

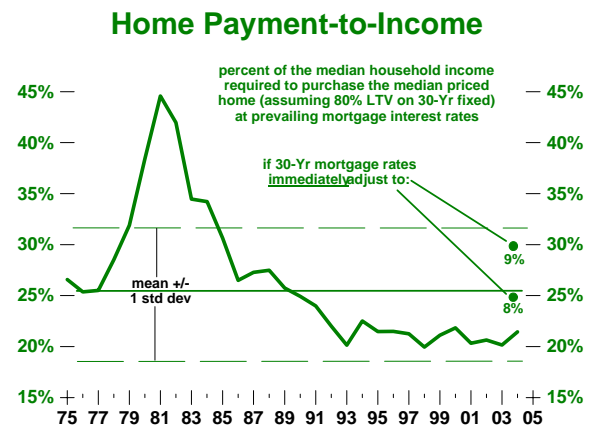
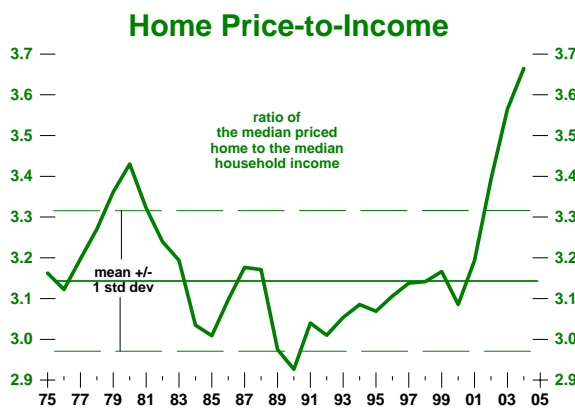
# METRO AREA HOME PRICES: VALUATION METHODOLOGY

## Executive Summary

- Median home prices for 99 metro areas were studied over the 1980-2004 period to determine statistically normal prices.
- A pooled time series approach was employed to evaluate prices as a function of relative income levels, population density, interest rates and historical premiums/discounts.
- The majority of the U.S. housing stock is not considered over-valued, though one-fifth of that stock exhibits a degree of over-valuation historically observed preceding local price corrections.

## Background

Single-family home prices in America have been climbing faster than household incomes for a decade, driving the ratio of median home price-to-median household income to its highest level in at least the past thirty years and contributing to increasing concern of a housing bubble. At the same time, however, falling mortgage rates have enhanced homebuyer affordability, defined as the share of the median household income required to make payments on the median priced home, assuming payments at the prevailing 30-year mortgage rate on a 80 percent loan-to-value.



In fact, this affordability measure is presently below its 30-year mean. Even if interest rates on 30-year conventional conforming, presently under 6%, advanced to 8%, this metric would only then approach the average of the past three decades.

Researchers have recently studied variations on these price-to-income and payment-to-income measures in an attempt to answer the following question: Is there a housing bubble in America? Most answer this question affirmatively or negatively, though some have taken on a more nuanced approach. The following research falls in this latter category.

It begins with the premise that addressing this question on a national basis is inappropriate. Rather, it takes metropolitan areas as the appropriate geographic unit, recognizing that even a state-level orientation may deliver misleading results (e.g. New York City and Rochester, NY illustrate the differences that may exist in a single state). Additionally, as a practical matter, experience has shown home price declines to be common at the metropolitan level; we identify 31 such corrections since 1980. Yet a national price declines are rare; none has been recorded in the past half century.

## Methodology

The analytic approach taken to determining normal housing values at the metro area level was in part determined by the data available. Specifically, we began by assembling a dataset of metro area median home prices and median household incomes. Given the occasional changes in MSA definitions, this restricted us to 99 metro areas over the 1980-2004 period (the dataset is described in detail, below).

For two reasons, a pooled time series statistical approach (combining the benefits of time series analysis with those of cross section analysis) was employed. First, this approach greatly enlarges the number of observations, which is limited by the annual data for each metro area over the 1980-2004 period. Under the pooled time series approach, the number of observations is 2,475 (99 areas by 25 years). Second, this approach forces an internal consistency, such that each area's estimated housing valuation bears an identical relationship to independent factors, for example, population density.

### Past Metro Area Corrections

	Decline		Valuation	
	Period	Percent	Peak	Percent
Austin, TX	1986-89	17	1986	22
Bakersfield, CA	1993-97	6	1993	5
Baton Rouge, LA	1987-90	6	1984	24
Boston, MA	1990-96	22	1990	30
Charleston, SC	1982-84	9	1982	49
Davenport, IA	1983-88	10	1983	25
Dayton, OH	1980-82	5	1980	26
Des Moines, IA	1980-82	7	1981	39
Detroit, MI	1981-83	6	1981	15
Eugene, OR	1980-84	20	1980	23
Fresno, CA	1982-84	6	1982	30
Hartford, CT	1989-97	24	1988	35
Honolulu, HI	1995-98	9	1995	15
Houston, TX I	1983-88	16	1984	35
Lansing, MI	1981-83	6	1981	29
Las Vegas, NV	1982-85	11	1982	31
Los Angeles, CA	1990-96	24	1990	16
Milwaukee, WI	1980-83	7	1981	19
Modesto, CA	1990-97	14	1991	19
New York, NY	1989-96	19	1987	32
Oklahoma City, OK	1983-87	13	1984	27
Peoria, IL	1981-85	18	1983	30
Portland, OR	1980-86	8	1980	16
Providence, RI	1989-95	13	1988	27
Richland, WA	1980-85	14	1980	21
Sacramento, CA	1991-96	12	1991	18
San Francisco, CA	1990-96	27	1990	22
Seattle, WA	1980-87	27	1980	19
Stockton, CA	1991-96	9	1990	13
Syracuse, NY	1993-96	5	1991	14
Washington, DC	1990-97	13	1990	9
Median		12		23

The model was specified as follows, with parameter estimates and t-statistics:

$$P_{MSA}:I_{MSA} = K_{MSA} + RI_{MSA} + PD_{MSA} + I$$

(coefficient)	(see table)	1.432	0.765	-0.720
(t-statistic)	6.532	9.693	3.928	9.152

R-Bar<sup>2</sup>: .1237  
Std. Error: .8766

Where:

- $P_{MSA}:I_{MSA}$  is the ratio of median home price to median household income for each MSA.
- $K_{MSA}$  is a constant term estimated for each MSA.
- $RI_{MSA}$  is the metro area median income level as a ratio to the U.S. median income level.
- $PD_{MSA}$  is the population density, in persons per square mile.
- $I$  is the yield on the 10-year Treasury note.

