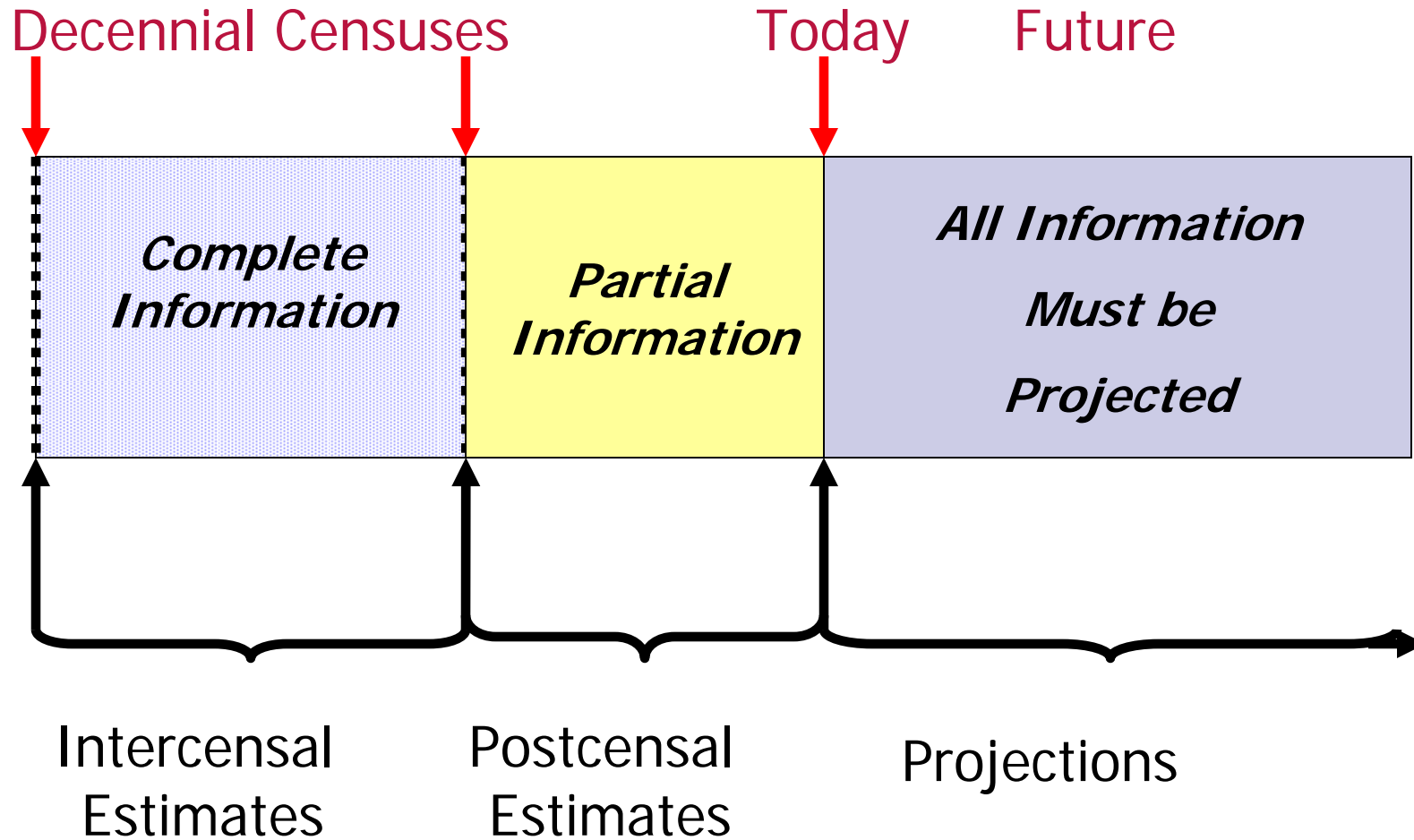
# Demography & Planning

- Size, location, age, and other characteristics of the population are essential information for planning
- Population estimates guide the delivery of current services
- Population projections guide infrastructure planning and budgeting

# Population Change



# Estimates and Projections





# Population Counts / Estimates

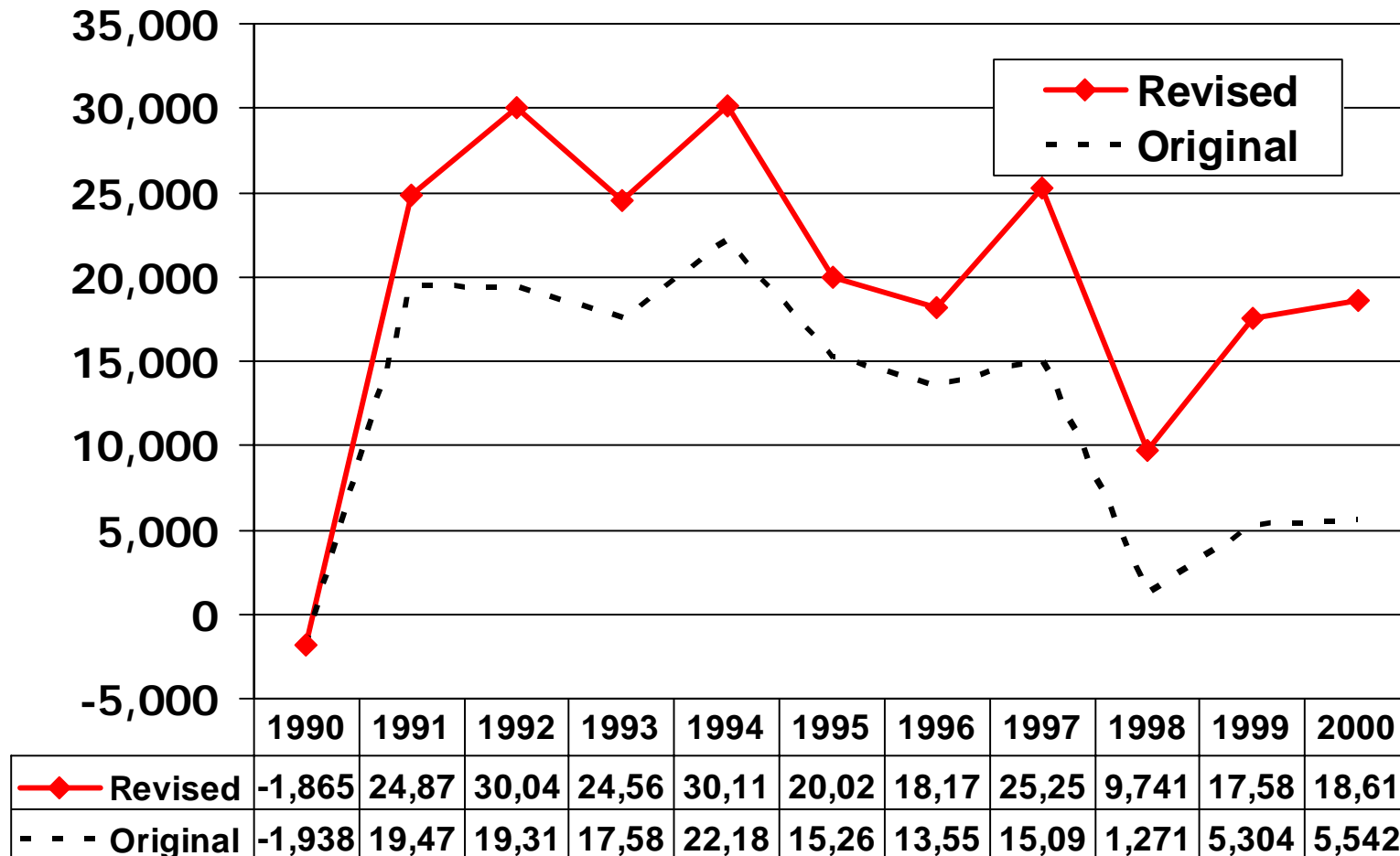
- The Decennial Census (every ten years) provides the most comprehensive information about the population.
- Between each Census, population is estimated using vital records and symptomatic data such as school enrollment. These are intercensal estimates.
- After each Census, population is estimated using vital records and symptomatic data. These are postcensal estimates.



# Population Projections

- While historical data and analysis is the basis, projections are based on forecasts of demographic trends.
- These include forecasts of fertility rates, mortality rates, and migration rates.
- The further into the future the projection is, the more uncertainty is associated with it.

# Utah Population Estimates Committee Net Migration: Original and Revised





# Why the Underestimation?

- Methods did not adequately capture changes in the structure of the population
- Given vital records (births and deaths), population estimation focuses on **migration**.
- Symptomatic data for migration did not track migrants as it had in the past.



# Migration Indicators

- School enrollment
  - Housing permits
  - IRS exemptions
  - LDS membership
- 
- These did NOT maintain a constant relationship with new populations. Why?



# New Utah Residents in the 1990s

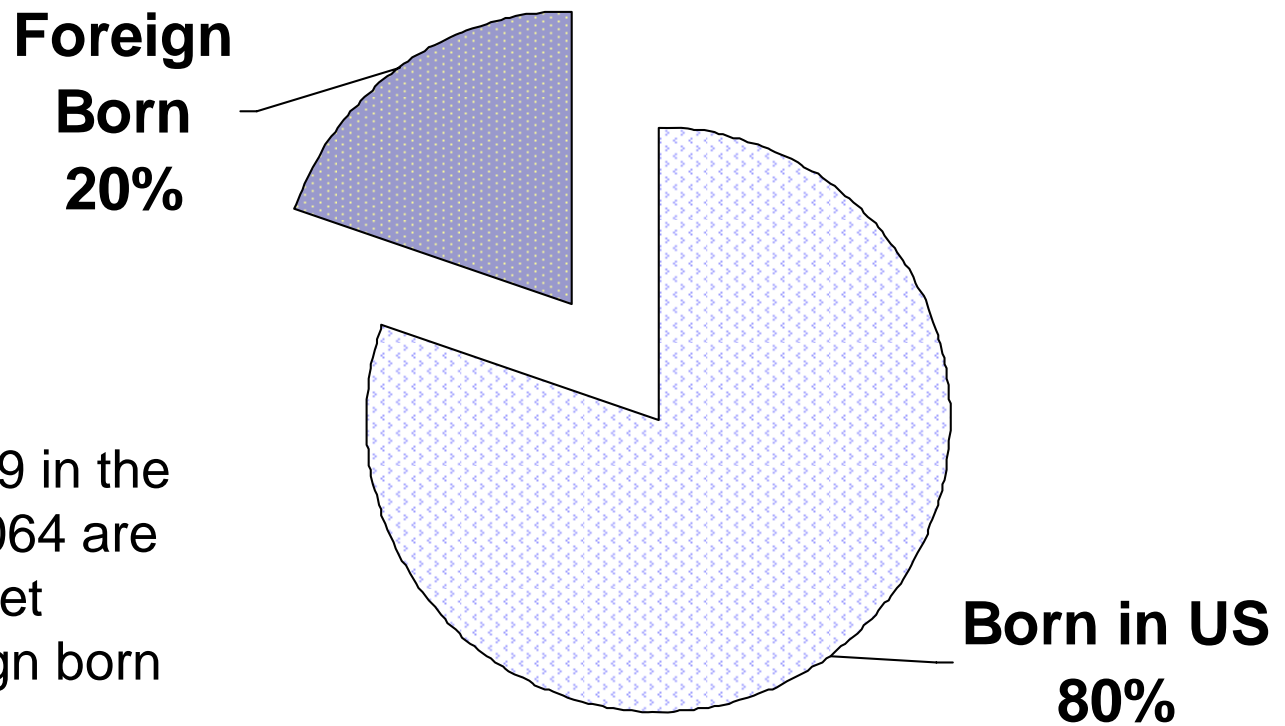
- International migrants
- Disproportionately
  - Male
  - Working age
  - Few children
  - Large households
  - Not LDS
- → Underestimation of migration



# Policy Implication of Trends

- Education
- Health Care
- Work force
- Language
- Standard of living
- Culture
- Legal barriers

# Foreign Born Contribution to Utah Population Increase: 1990-2000



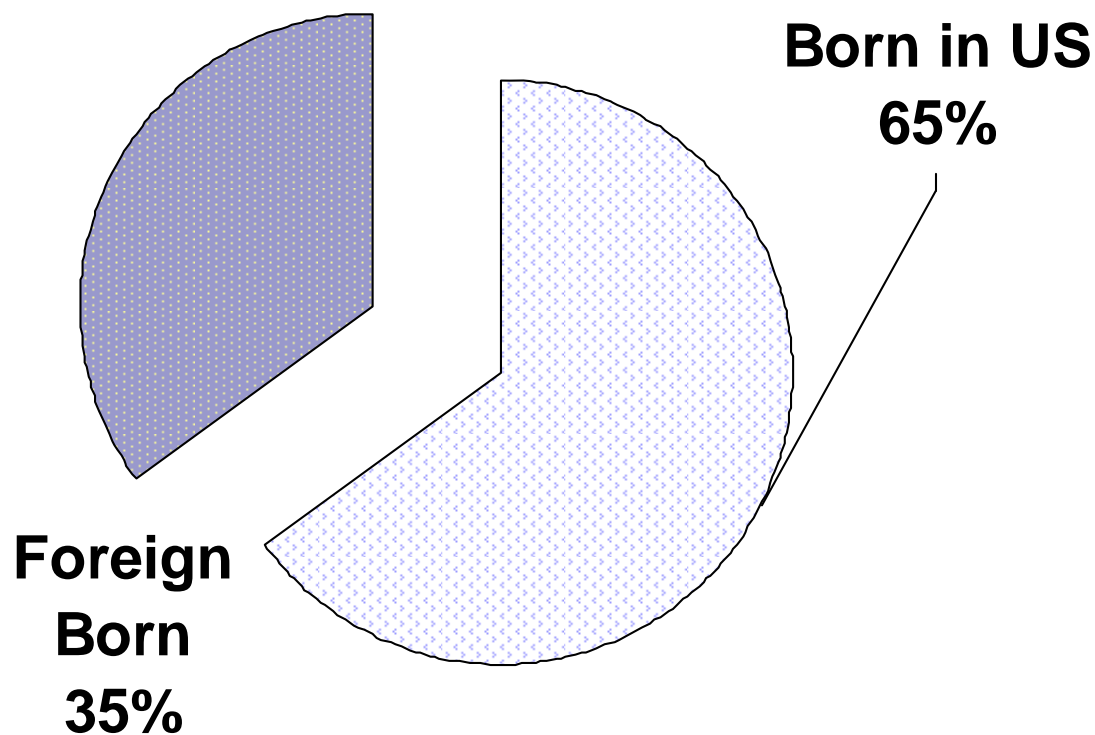
The Utah population increased by 510,319 in the 1990s. Of this 100,064 are accounted for by a net increase in the foreign born population.

# 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.

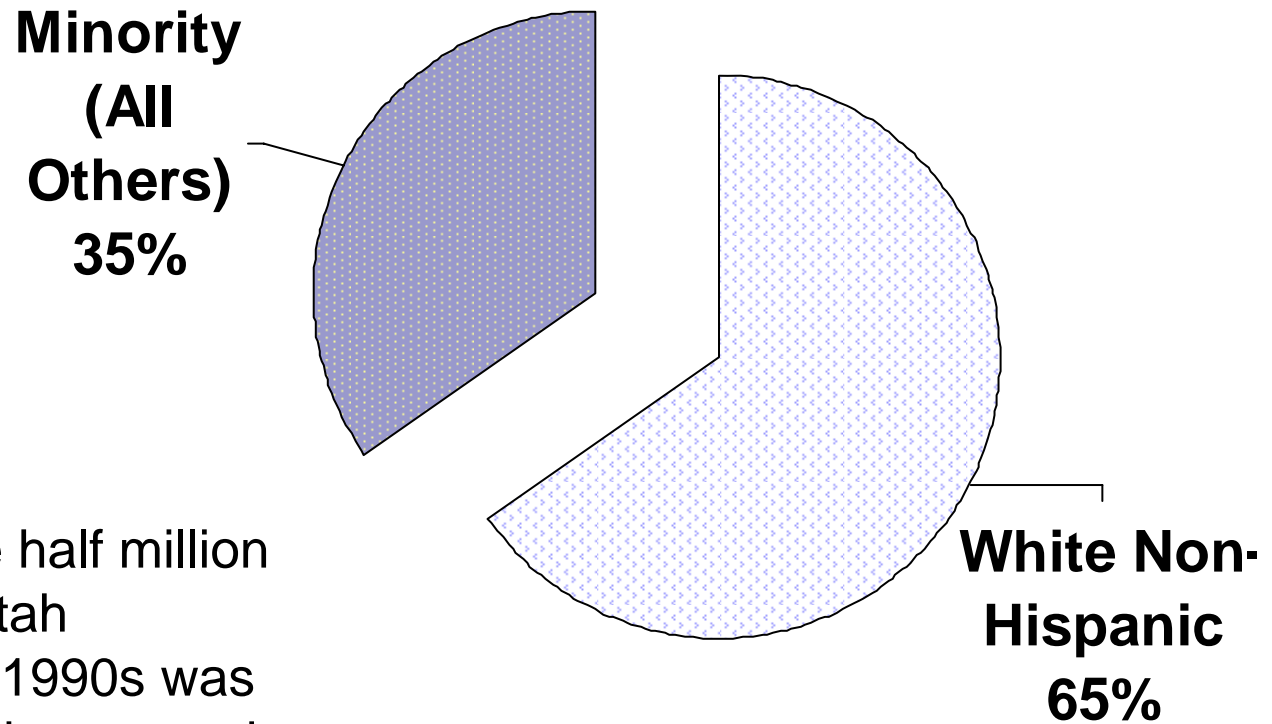
The results:

- US population is younger compared to other developed countries.
- US population growth is more rapid than other developed countries.