The constant term is estimated by the regression approach and reflects the extent to which other factors, not incorporated here, contribute to historically observed price-to-income ratios. Such factors may include weather conditions, cultural amenities, geographic location, zoning regulations, pollution, utility rates, tax rates, etc. Ideally, each of these determinants would be consistently measured and directly incorporated.

The relative income term serves to measure the luxury good effect. Specifically, if housing is a luxury good, residents in high [low] income areas will allocate a larger [smaller] share of their income towards its consumption. The population density term serves as a proxy for the scarcity of land and the interest rate term captures the effect that interest rates have on affordability.

## Results

Quantifying these relationships enables the estimation of historically normal median home prices for all metro areas over the past quarter century. When compared to actually observed prices, measures of under-/over-valuation are derived. Charts depicting these data for all metro areas appear at the end of this report and a summary for 2004 is depicted below.



## The Data\*

Median home prices for each metro area are derived from a combination of two primary sources: the Census of Housing and the Office of Federal Housing Enterprise Oversight (OFHEO). Specifically, Census data for the years 1980, 1990 and 2000 were interpolated/extrapolated on the OFHEO data to create 25-year time series.

Median household incomes for each metro area are derived from two primary sources: the Census of Population and Local Area Personal Income, published by the Bureau of Economic Analysis. Specifically, median household income levels for 1979, 1989 and 1999 were interpolated between Census years, based on per-capita income, and extrapolated to 2001. The subsequent years were extrapolated on a combination of state-level per-capita income and local employment to create a 25-year time series.

Population density for each metro area is derived by dividing resident population estimates from the Bureau of Census by metro area land area.

Note: This analysis was originally conducted in the summer of 2004, at which time OFHEO and per-capita income data were only available through the first half of that year. Hence, annual 2004 estimates of median household income and median home price were based on annualizing that available data.



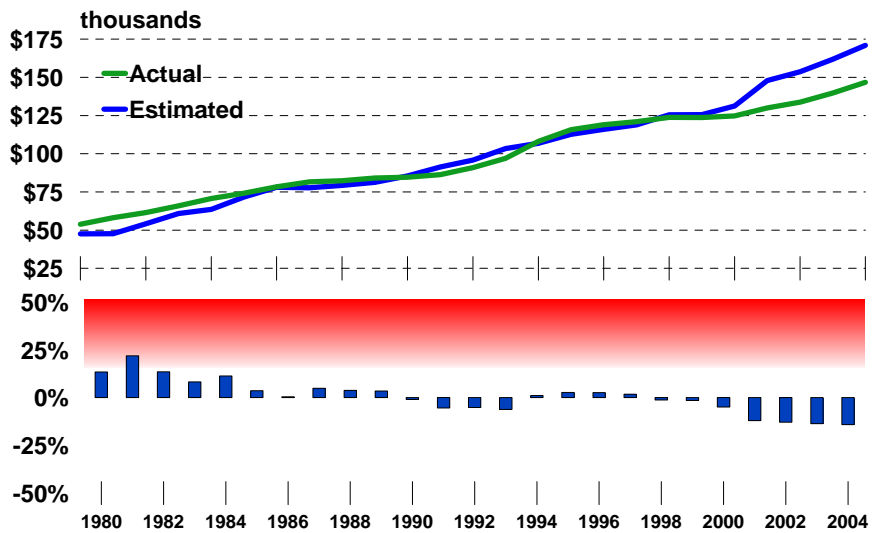
Richard J. DeKaser  
Chief Economist  
National City Corporation

February 14, 2005

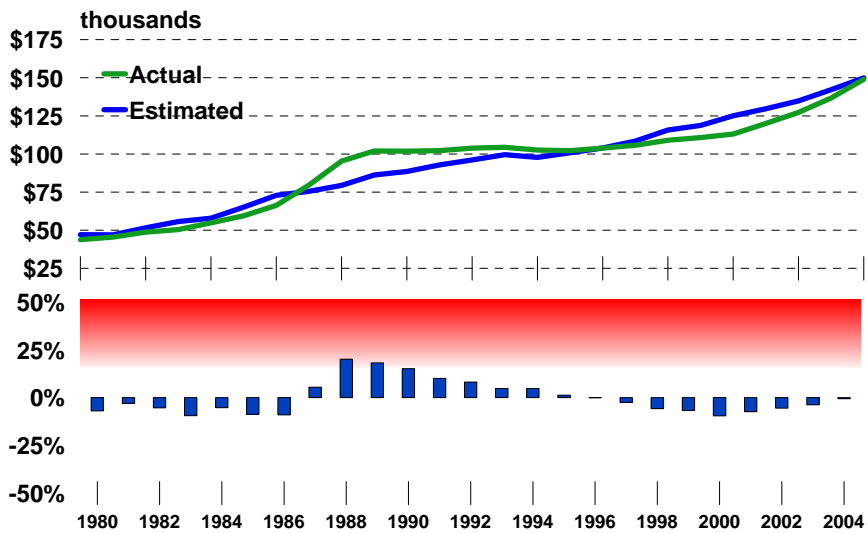
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\* All data are available on [www.nationalcity.com/economics](http://www.nationalcity.com/economics).

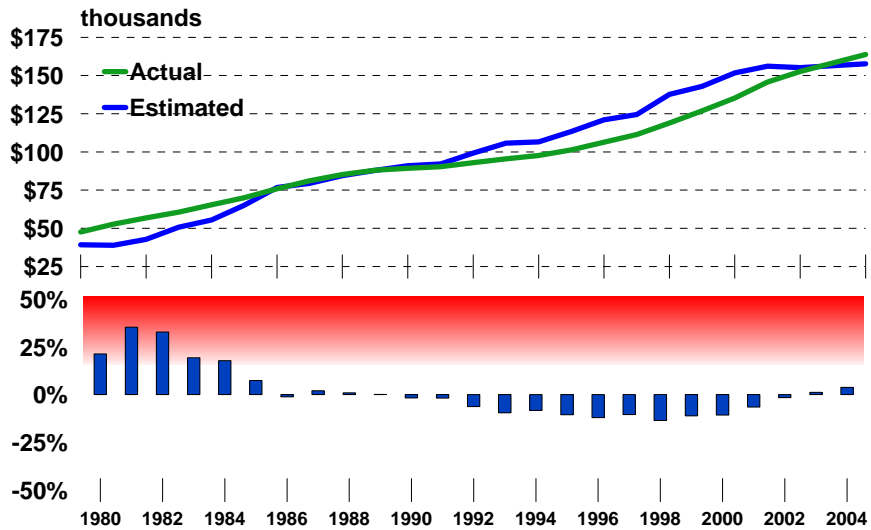
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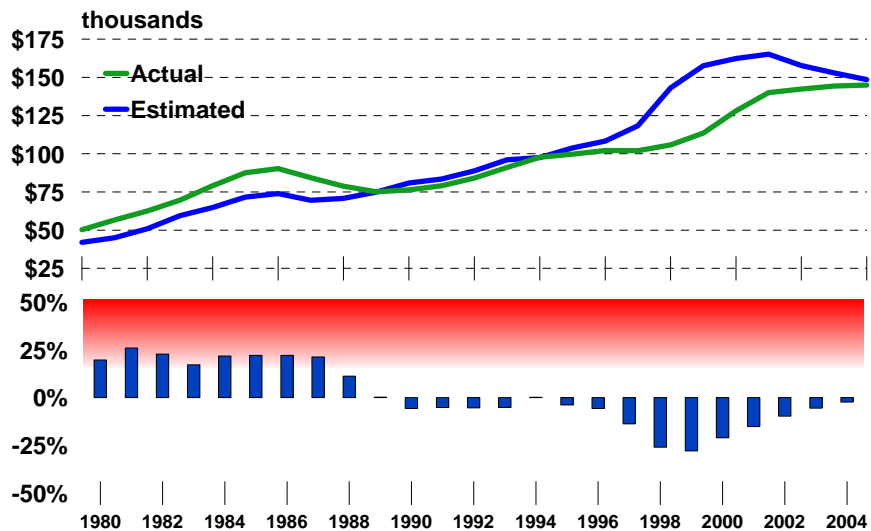
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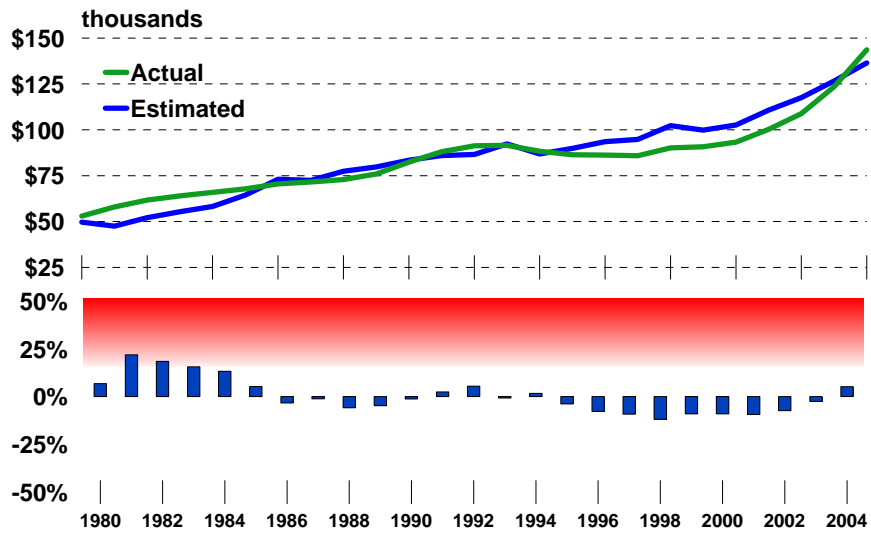
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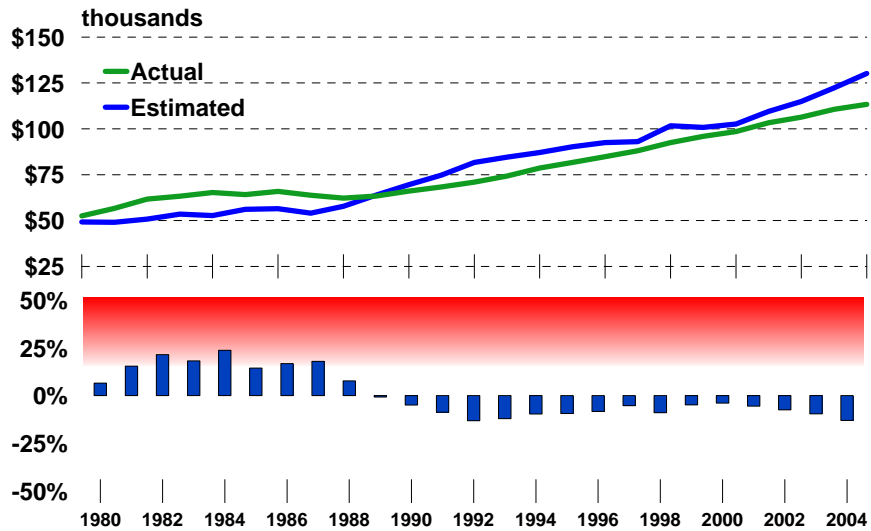
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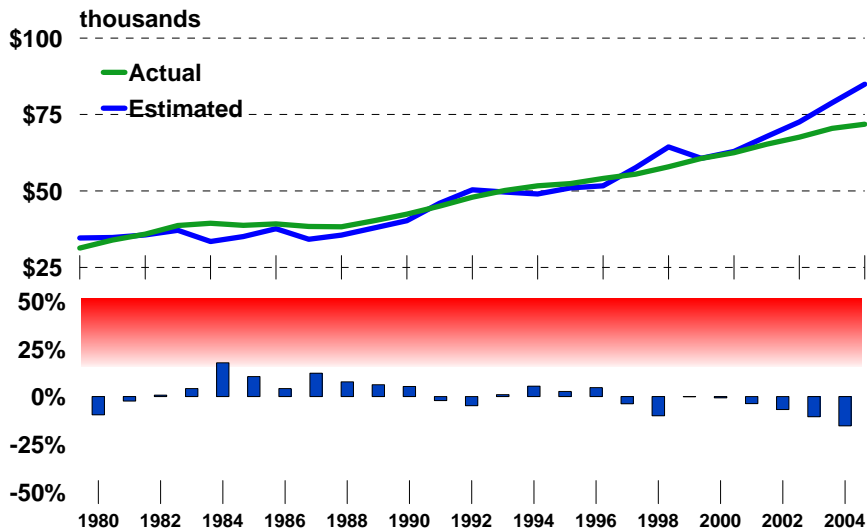