# Utah Population Increase: 1990-2000

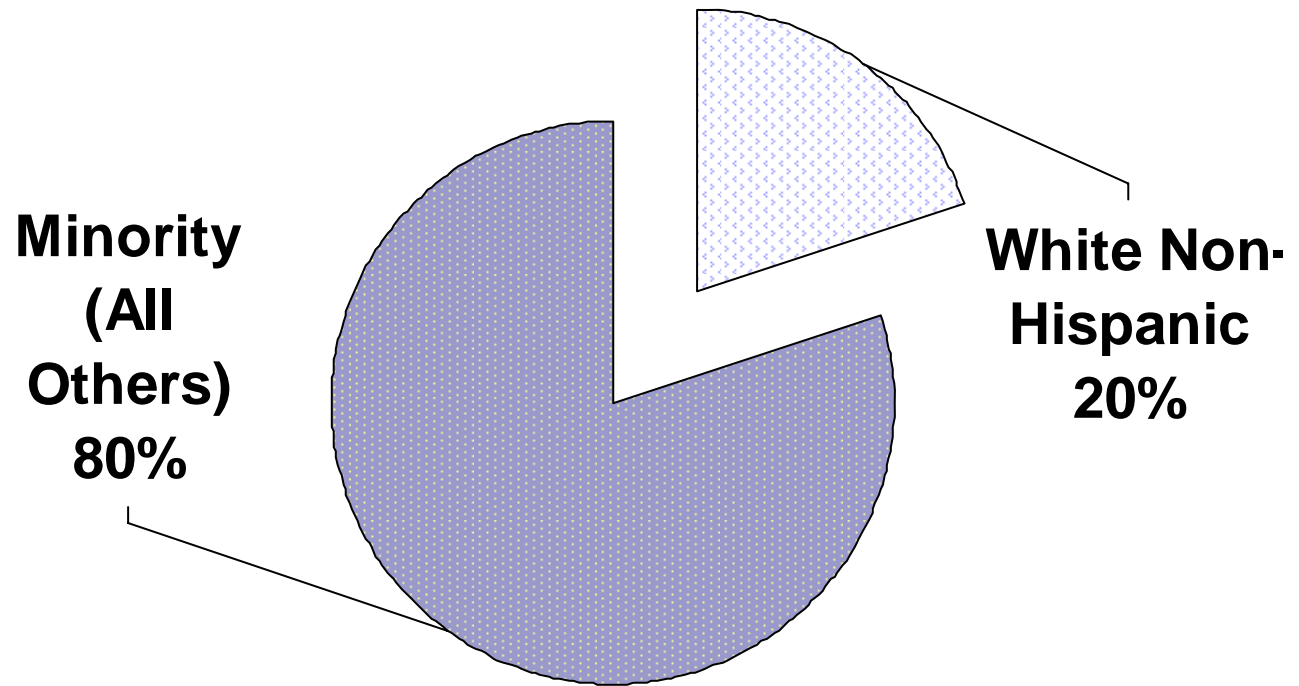
## Minority Contribution



About 35% of the half million increase in the Utah population in the 1990s was accounted for by increases in the minority population.

# U.S. Population Increase: 1990-2000

## Minority Contribution



Minorities contributed 80% of the nation's population growth over the 1990s.



# Cohort

- A group of people who have a common initial demographic characteristic
  - Birth
  - Entry into school
  - Year of entry (immigrants)
- Age group (school age population) contains a different group of people every year (e.g., school age population)
- Cohort contains the same population over time (Baby Boomers, Echo Boomers, etc.)
- Generation refers to a particular cohort (Generation X)



# Interacting Effects

- Cohort

- Generational – Baby Boom

- Period

- Historical experiences – Great Depression

- Age-cycle or life cycle

- Behavior / experiences vary over the course of a lifetime

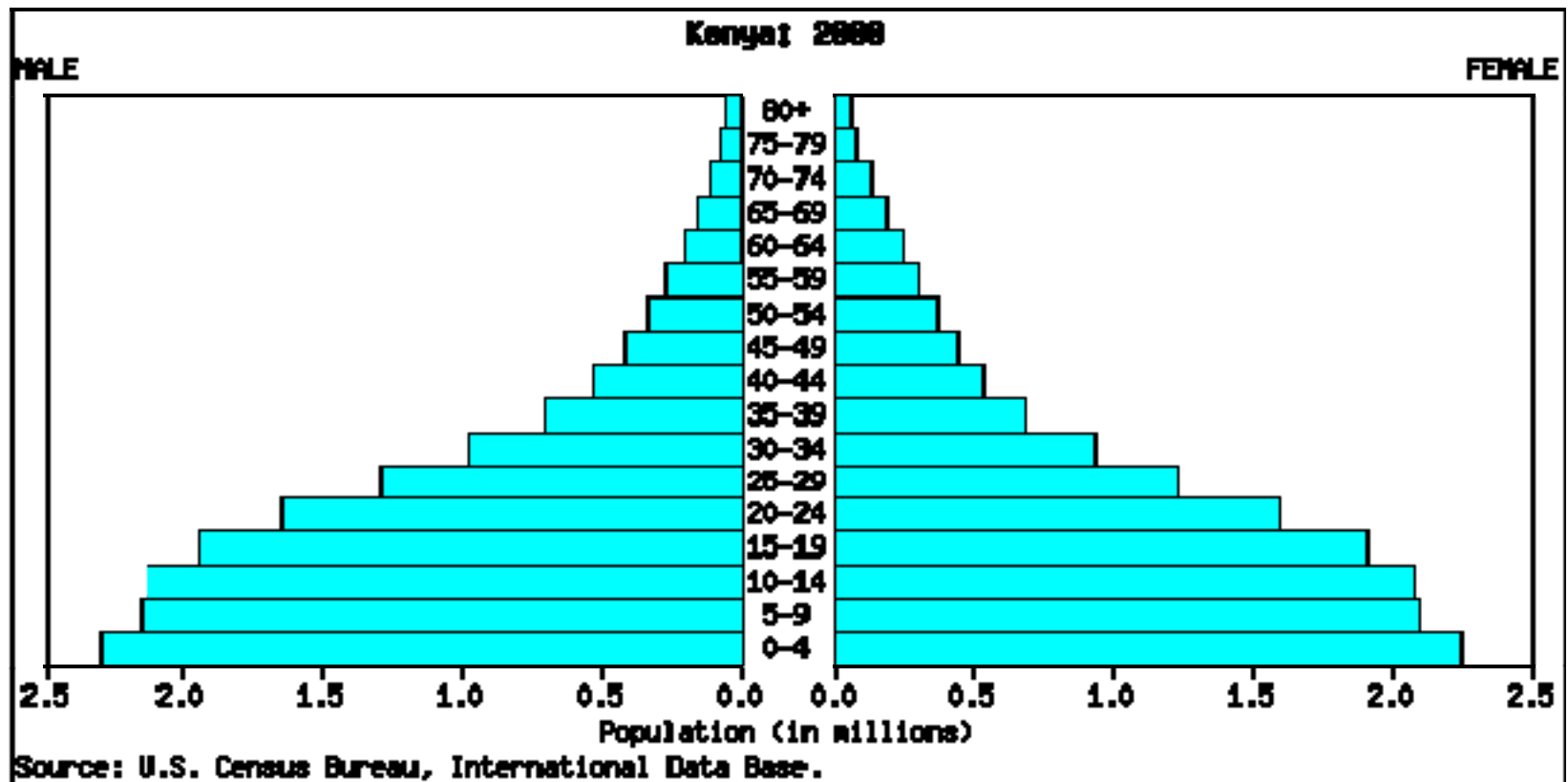
**EXAMPLES:** Savings behavior, fertility



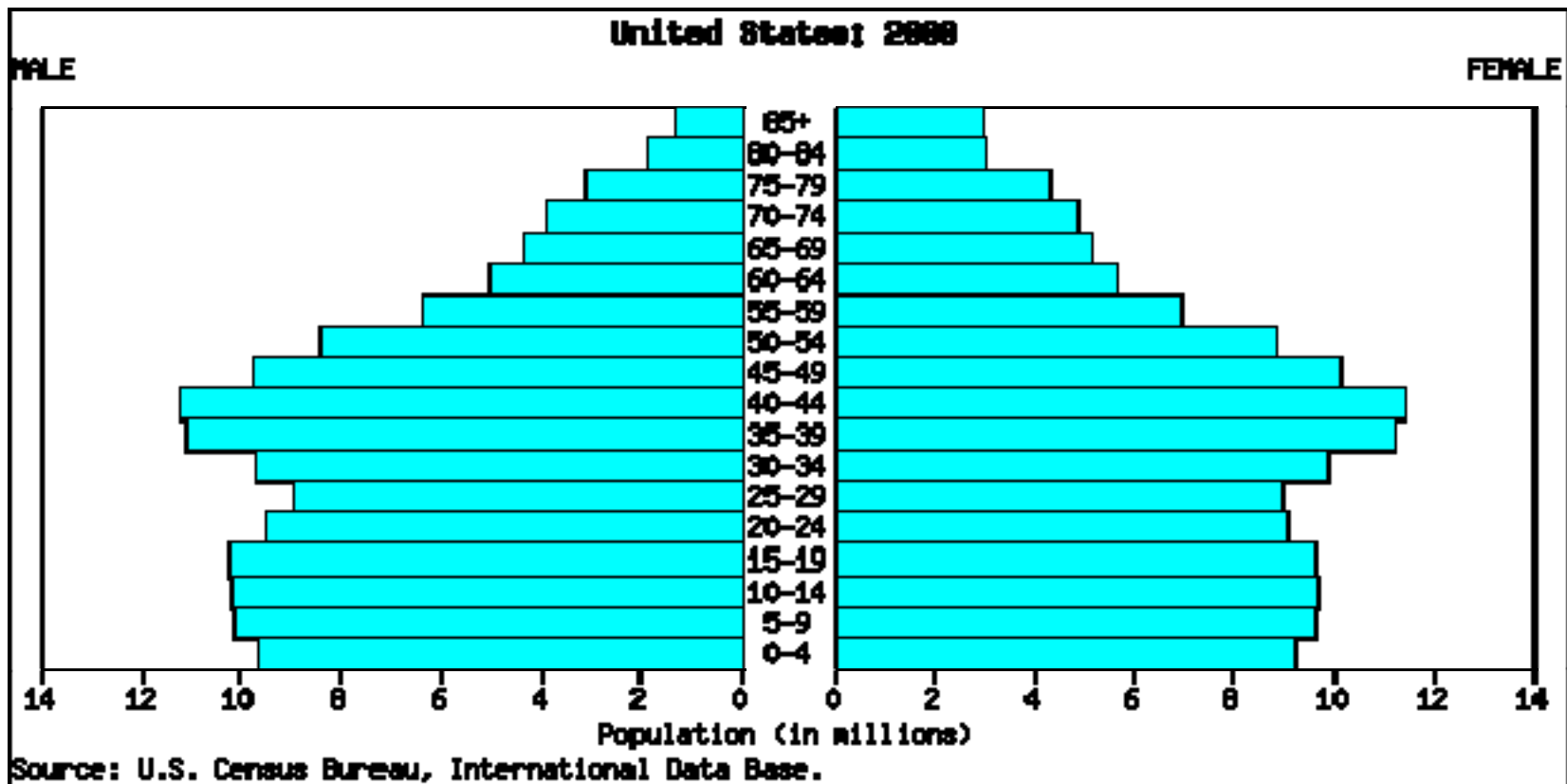
# Population Pyramids ↔ **Age Structure**

- These show the age and sex distribution of the population at a point in time.
- “Christmas tree” shape => rapid growth and young population
- “Square” shape => higher median and and slower growth

# Fast Growth



# Slow Growth



# Negative Growth

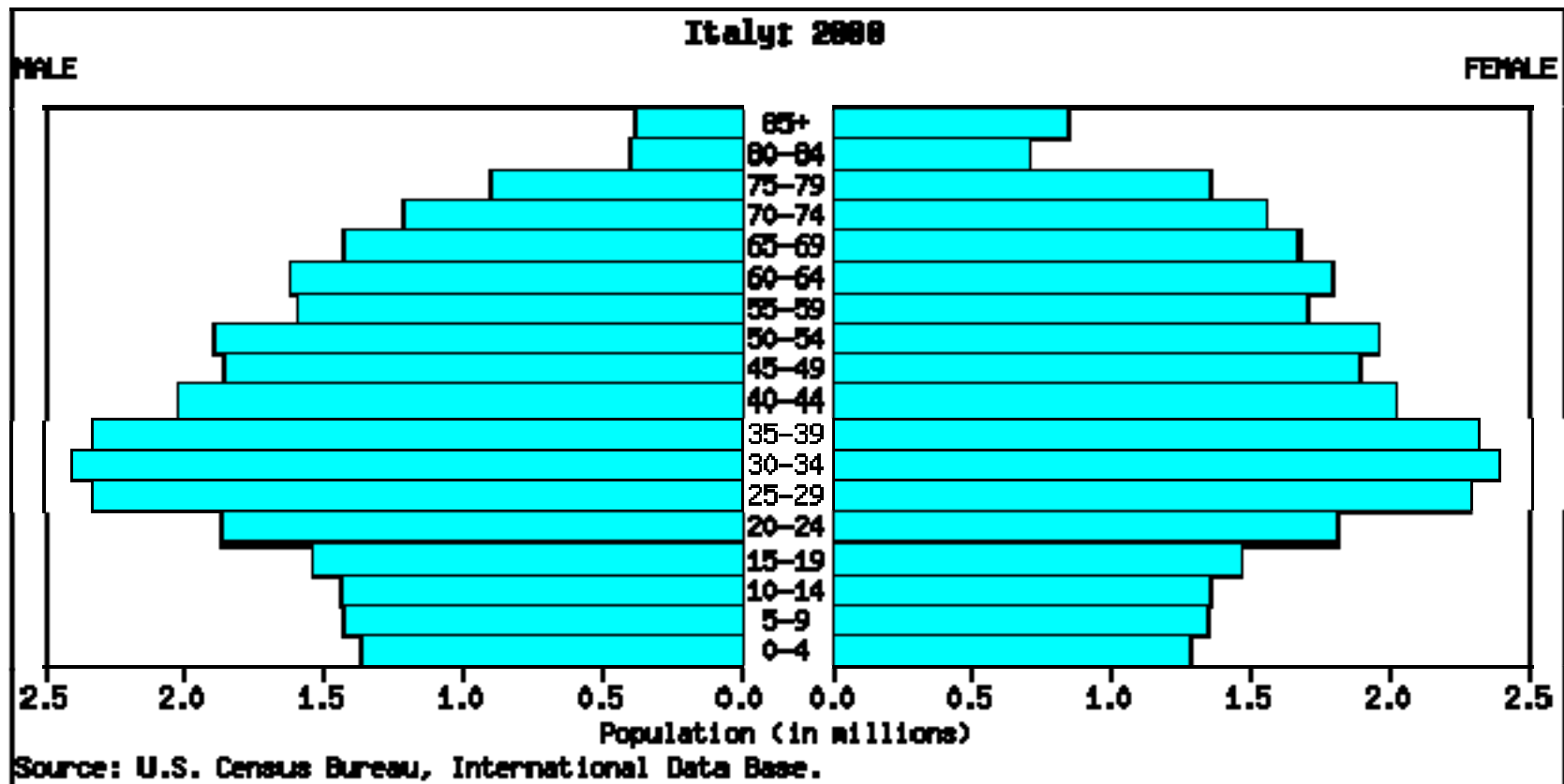
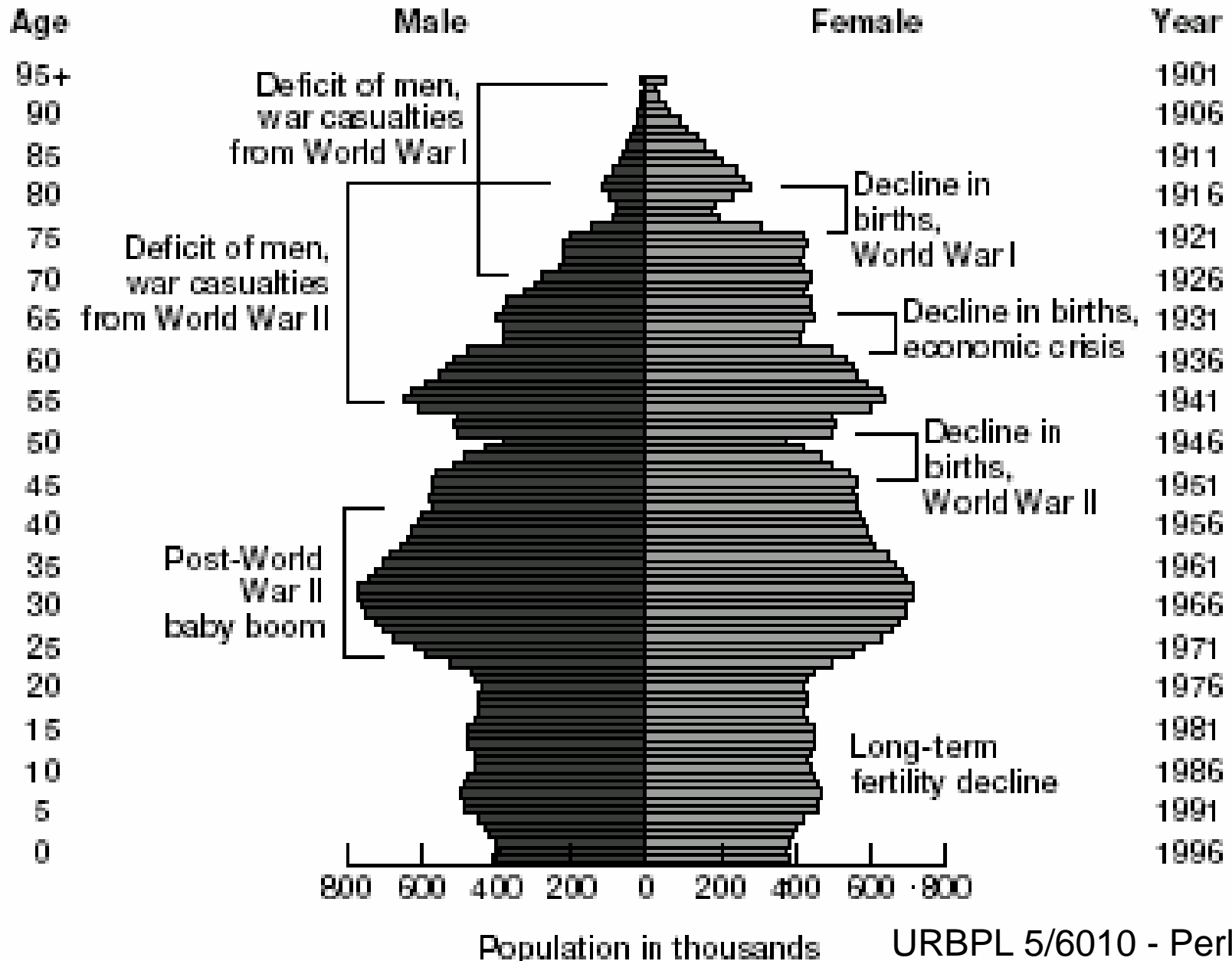