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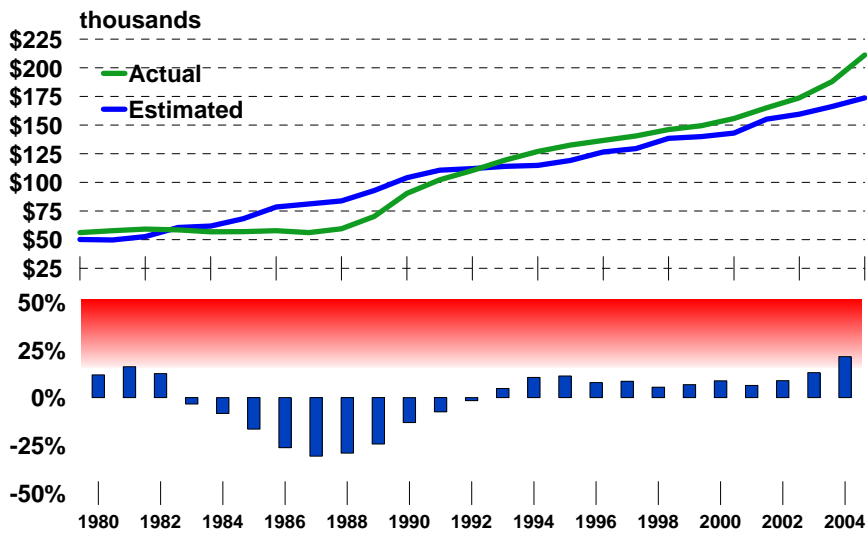
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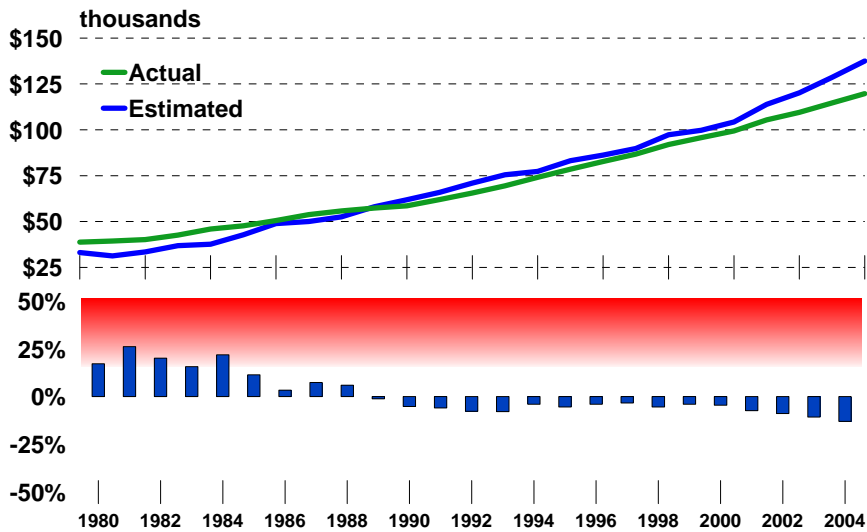
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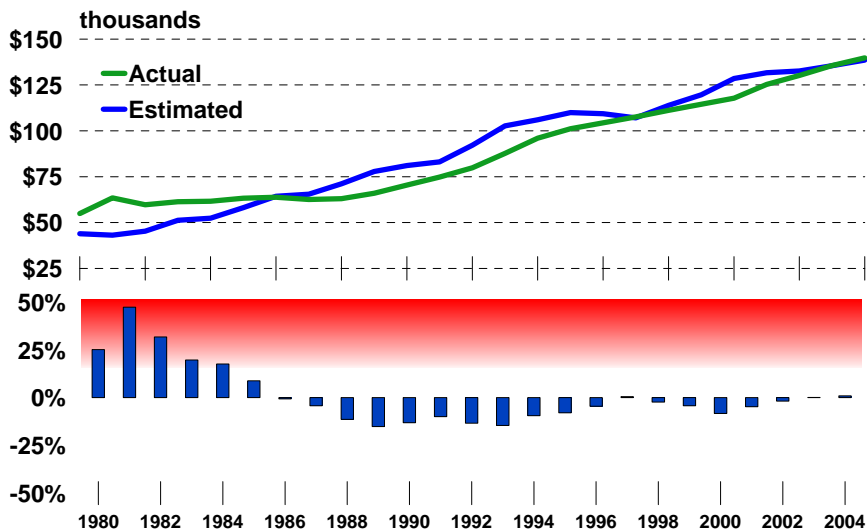
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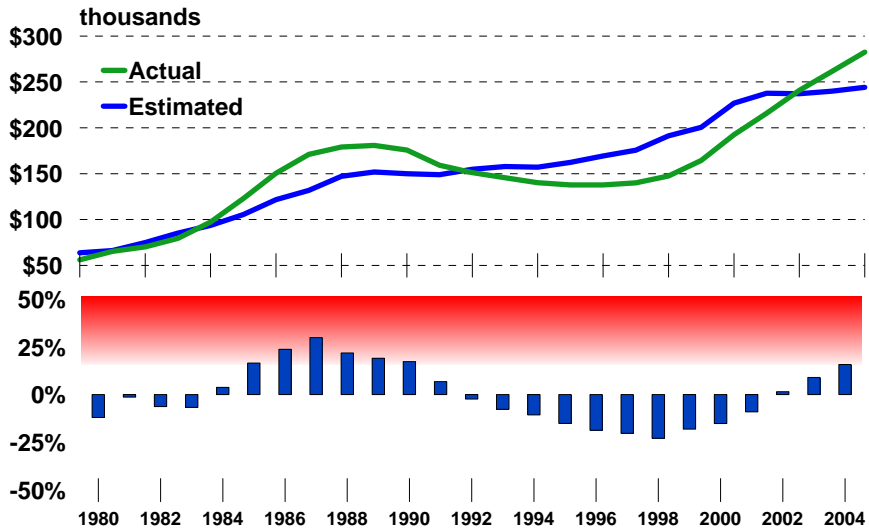
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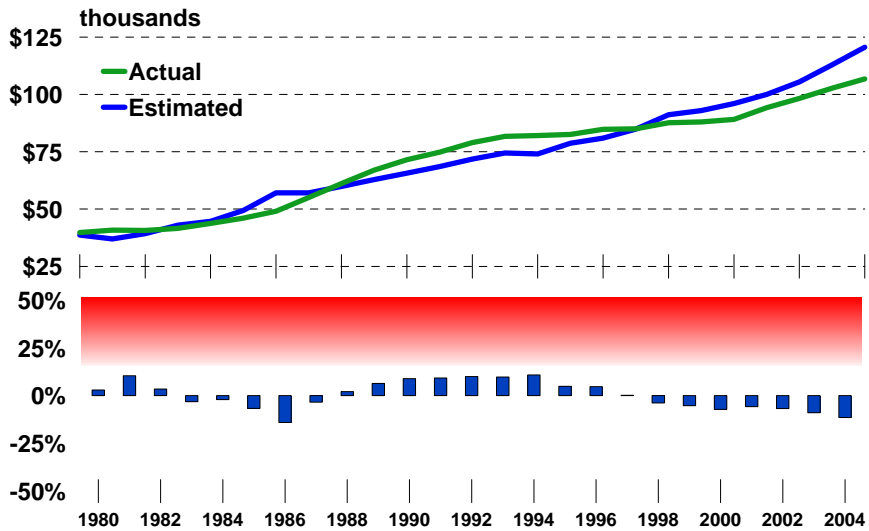
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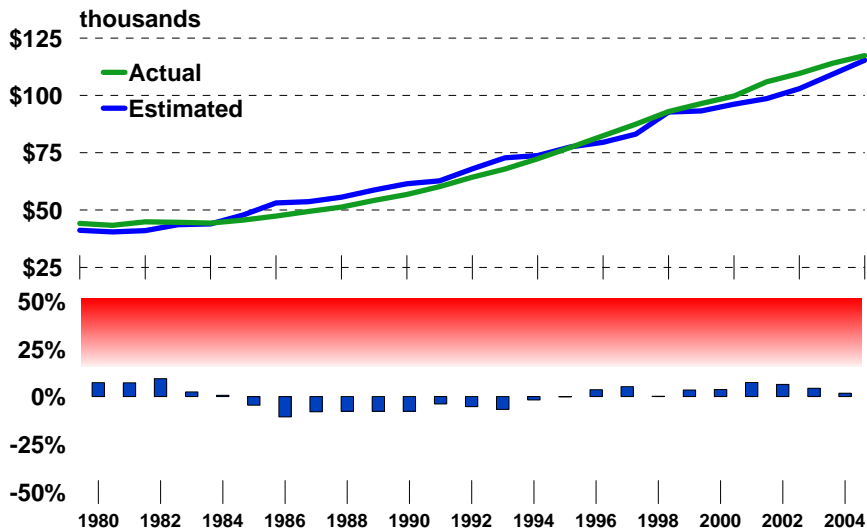
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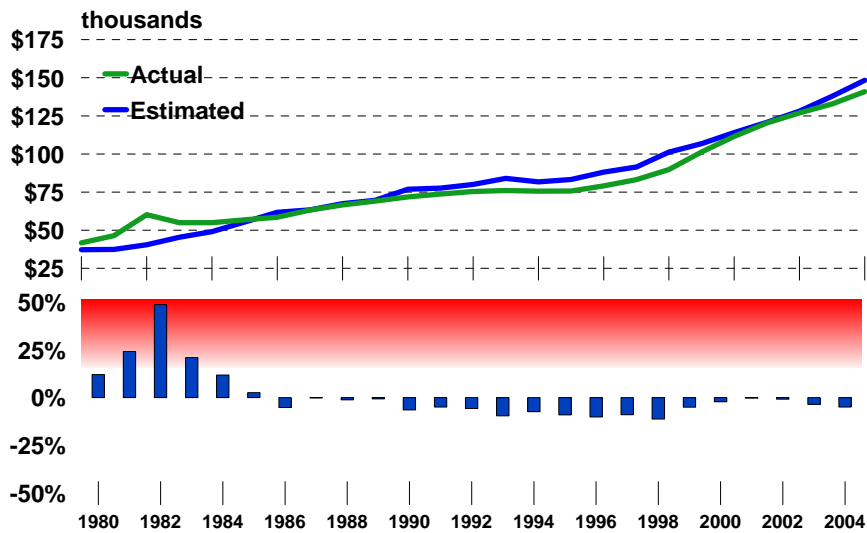
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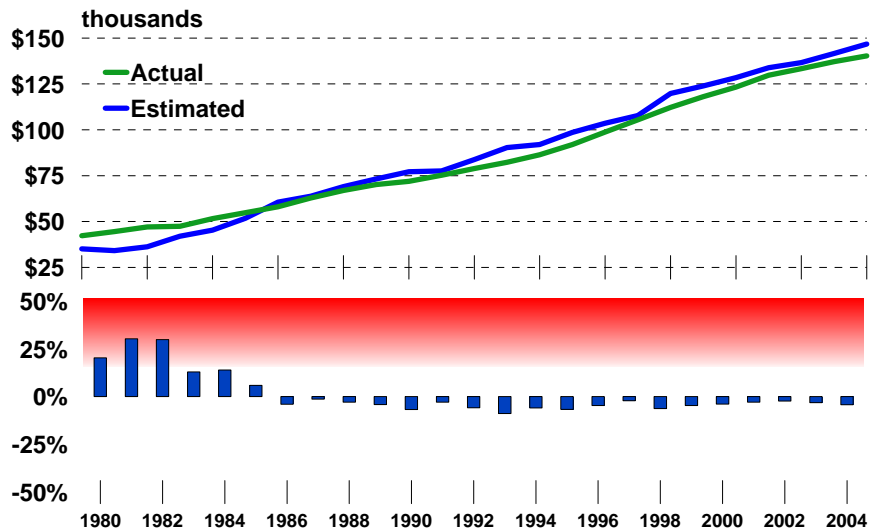