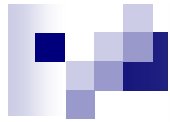
Figure 1

# Germany's Population by Age and Sex, 1996

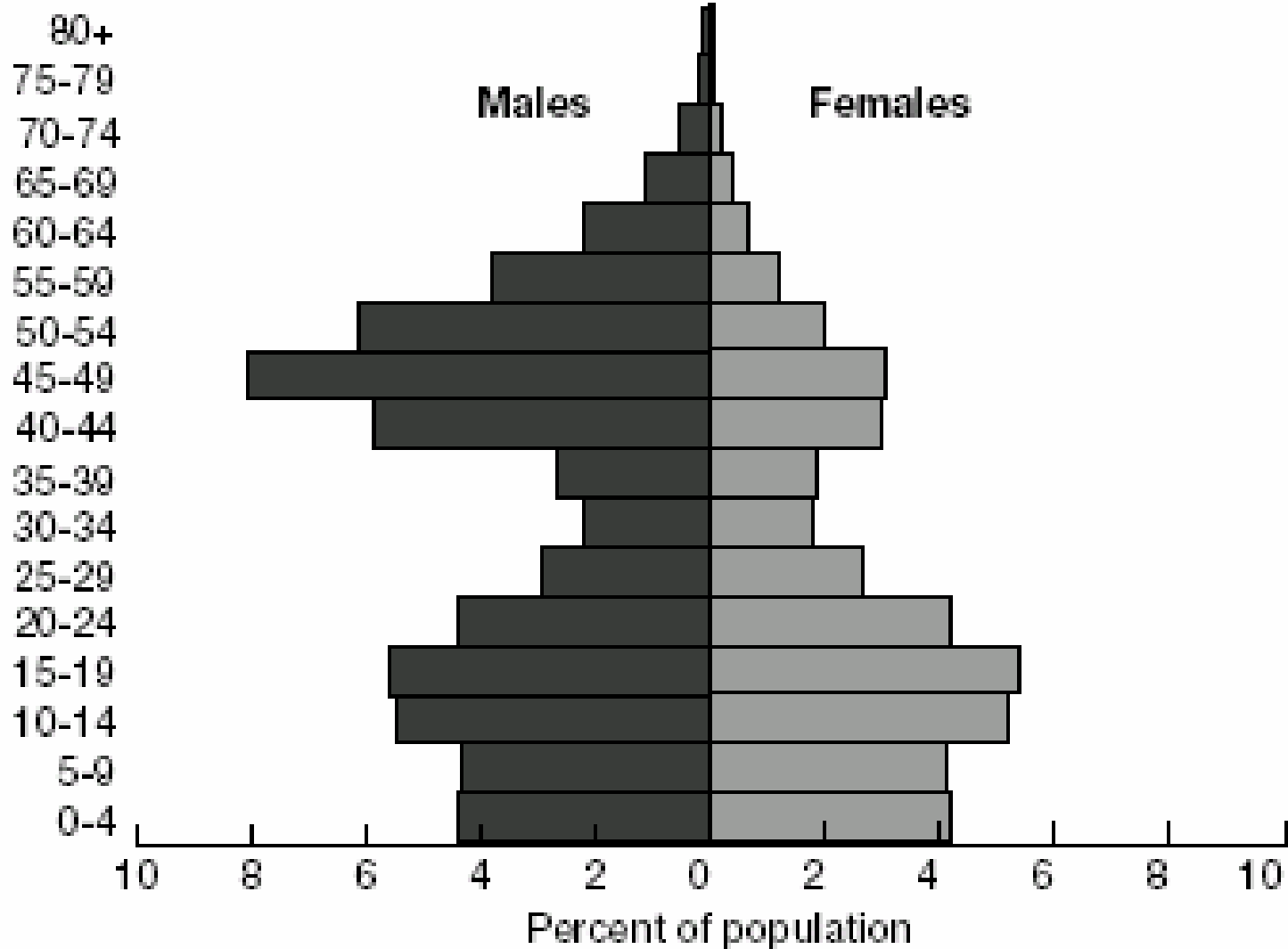


Source: PRB, Population Bulletin, V58, N4, p27.

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# Population of the United Arab Emirates, by Age and Sex, 2000

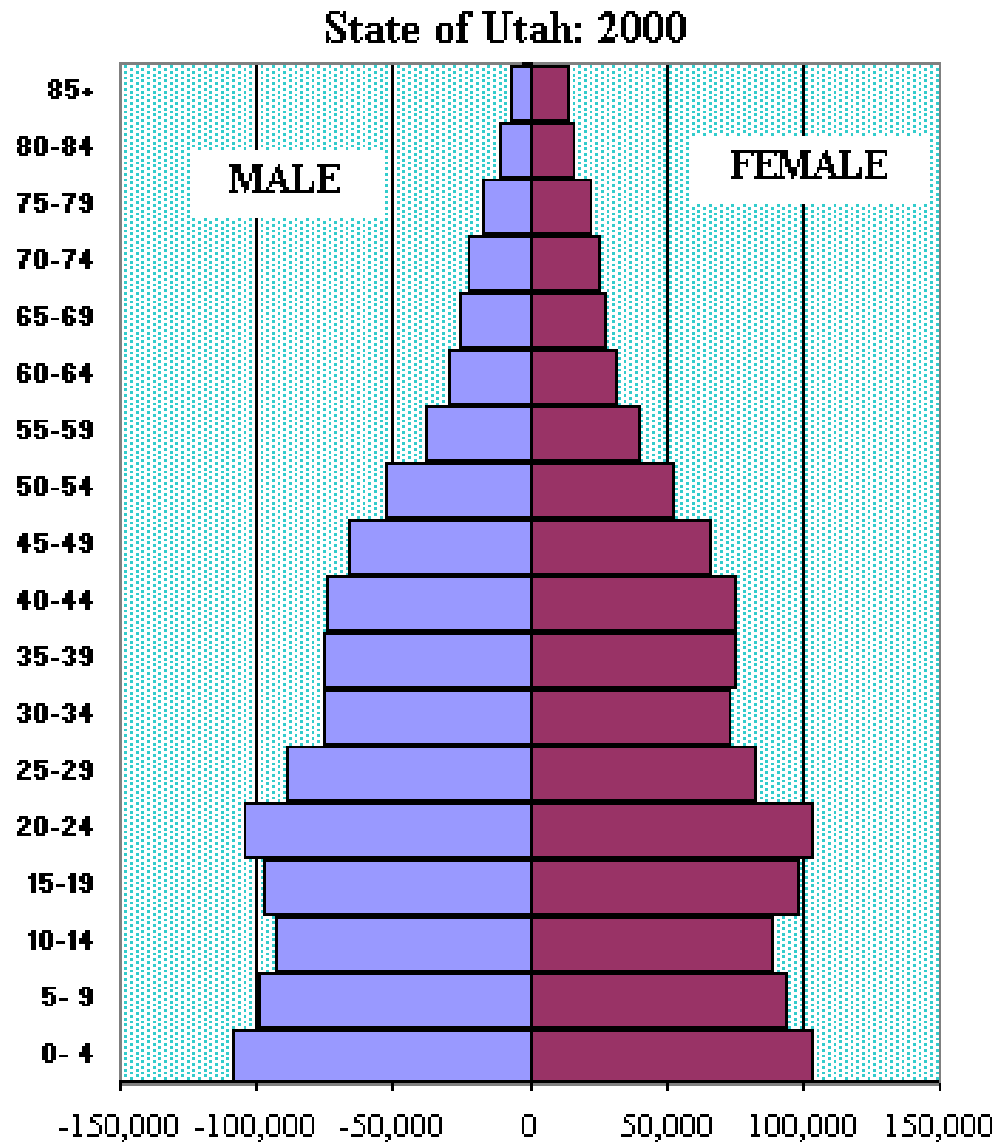


Source: U.S. Census Bureau, International Data Base (updated July 17, 2003; [www.census.gov/ipc/www/idbpyr.html](http://www.census.gov/ipc/www/idbpyr.html), accessed Sept. 30, 2003).

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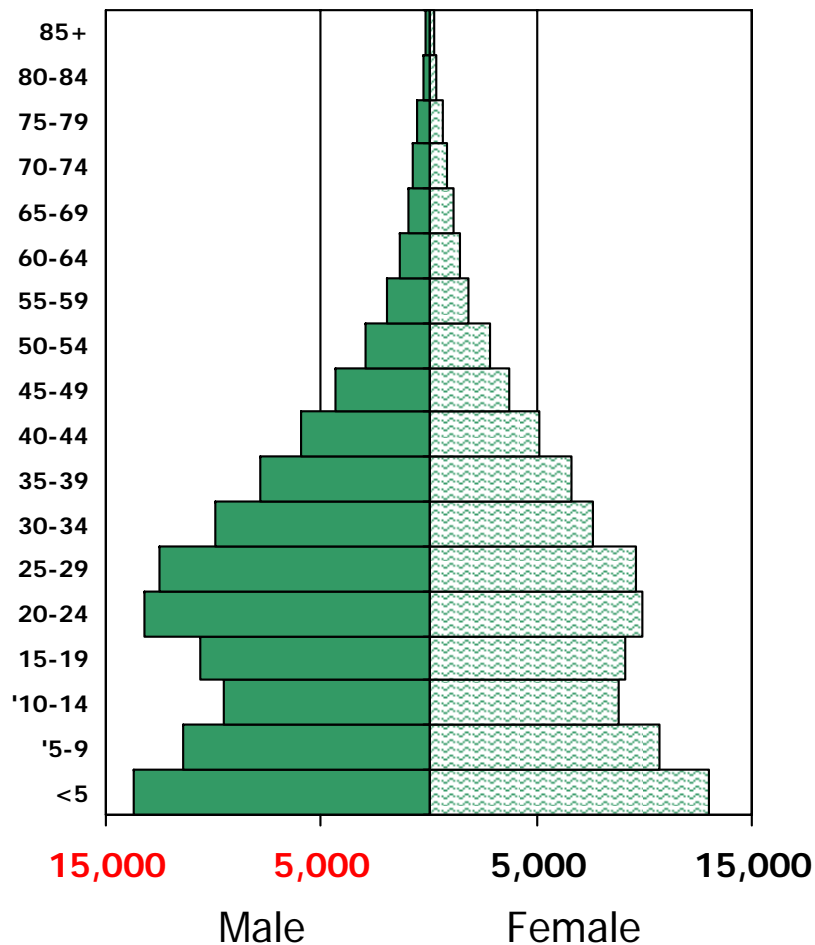
Source: PRB, Population Bulletin, V58, N4, p28.

# Utah

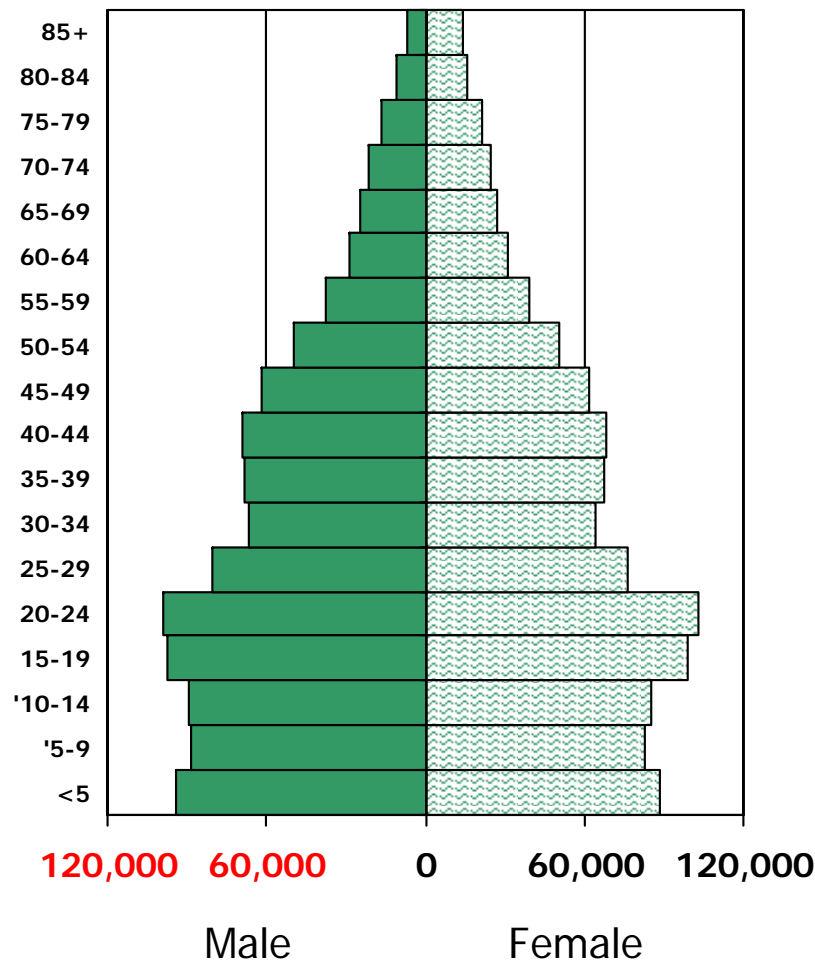


# Utah Age & Sex Distributions x Ethnicity (2000)

## Hispanic



## Not Hispanic

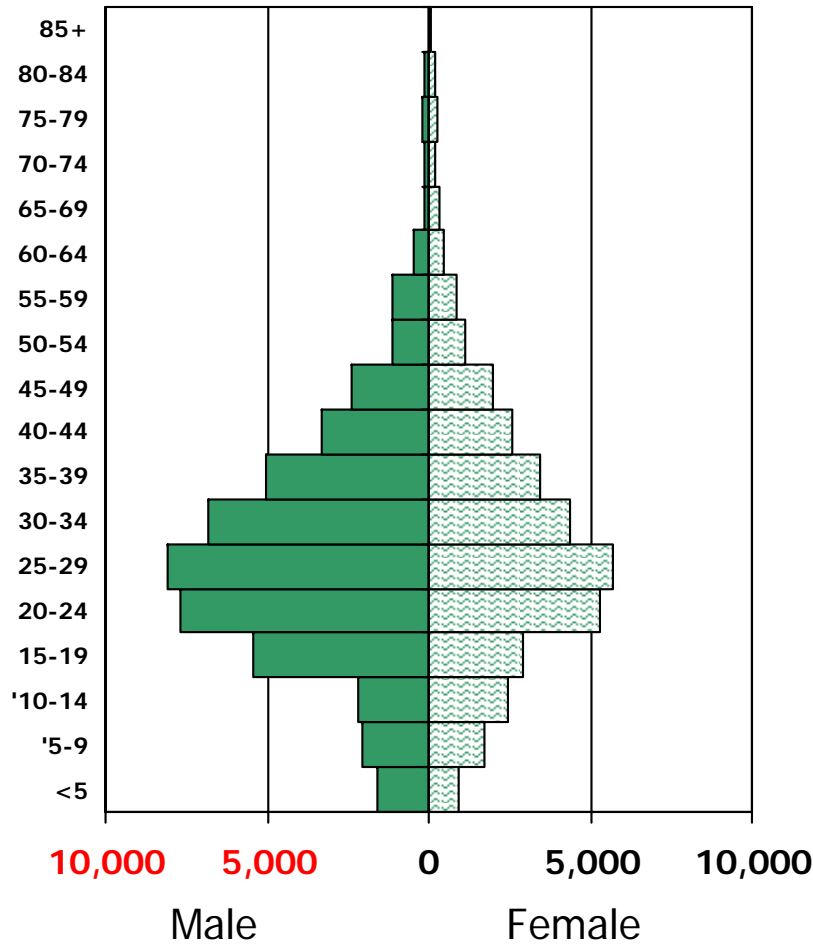


Source: BEBR, University of Utah analysis of Bureau of the Census data, Census 2000, SF4.