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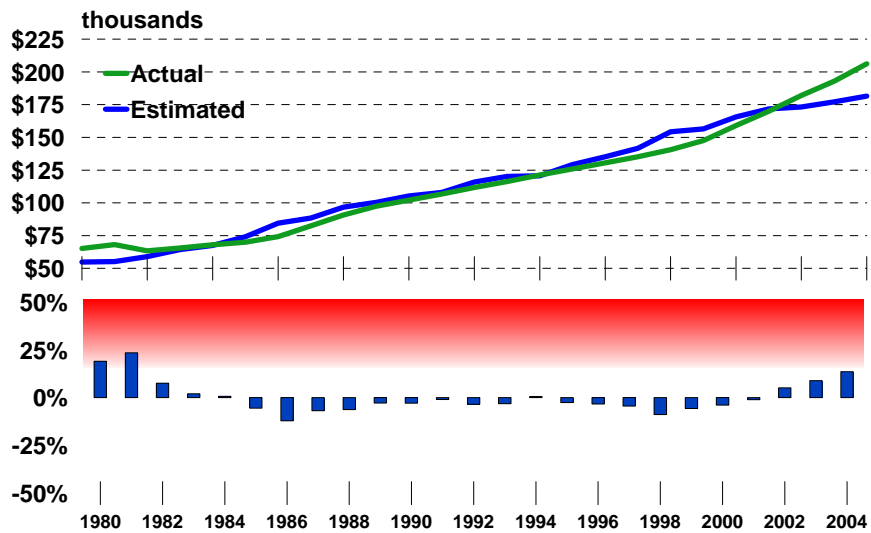
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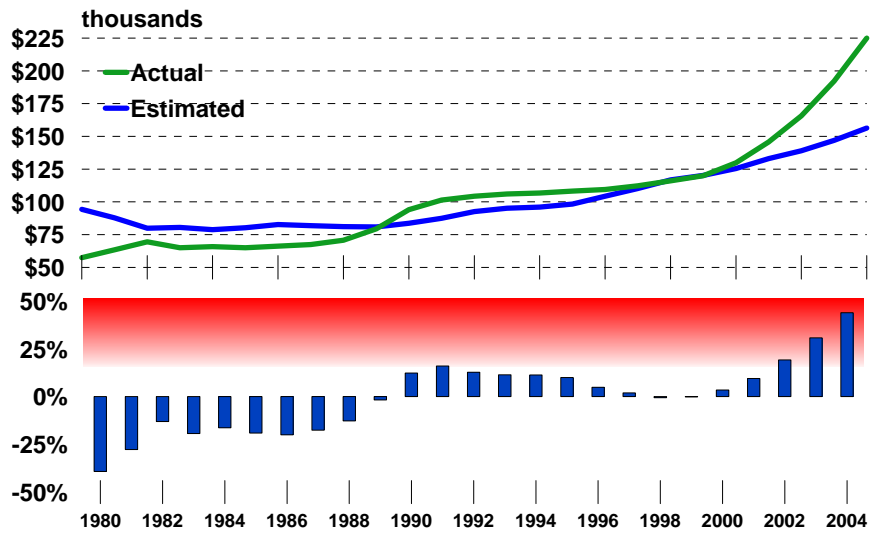
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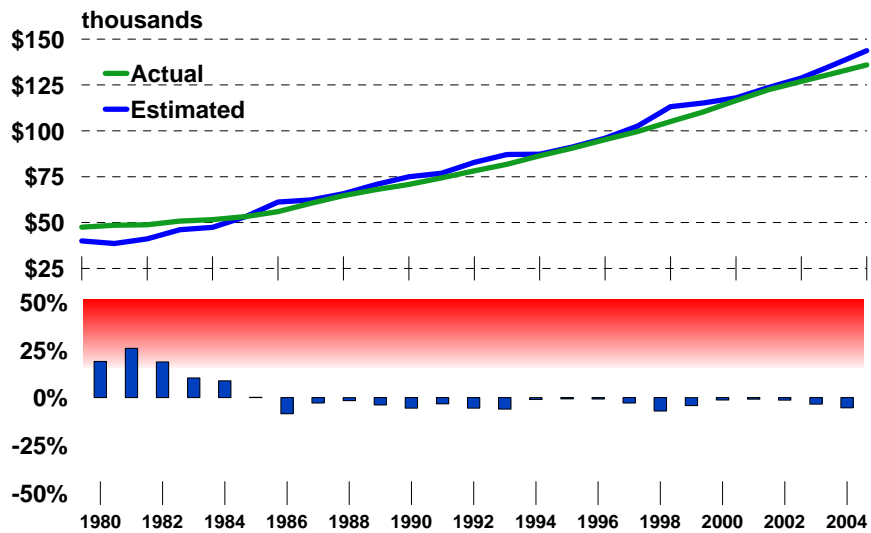
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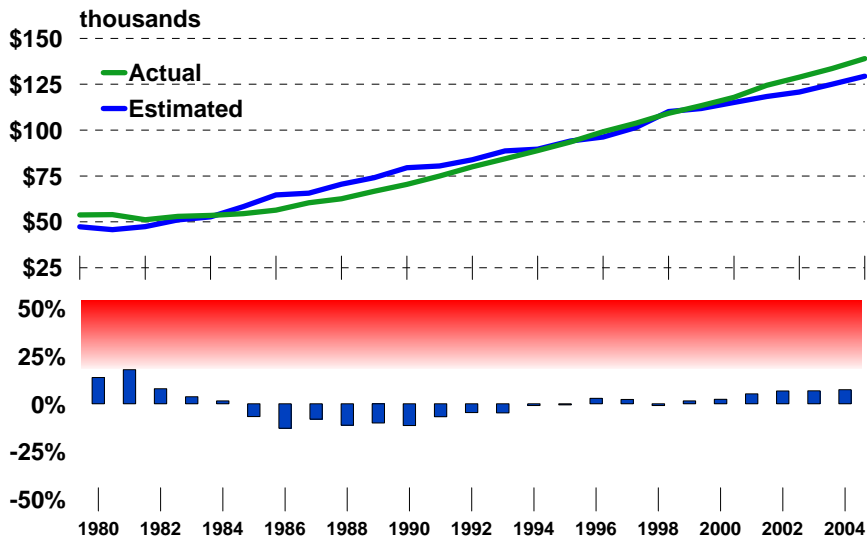
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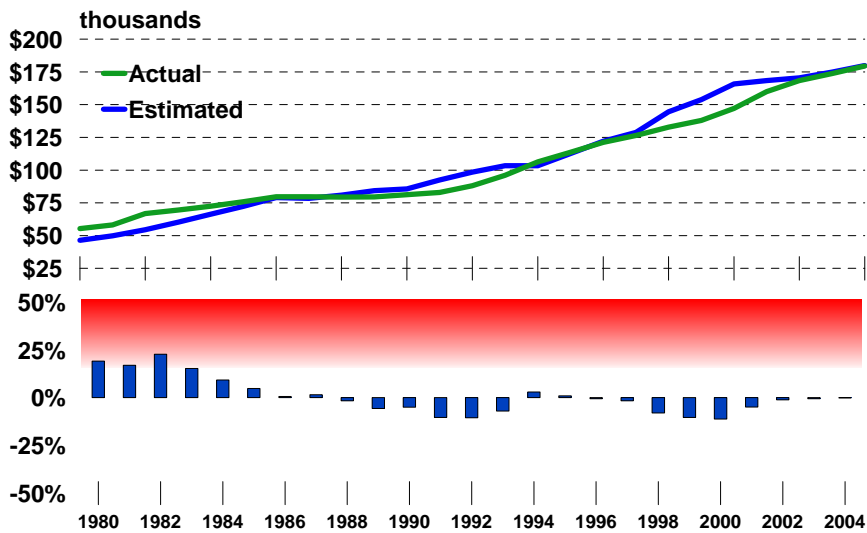
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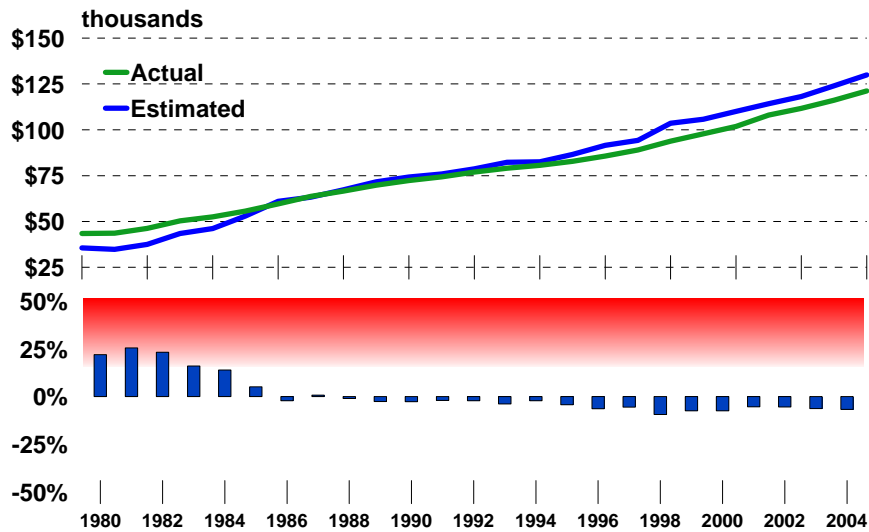
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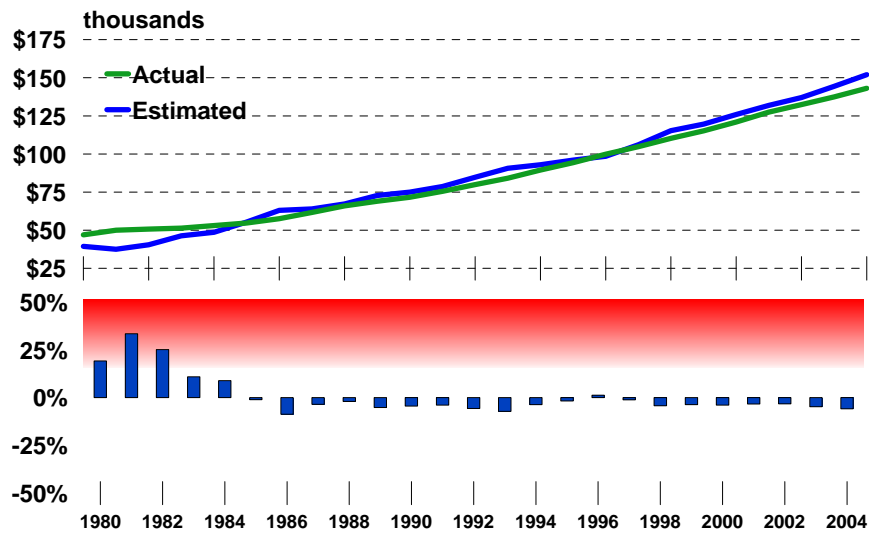
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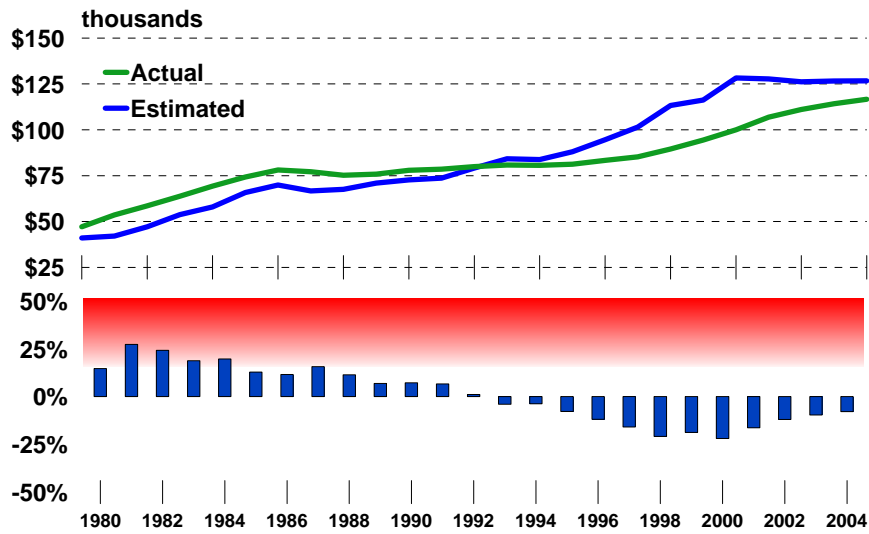