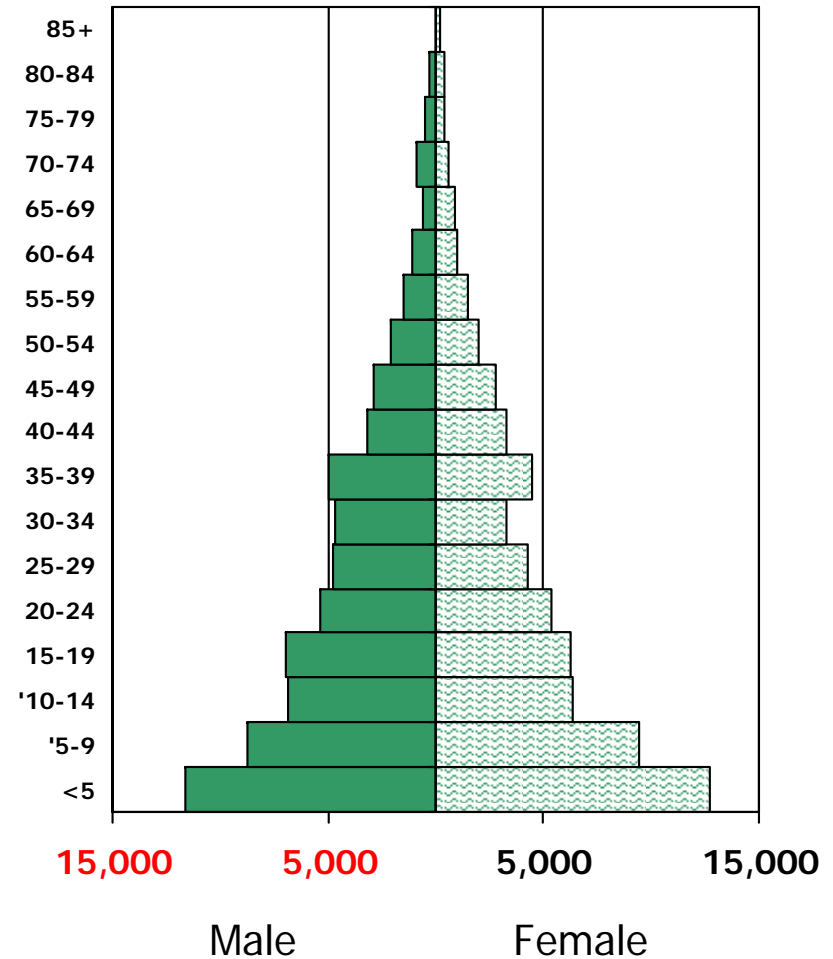
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# Utah Hispanic Age & Sex Distributions x Nativity (2000)

## Foreign Born

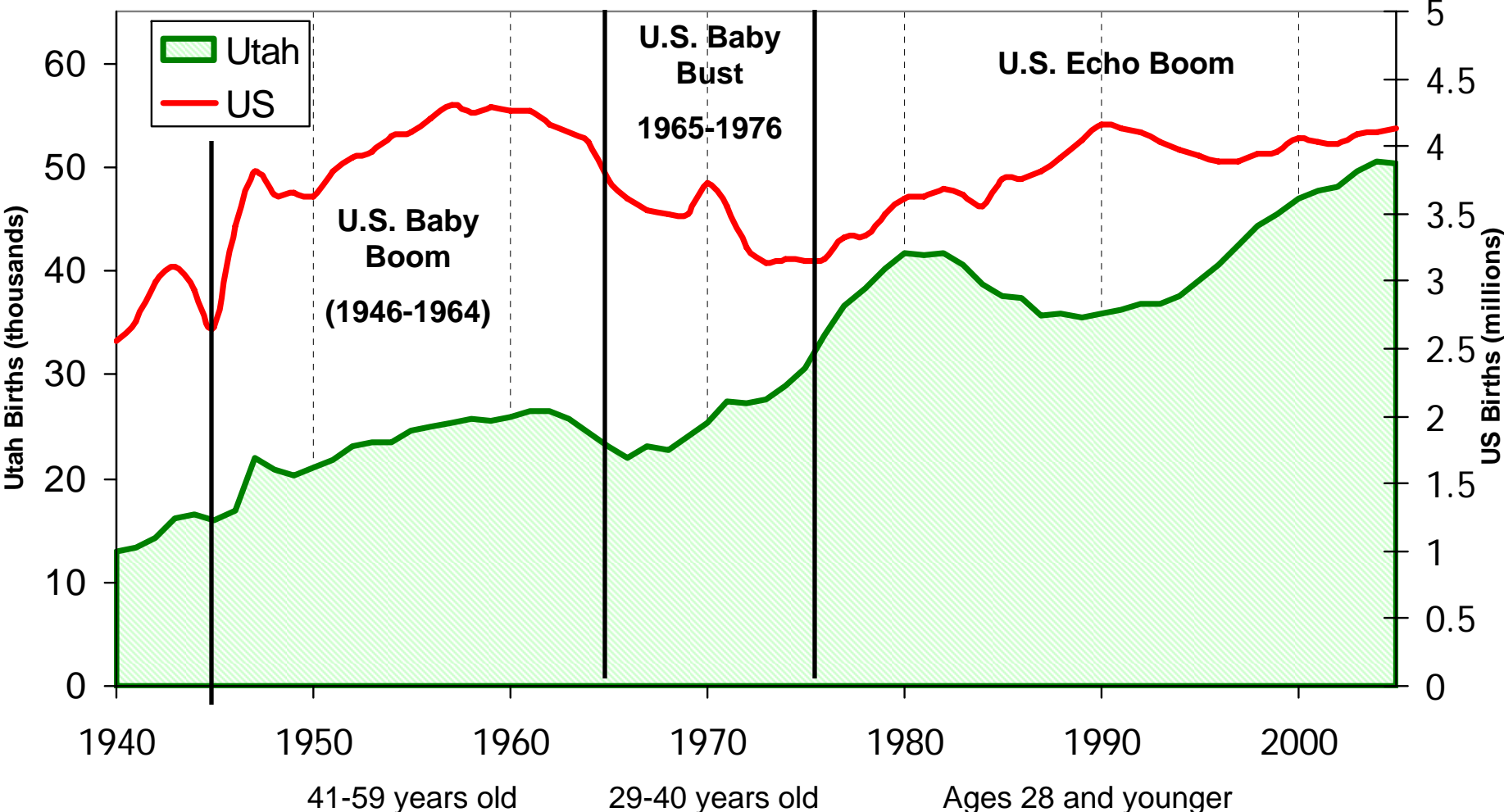


## Native Born



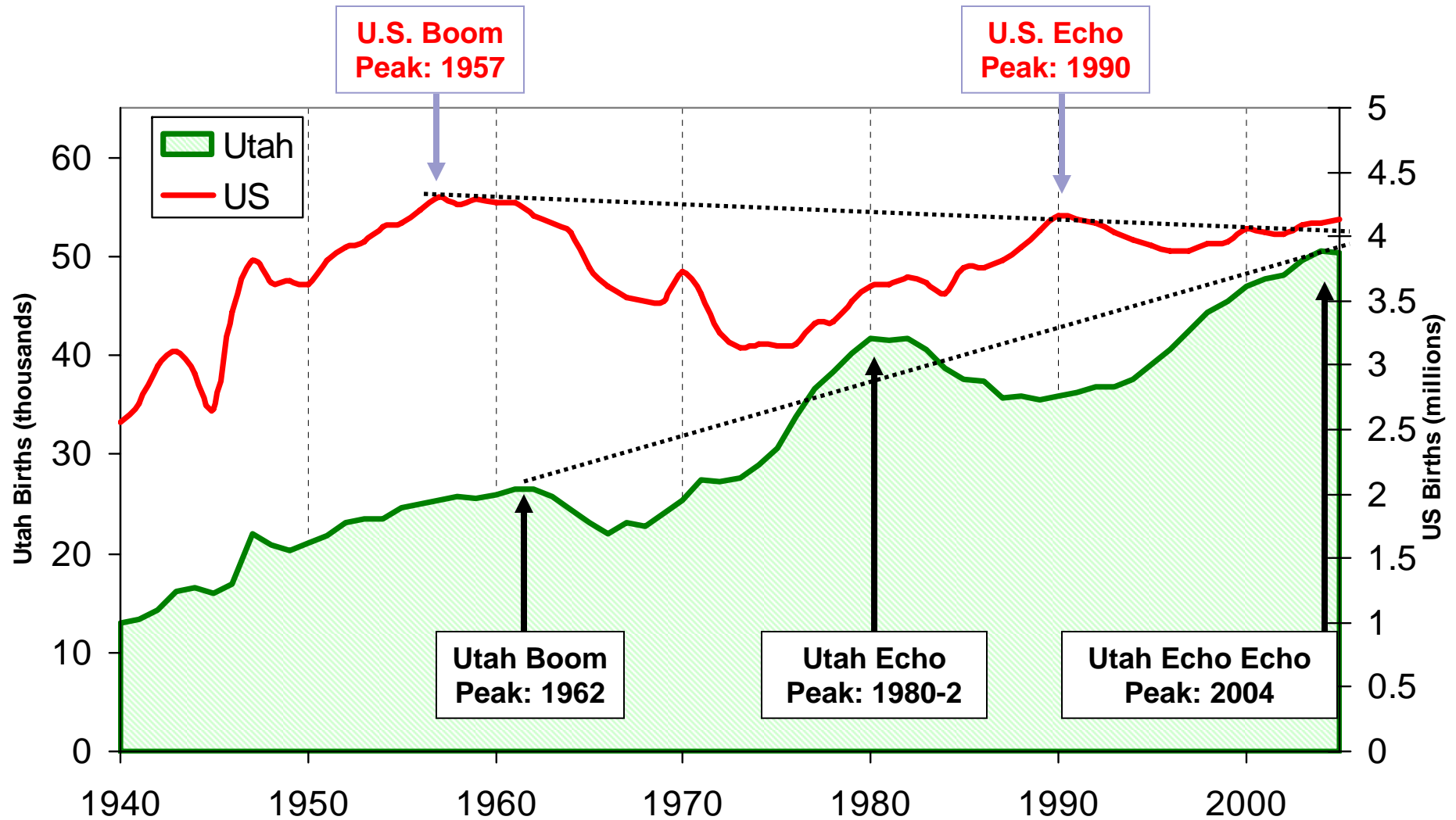
Source: BEBR, University of Utah analysis of Bureau of the Census data, Census 2000, 5% PUMS.  
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# Utah and U.S. Annual Births: 1940-2005



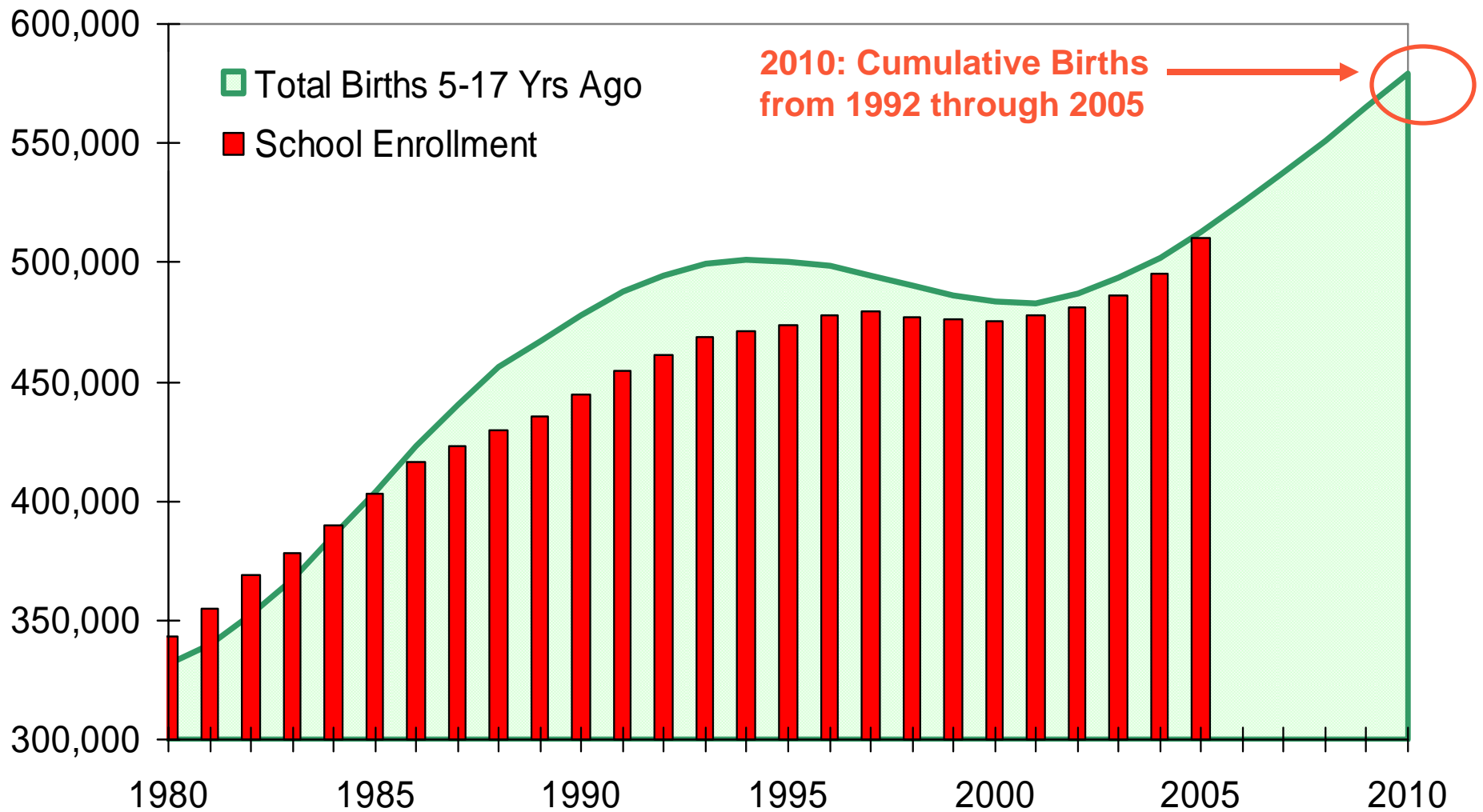
Source: BEBR analysis of data from the Utah Population Estimates Committee and the National Center for Health Statistics.

# Utah and U.S. Annual Births: 1940-2005



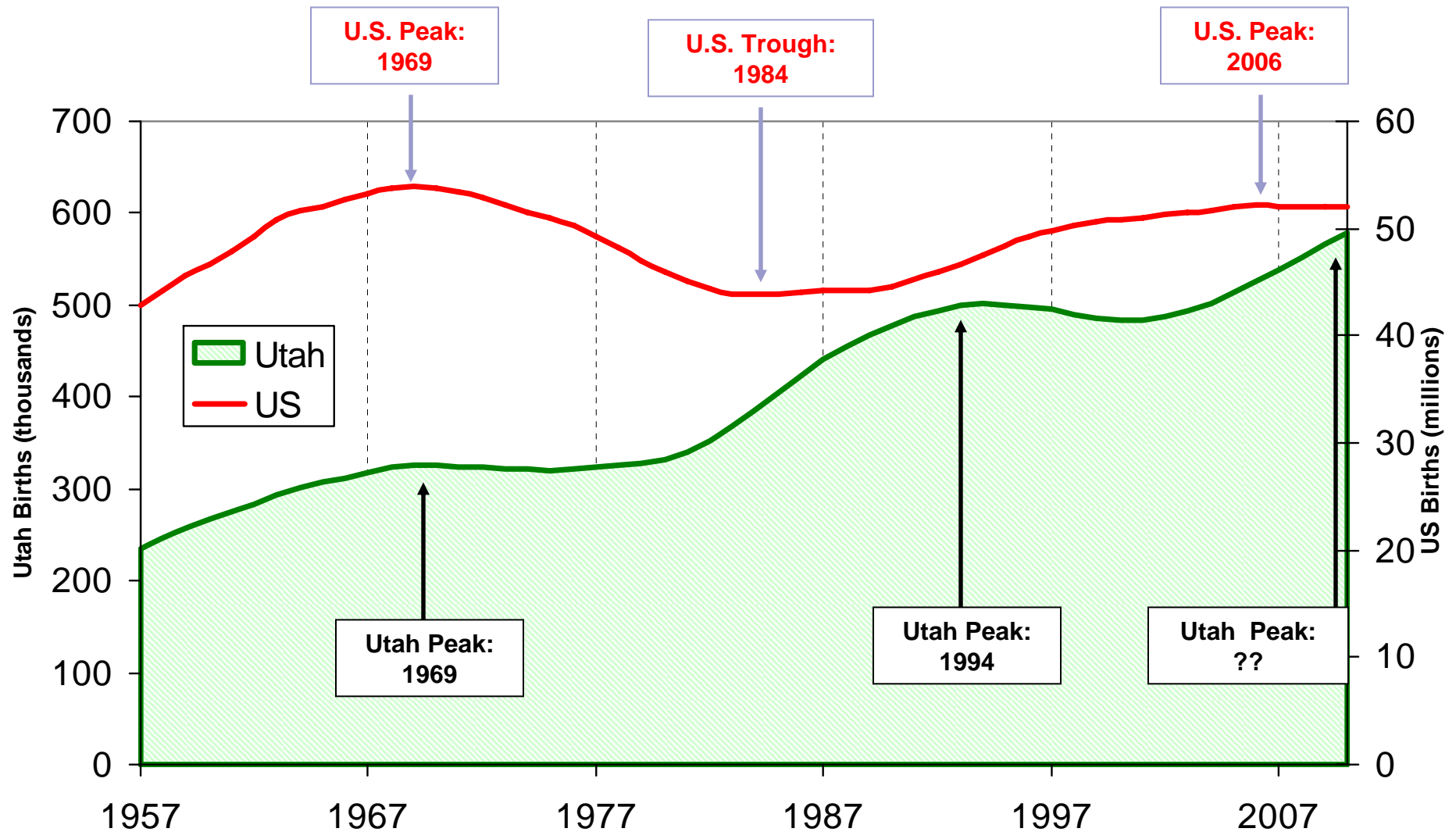
Source: BEBR analysis of data from the Utah Population Estimates Committee and the National Center for Health Statistics.

# Utah School Enrollment and Births 5 - 17 Years Prior



Sources: Patricia Murphy, Utah State Office of Education, Finance and Statistics; Utah Population Estimates Committee.

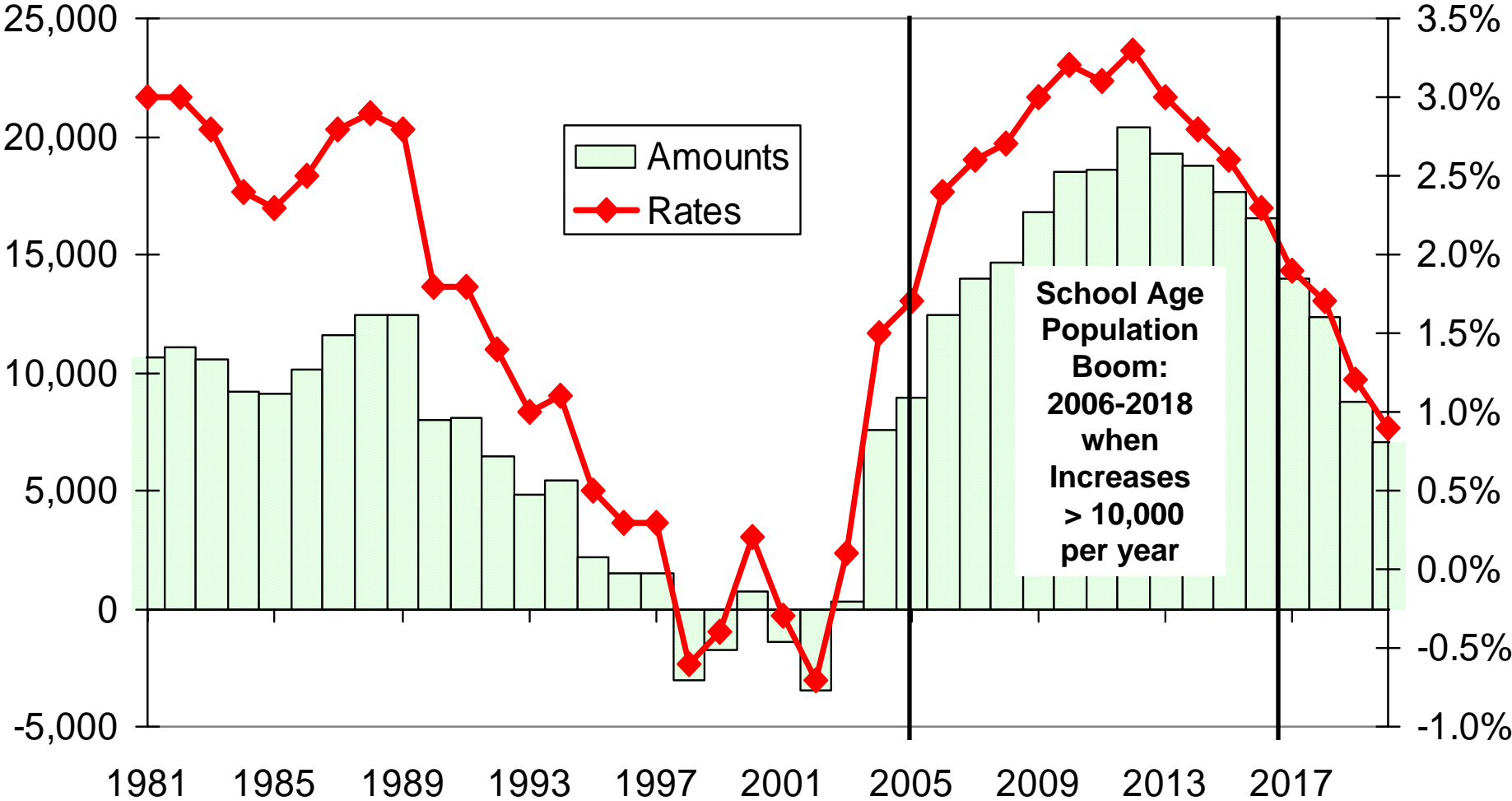
# Utah and U.S. Annual Births: 5 - 17 Years Prior



Source: BEBR analysis of data from the Utah Population Estimates Committee and the National Center for Health Statistics.

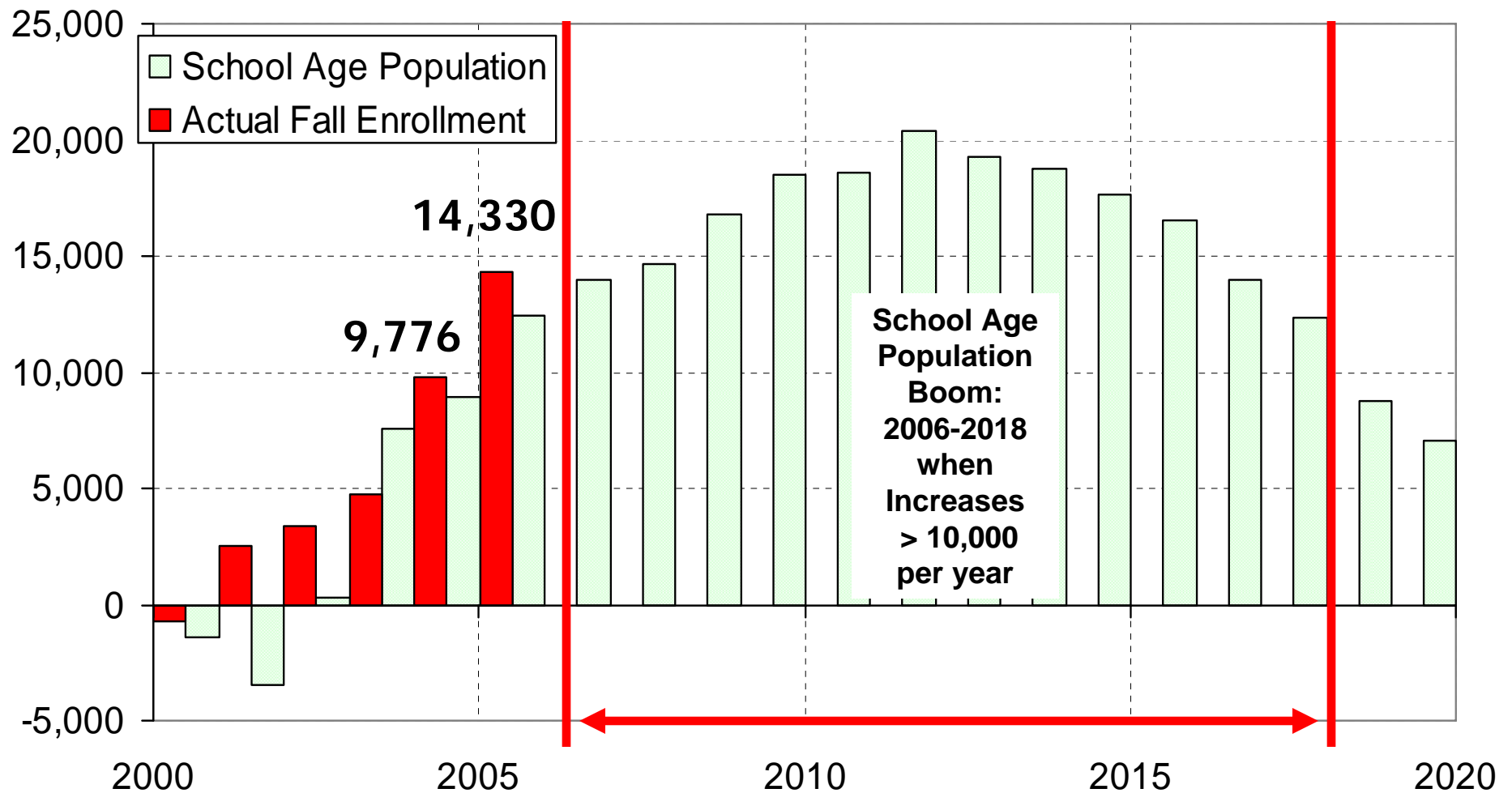
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# Year-Over Amounts and Rates of Change in the Utah School Age Population



Source: Perlich and Reeve, "The Coming Boom in Utah's School Age and College Age Populations," *Utah Economic and Business Review*, 2002.

# Annual Change in Enrollment Exceeded 10,000 in 2005: *The Boom is On*



Sources: Patricia Murphy, Utah State Office of Education, Finance and Statistics; and Perlich and Reeve, "The Coming Boom in Utah's School Age and College Age Populations," *Utah Economic and Business Review*, 2002.

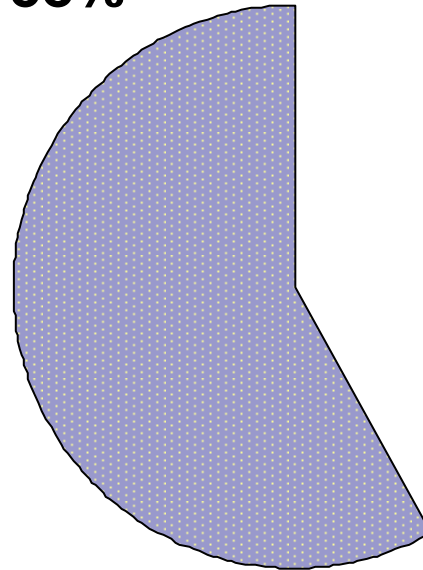
# Utah School Enrollment Increase: 2000 -2005

Enrollment Growth  
from 2000 to 2005:

Total: 34,743

Hispanic: 20,188

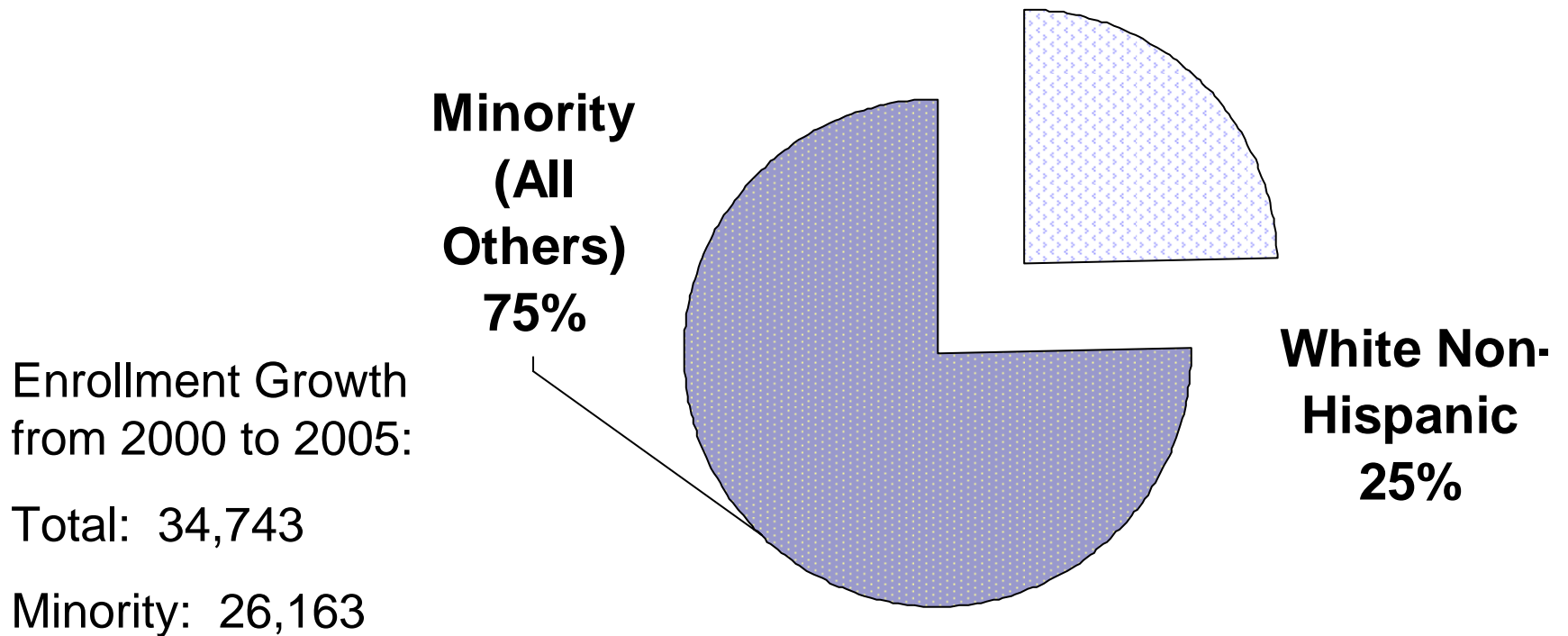
**Hispanic**  
**58%**



**Not  
Hispanic**  
**42%**

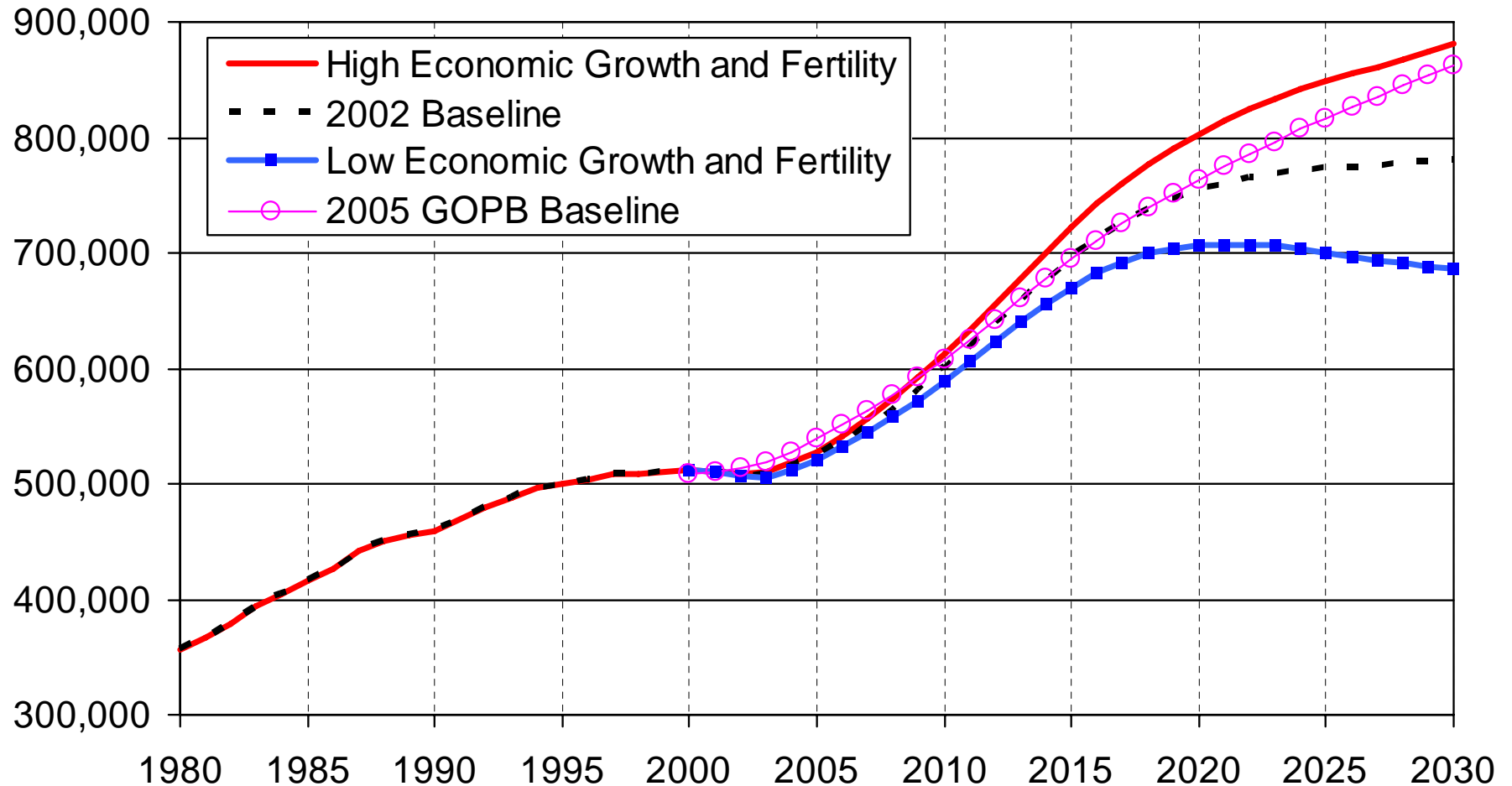
Source: Patricia Murphy, Utah State Office of Education, Finance and Statistics.

# Utah School Enrollment Increase: 2000 -2005



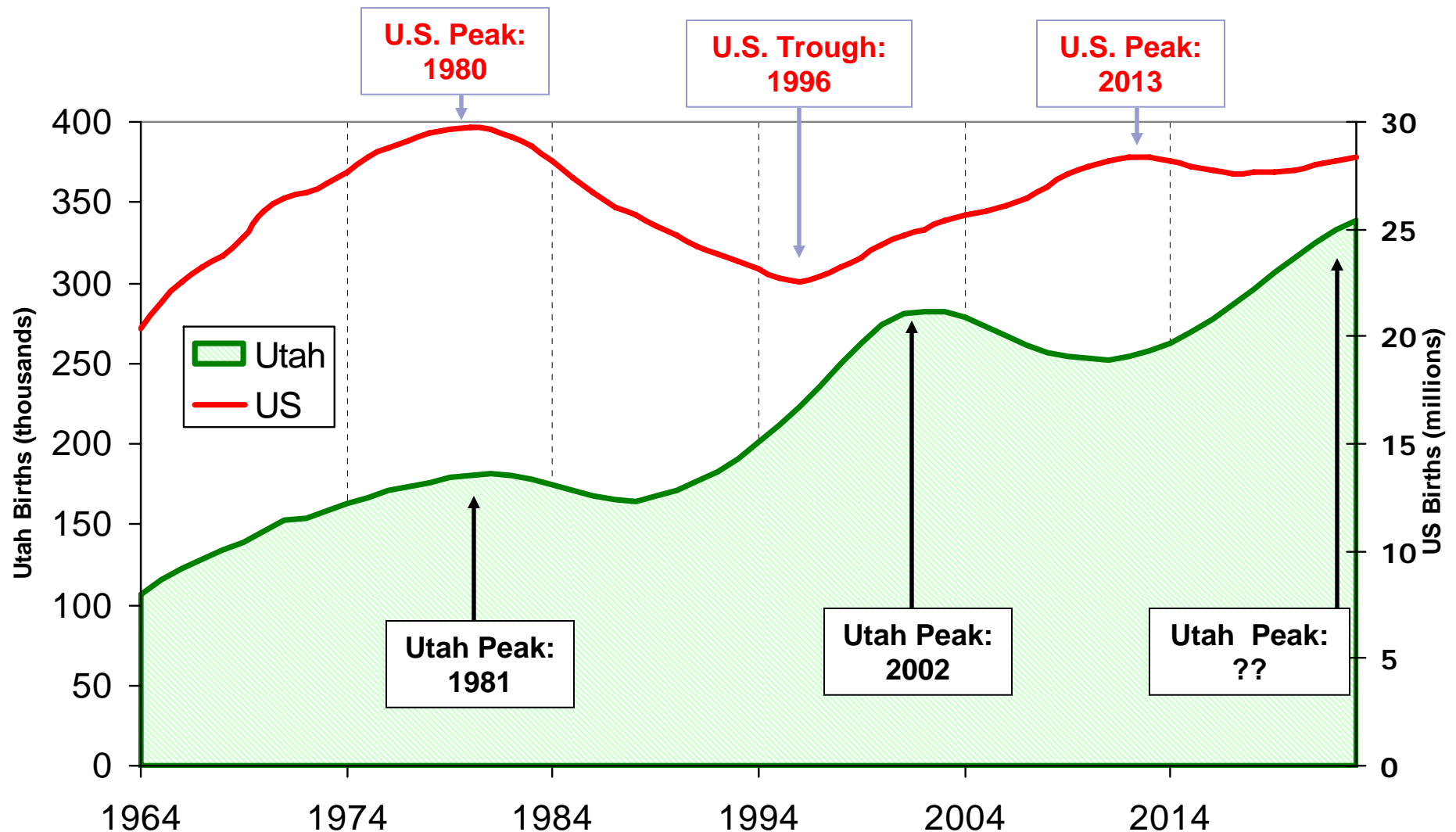
Source: Patricia Murphy, Utah State Office of Education, Finance and Statistics.

# Historical and Projected Utah School Age Population



Sources: Perlich and Reeve, "The Coming Boom in Utah's School Age and College Age Populations," *Utah Economic and Business Review*, 2002; GOPB 2005 Baseline Projections.

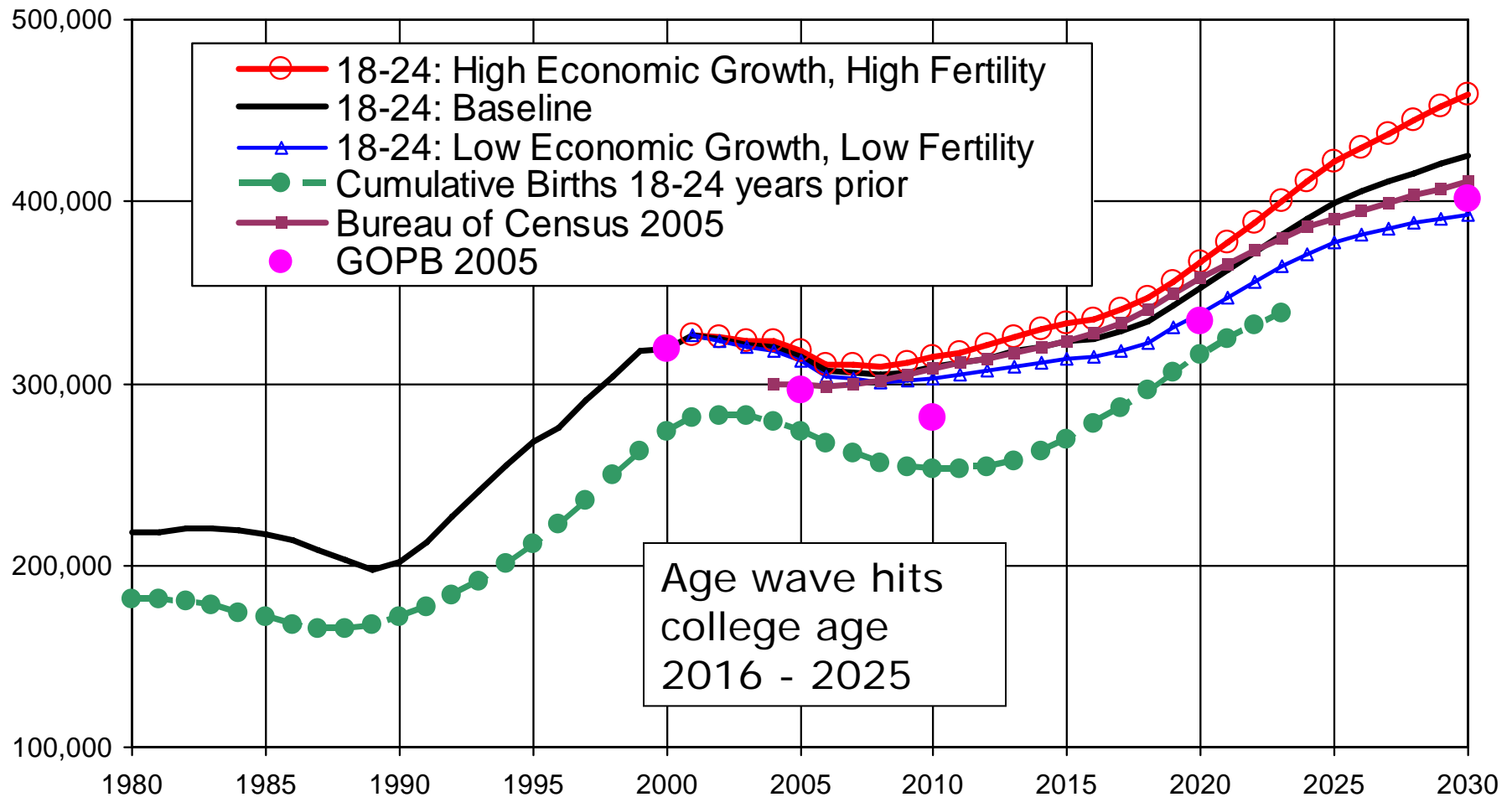
# Utah and U.S. Annual Births: 18 - 24 Years Prior



Source: BEBR analysis of data from the Utah Population Estimates Committee and the National Center for Health Statistics.

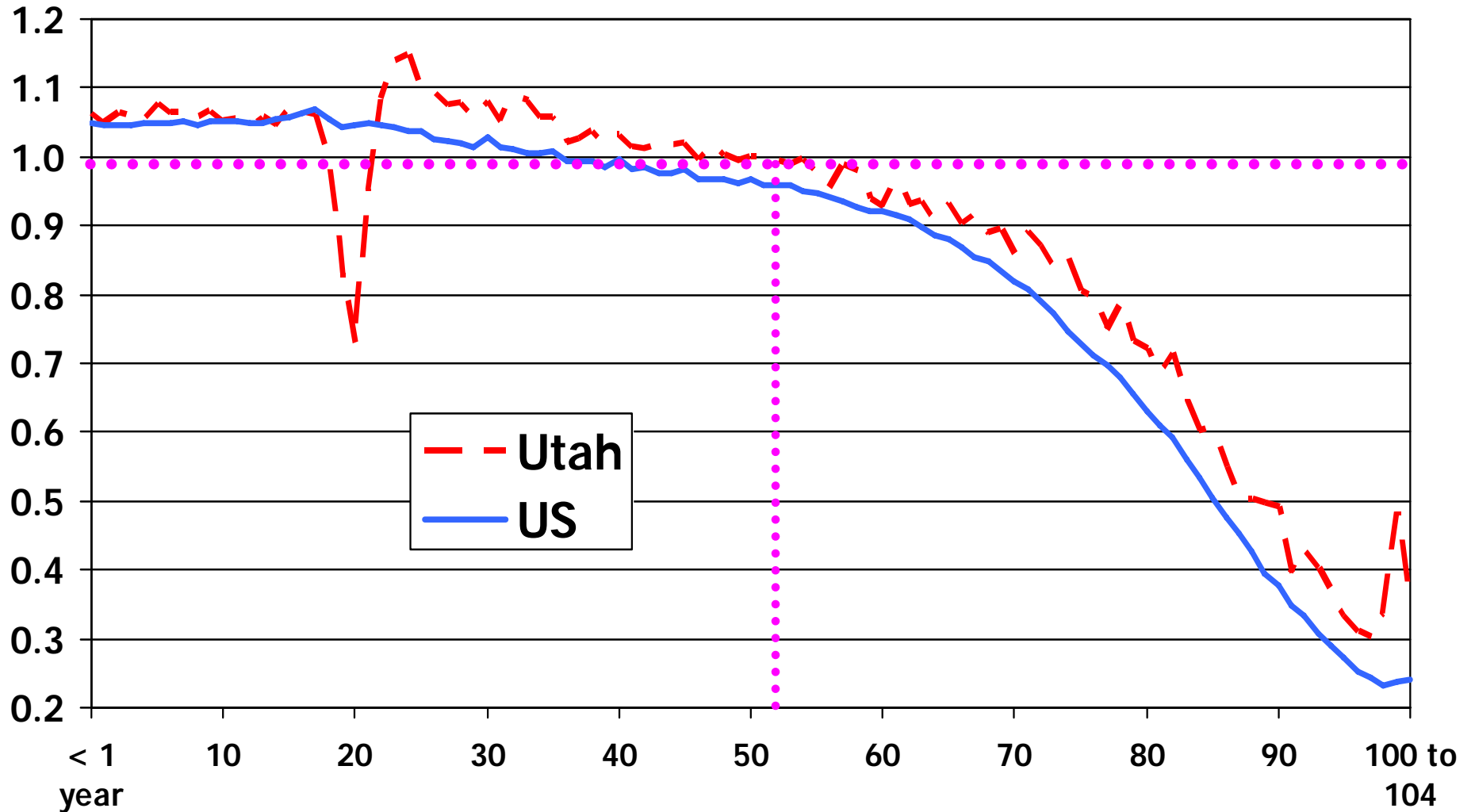
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# Utah College Age Population: Historical & Projected 18 - 24 Year Olds



Source: Perlich and Reeve, "The Coming Boom in Utah's School Age and College Age Populations," *Utah Economic and Business Review*, 2002. BEBR analysis of data from the Utah Population Estimates Committee.

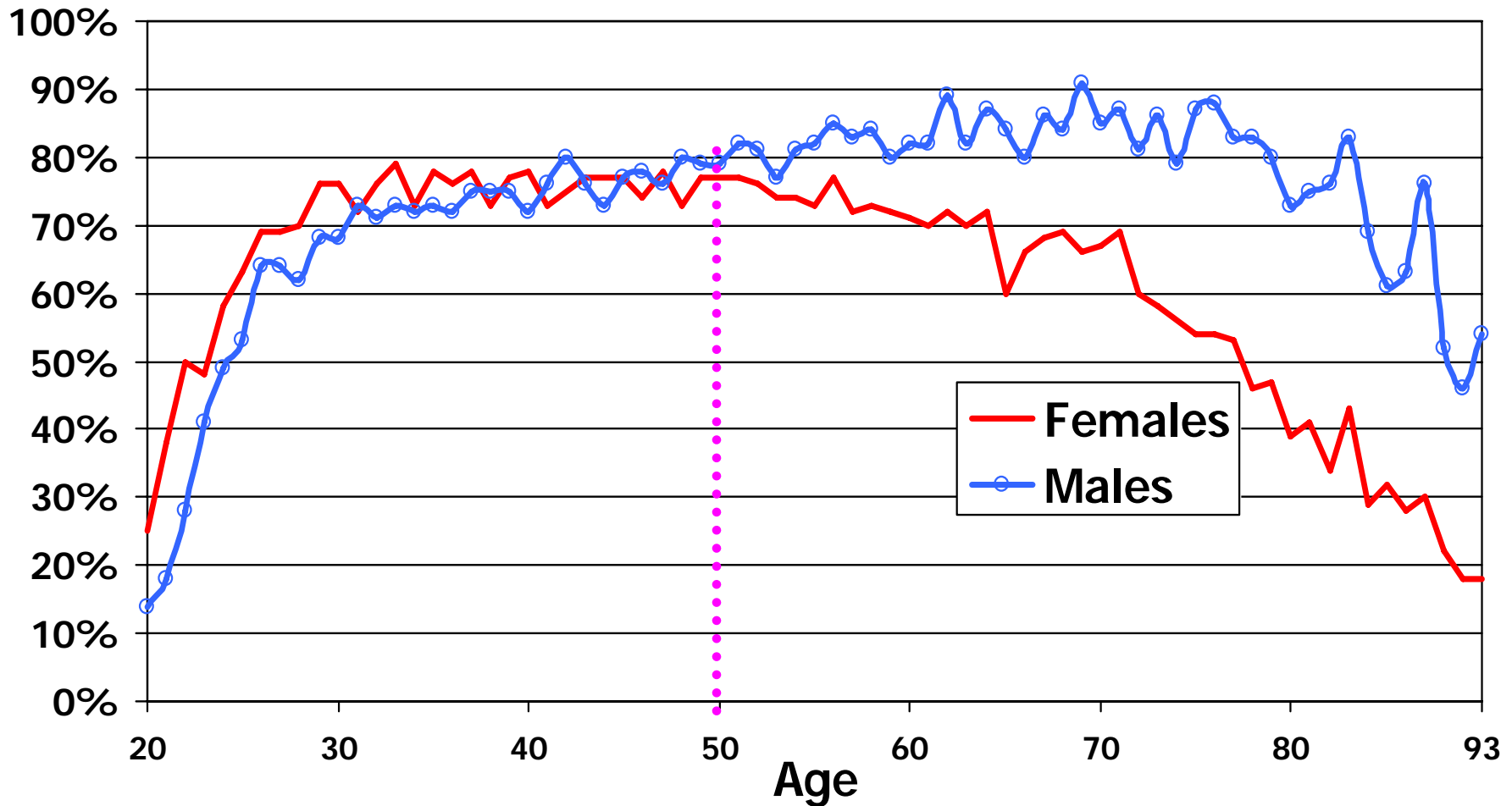
# Male to Female Ratio: UT & US (2000)



Bureau of the Census data, Census 2000, SF2

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# Percent Currently Married by Age: Utah Males and Females (2000)



Bureau of the Census data, Census 2000, 5% PUMS

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# Measures of Age Structure

- Median Age: Age at which half of the population is older and half is younger
- Dependency Ratio: The number of non-working age persons per 100 working age persons
- Population Pyramids: Graphical representation of the age distribution



# Median Age

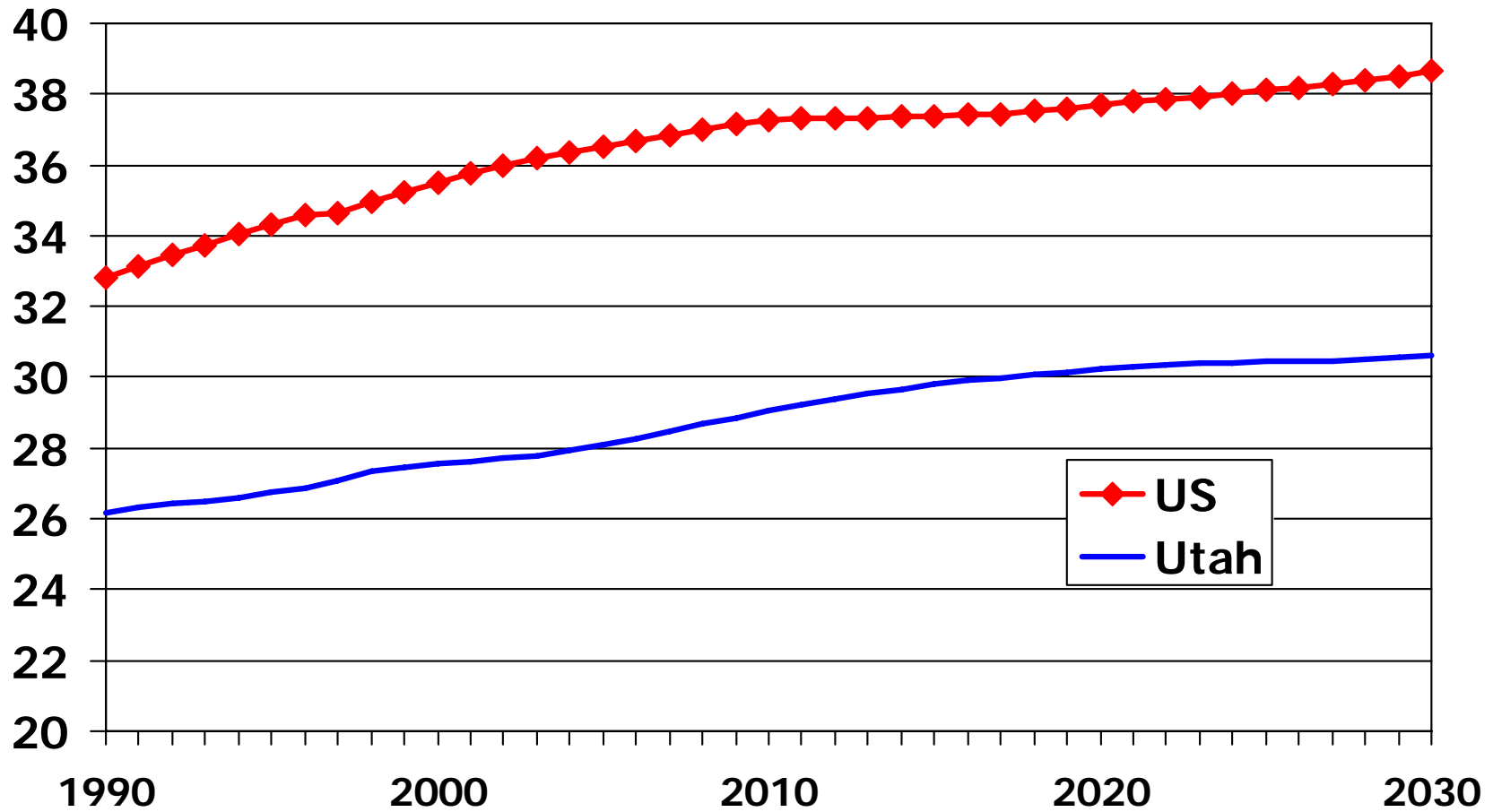
- Utah is consistently among the youngest of all states.
- Median age:
  - Utah = 27.1 (Census 2000)
  - US = 35.3 (Census 2000)
  - Globally = 26



## Median Age is Projected to Increase

- In the US – this is because of the aging of the Baby Boom
- Globally - this is because of the Demographic Transition
- Developed Countries experienced the Demographic Transition more recently than the Less Developed Countries.
- The AIDS epidemic has drastically affected the African continent.

# Historical & Projected Median Age: US and Utah



Sources: GOPB Baseline Projections & Bureau of the Census

# Median Age & Percent Over 60 Years Old by Major Area: 1950, 1999, 2050

Major area	Median age (years)			Per cent aged 60 or older		
	1950	1999	2050	1950	1999	2050
World total	23.5	26.4	37.8	8.1	9.9	22.1
More developed regions	28.6	37.2	45.6	11.7	19.3	32.5
Less developed regions	21.3	24.2	36.7	6.4	7.6	20.6
Africa	18.7	18.3	30.7	5.1	5	12
Asia	21.9	26	39.3	6.7	8.7	23.5
Europe	29.2	37.4	47.4	12.1	20.1	34.7
Latin America and the Caribbean	20.1	24.2	37.8	5.9	7.8	22.3
Northern America	29.8	35.6	42.1	12.4	16.4	28
Oceania	27.9	30.9	39.3	11.2	13.4	24.2

Source: United Nations Population Division.



# Dependency Ratio

- Another measure of the age distribution
- Defined as the number of non-working age persons per 100 working age persons

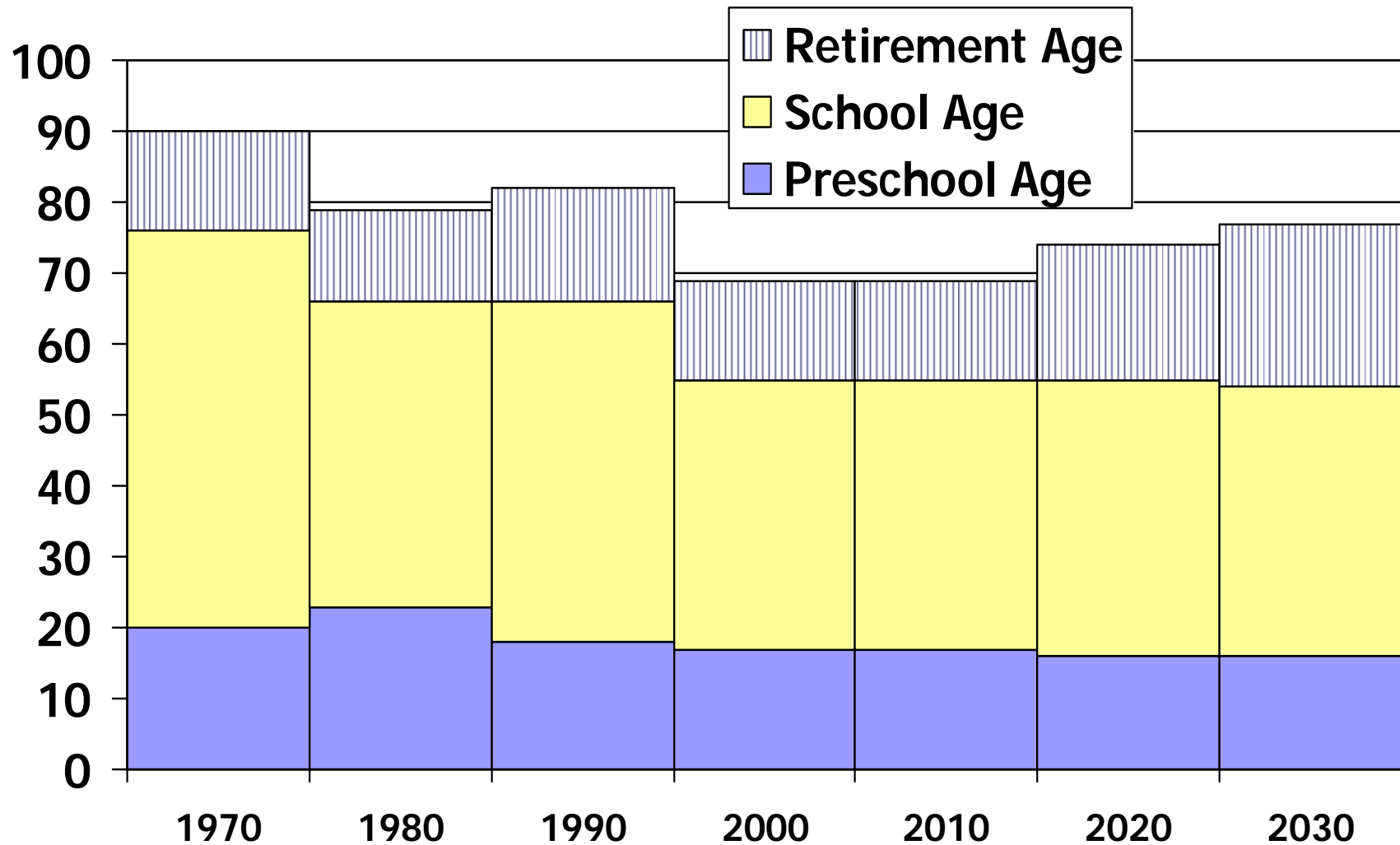
$$\frac{[(Pop_{0-17}) + (Pop_{65+})]}{[Pop_{18-64}]} \times 100$$



# Dependency Ratio Comparisons

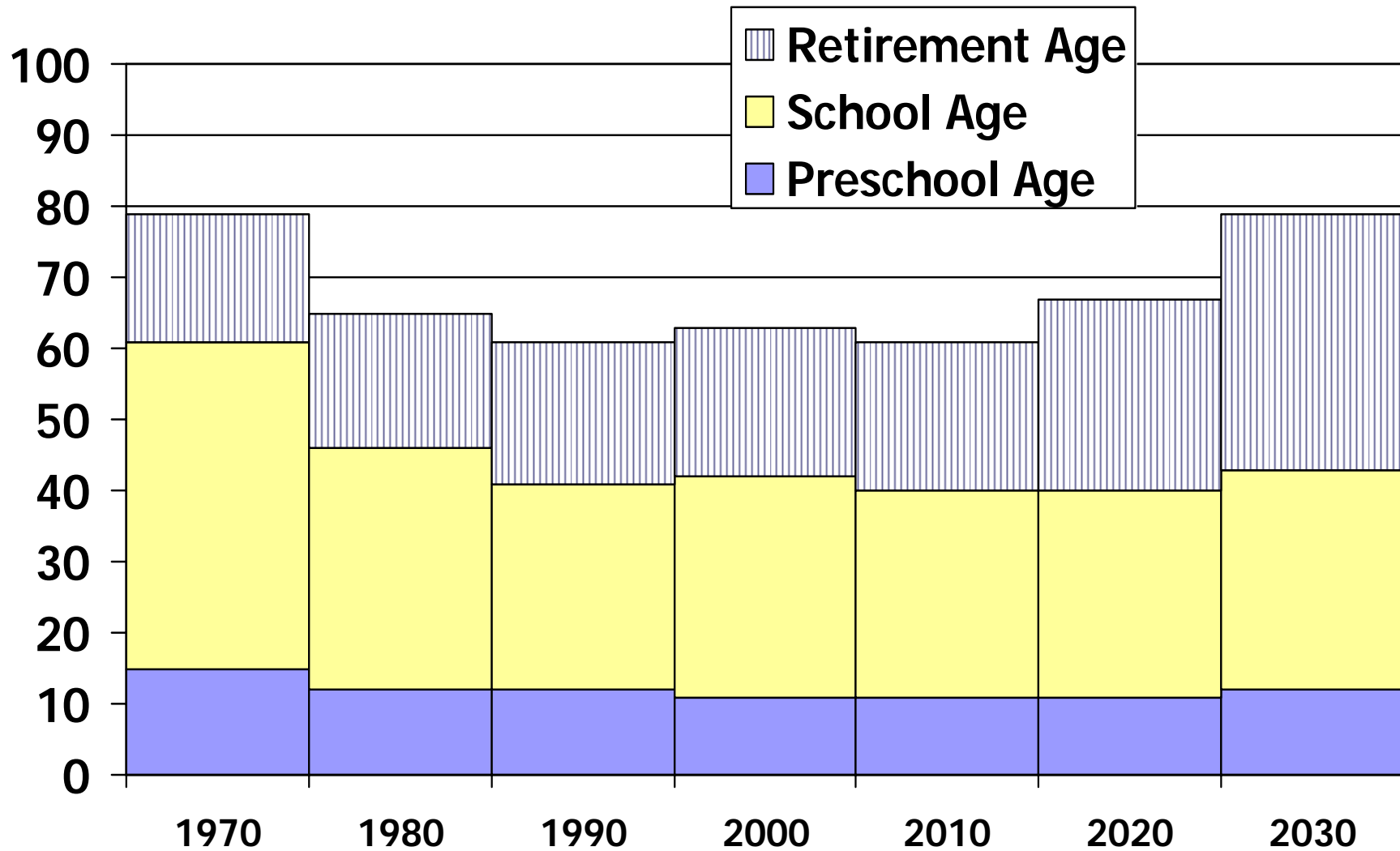
- Utah is consistently among the highest dependency ratio states because of its young population & high fertility rate.
- Florida ranks quite high because of the retirement age population.
- Dependency ratios are projected to increase nationally because of the aging of the Baby Boom.
- Dependency ratios are projected to increase internationally because of the Demographic Transition.

# Utah Dependency Ratio Over Time



Sources: Bureau of the Census & UPED Model System

# US Dependency Ratio Over Time



Source: Bureau of the Census

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# Age Adjusted Data

- Account for age distribution in rate calculations – otherwise, misleading results
- Examples: crude birth rate, crude death rate, per capita income, labor force participation rates

Deseret Morning News, Sunday, July 30, 2006

## **Salt Lake ranking slips as place for singles**

*Forbes lists city only 36th out of 40; magazine's criteria draw fire*

By [Elaine Jarvik](#)

Deseret Morning News

Salt Lake City has plummeted to No. 36 out of 40 in a ranking of "best cities for singles." Lower than Cleveland even.

This year's pitiful showing represents a drop of 12 spots from Forbes.com's 2005 ranking. That's largely because of our nightlife, explains Lacey Rose, who co-authored the singles ranking. It turns out, though, that Salt Lake City's reputation may have been besmirched in part due to a change in the way Forbes compiled the statistics.

In past years, the online magazine came up with its "nightlife" score by simply adding up the number of restaurants, bars and nightclubs in each city. This year, Forbes figured the nightlife on a per capita basis.

Deseret Morning News, Sunday, July 30, 2006 – cont.

"There's a flaw in the methodology," says Pam Perlich, a senior research economist at the University of Utah. It's silly to figure nightlife on a per capita basis, she says, since per capita in this case includes preschoolers as well as adults. In the Salt Lake metropolitan area, nearly one-third of the population is under 18, compared to one-fourth in the Denver-Boulder area, which ranked No. 1 on Forbes.com's singles-o-meter.

Children have "night lights, not nightlife," says Perlich.

Perlich points to the perils of statistics, recalling a newspaper story from a few years back that named Utah's Daggett County (current population 833) as the place with the most single men per capita in the entire country. Daggett, she later pointed out to the reporter, is the home of a correctional facility, so "it's a great place for a single woman if she wants her companion to be an incarcerated male."

According to Forbes.com, whose annual singles ranking is now in its sixth year, scoring was based on seven criteria: singles, nightlife, culture, cost of living alone, job growth, online dating and coolness. The "online dating" score was based on "active profiles per capita," a number that was also skewed because of our plethora of kids.

Deseret Morning News, Sunday, July 30, 2006 – cont.

The magazine gave double weight to the criterion "singles" (the percentage of a city's over-15 population that has never been married). This score also helped pull Salt Lake City down into the cellar of singledom, because of course we like to marry and to marry young (in Utah we have the highest percentage of married households in the nation, and our median age at first marriage is three years younger than in the country at large).

Forbes.com's scoring was "numbers-based," explains Rose. "None of this is subjective. None of this is 'Hey, this is a fun city, I found a date here.' " Even the "coolness" category was numbers-based, she says. Coolness, according to the online magazine, "is determined by an area's diversity and its number of creative workers (i.e., those whose jobs require creativity, such as artists, scientists, teachers and musicians)." Salt Lake City ranked 38th out of 40 in coolness.

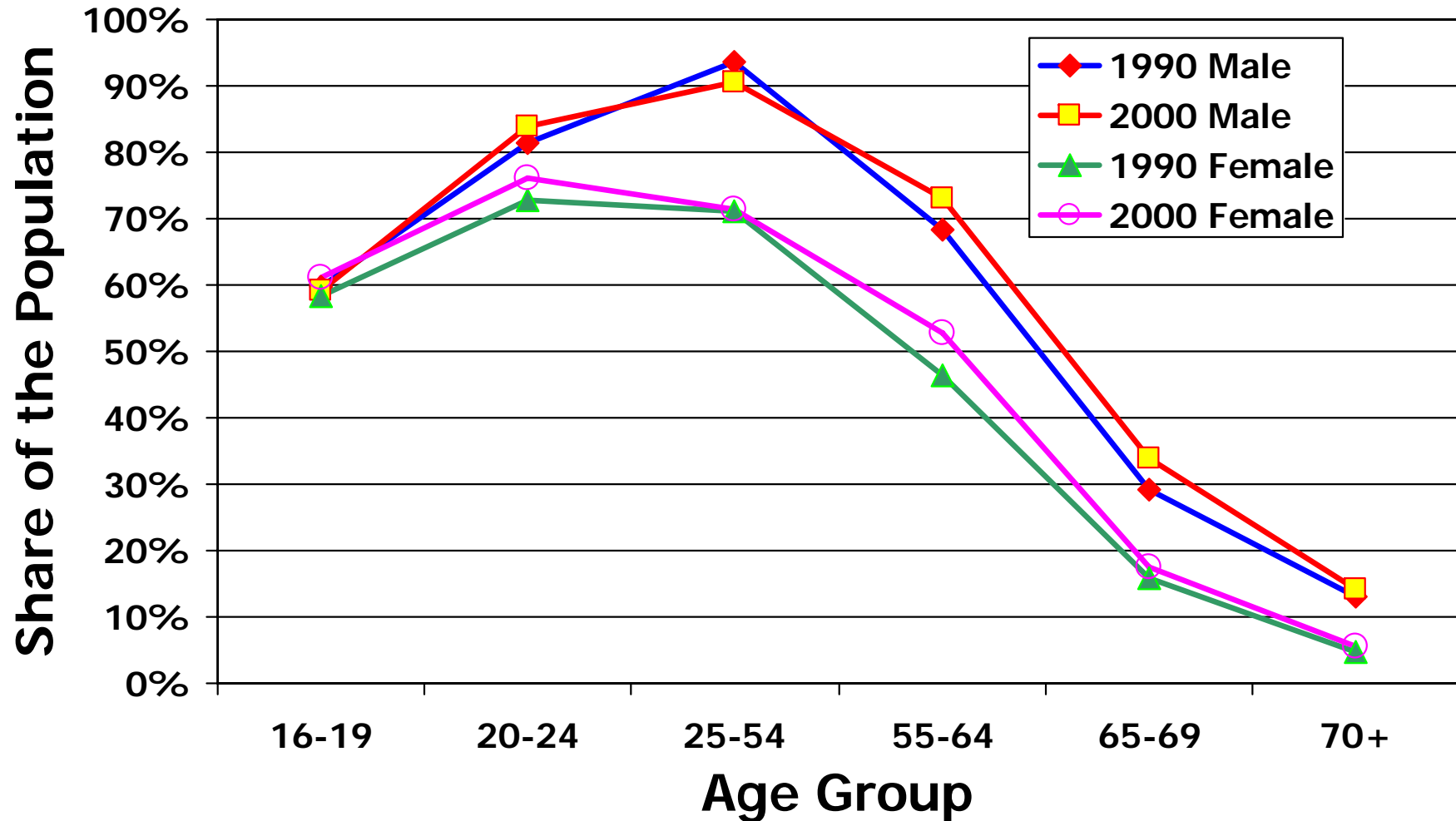
Although Salt Lake City may not be deemed so great for singles, Utah has received its share of kudos in recent years. Two years ago the New Sex Institute of Beverly Hills, Calif., named the state the fifth "most sexually adventurous" state in America. And Forbes named Utah "the best place to die."



# Female Labor Force Participation Rates

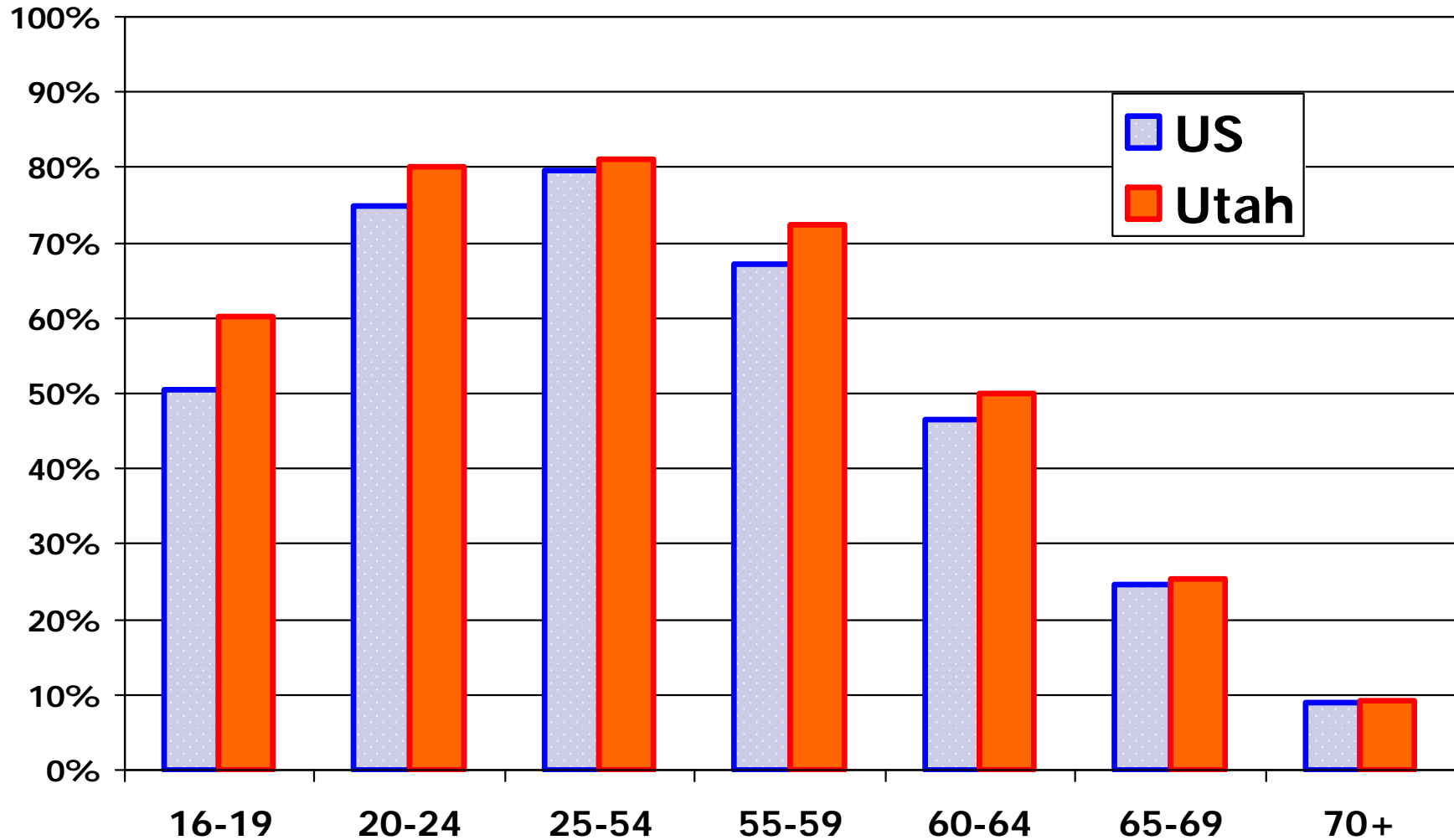
- Aggregate LFPR = share of non-institutionalized population 16 and older in the labor force
- Utah = 61% (2000 Census)
- US = 57.5% (2000 Census)
- Age adjusted Utah rate = 57.4%

# Utah LFPR: 1990 and 2000



Source: Bureau of the Census, 1990 and 2000 Census

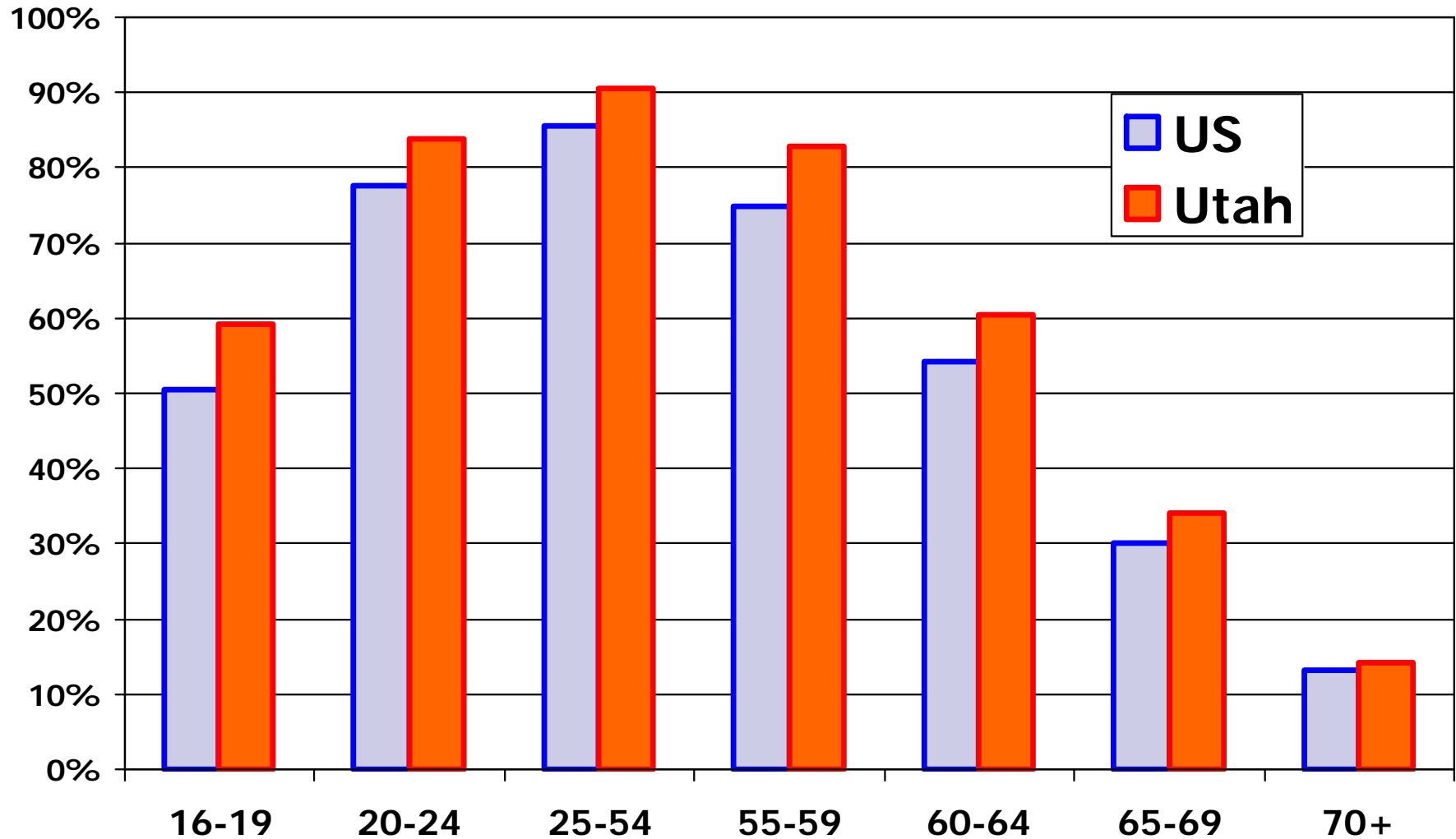
# Utah & US LFPR: Total (2000)



Source: Bureau of the Census, 2000 Census

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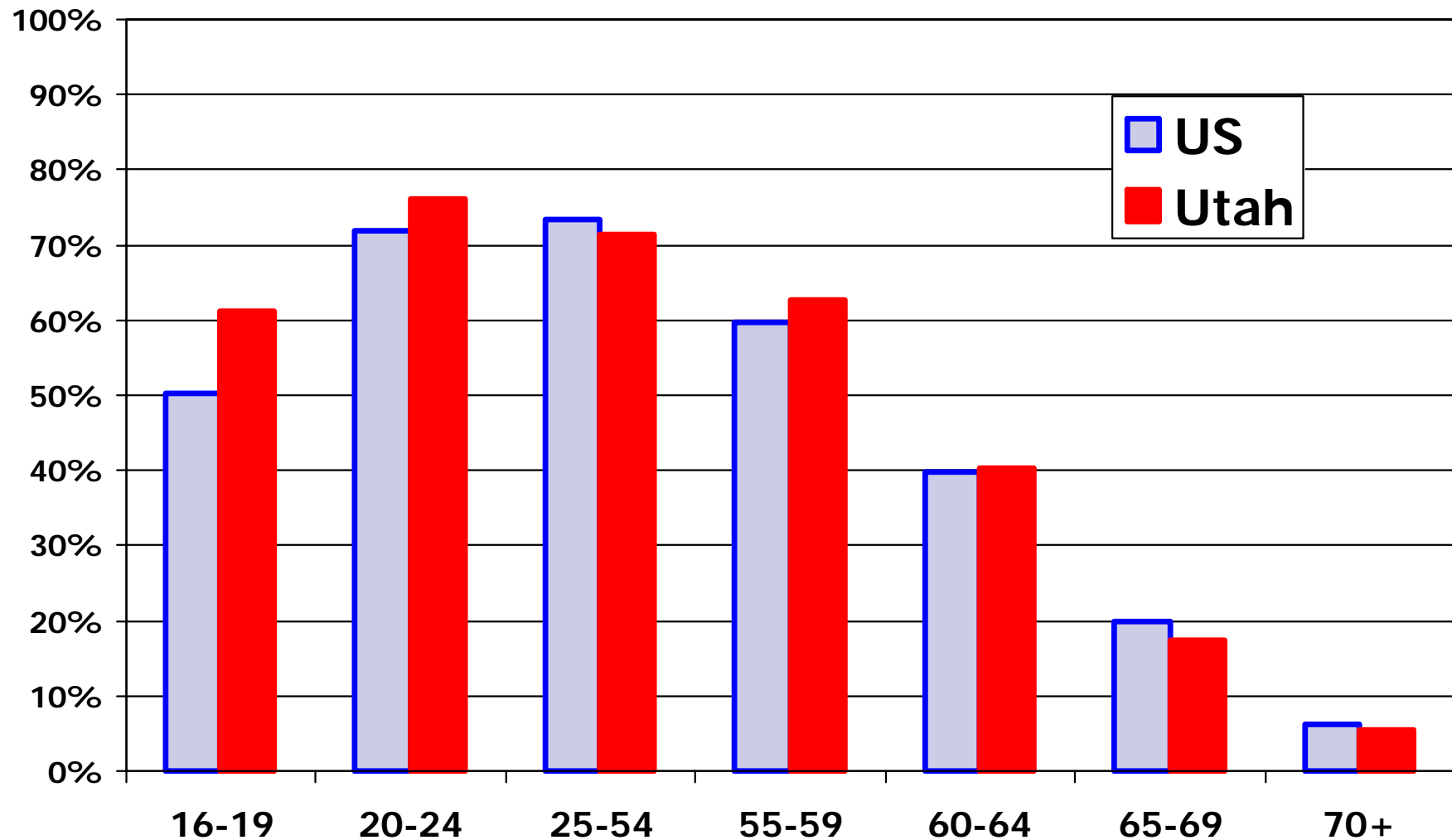
# Utah & US LFPR: Male (2000)



Source: Bureau of the Census, 2000 Census

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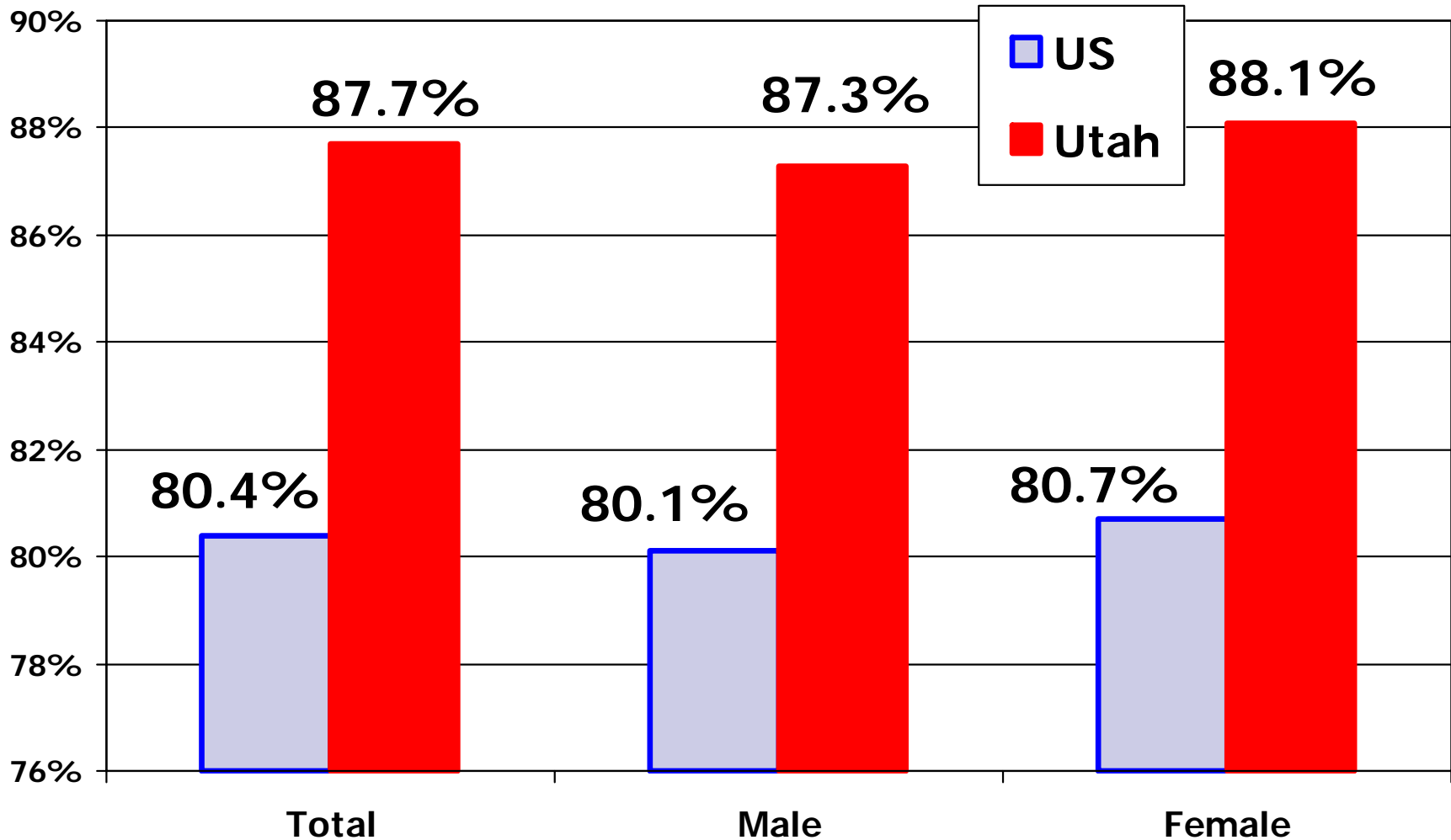
# Utah & US LFPR: Female (2000)



Source: Bureau of the Census, 2000 Census

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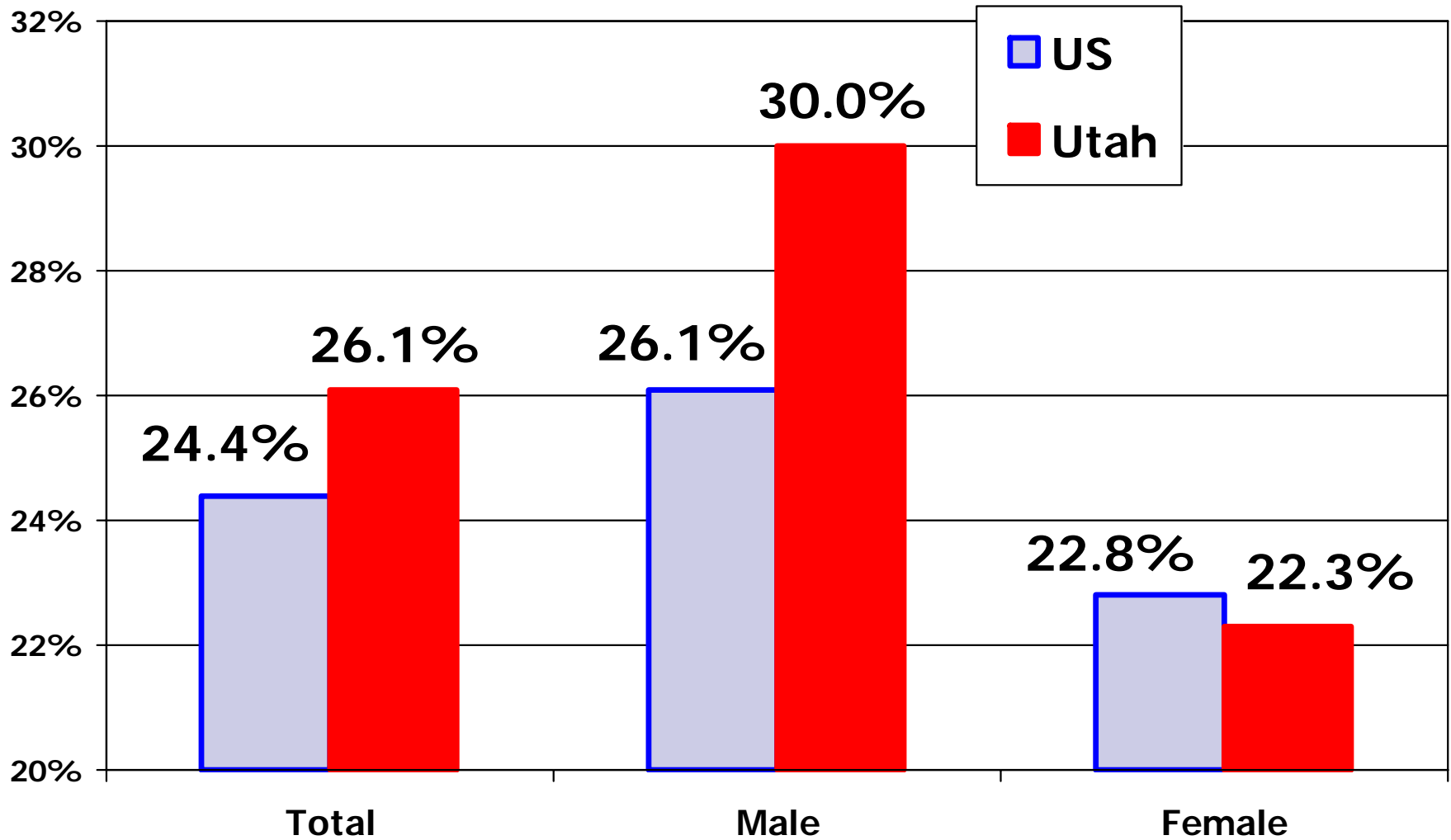
# Share of Population 25 Years and Older with at Least High School Completion (2000)



Source: Bureau of the Census, 1990 and 2000 Census

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# Share of Population 25 Years and Older with at Least a Bachelors Degree (2000)



Source: Bureau of the Census, 1990 and 2000 Census

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# Extrapolation vs. Interpolation

- Extrapolation

- Trend into the future

- Interpolation

- Trend between two points
- “Fill in the blanks”
- Linear (uniform distribution)
- Pareto interpolation ( Decreasing density)



# Demography ↔ Planning

- Planning for human populations
  - Size
  - Location
  - Age
  - Gender
  - Nationality
  - Income
  - Commuting



# Decennial Census = Basic Picture

- Short form – counts, age, race, sex, household, group quarter (SF1 and SF2)
  - Block level
- Long form – socio-economics – income, employment, place of birth, migration, language spoken at home, etc.
  - Block group level
- SF3 data at BEBR - State Data Center Lead Agency
  - <http://www-new.business.utah.edu/display.php?pageId=1132>
  - [http://www.slcgov.com/info/area\\_info/census/tract.htm](http://www.slcgov.com/info/area_info/census/tract.htm)



Let's Get Started . . .