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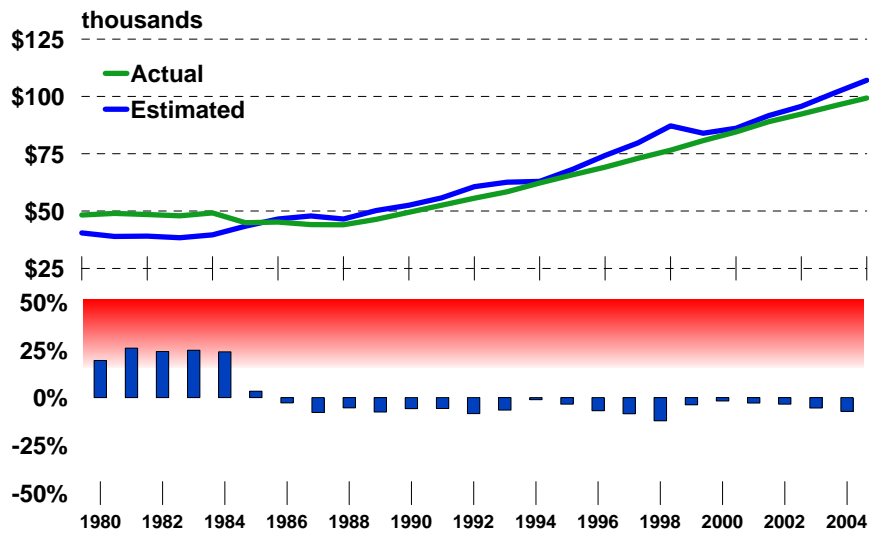
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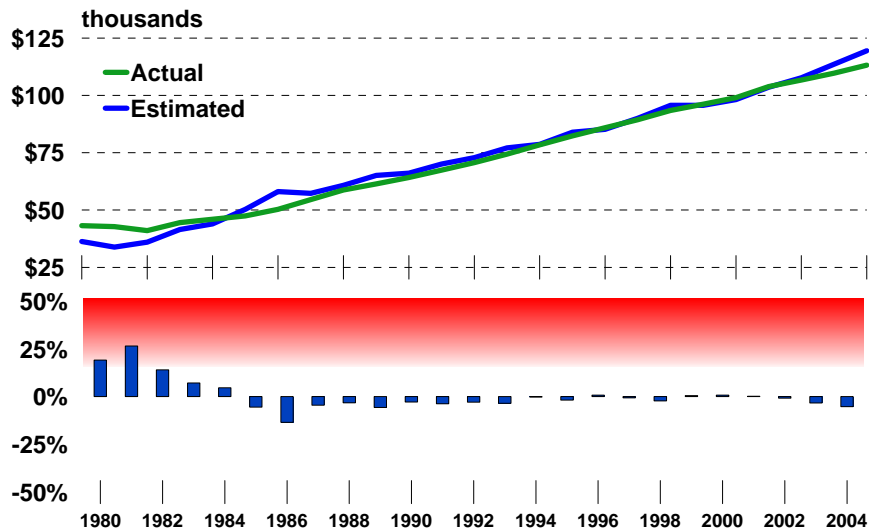
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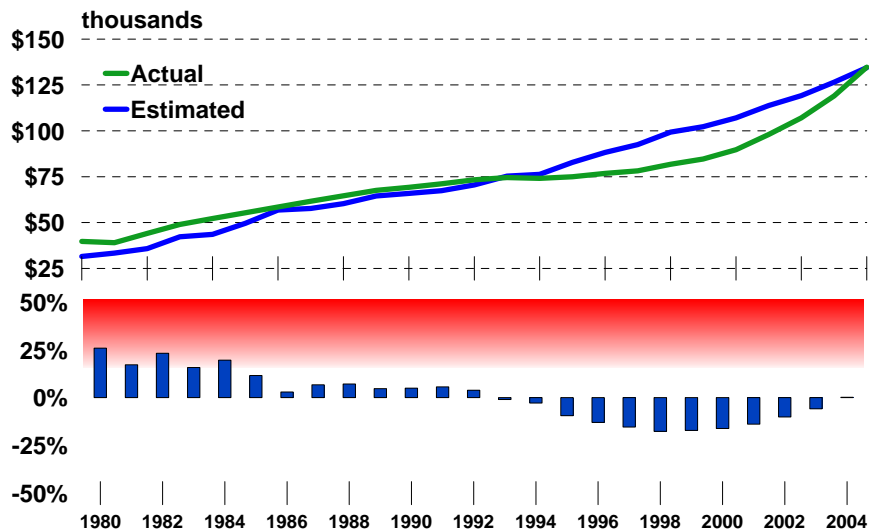
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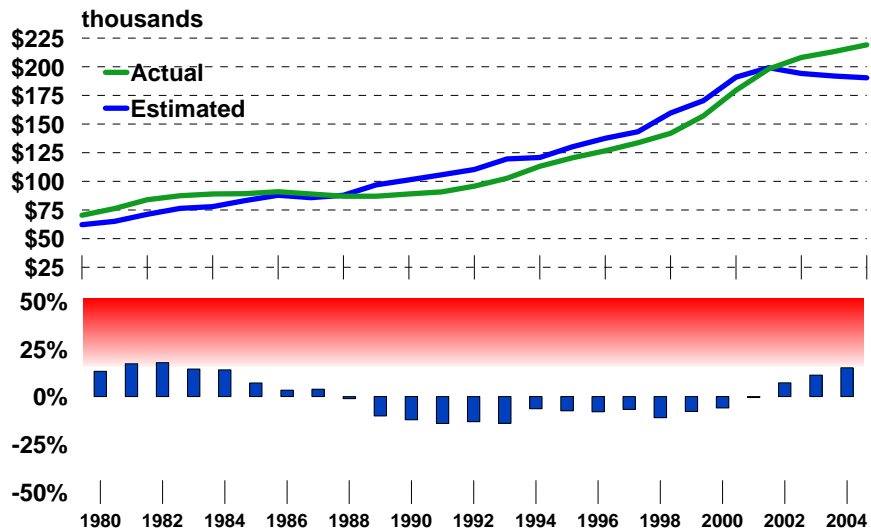
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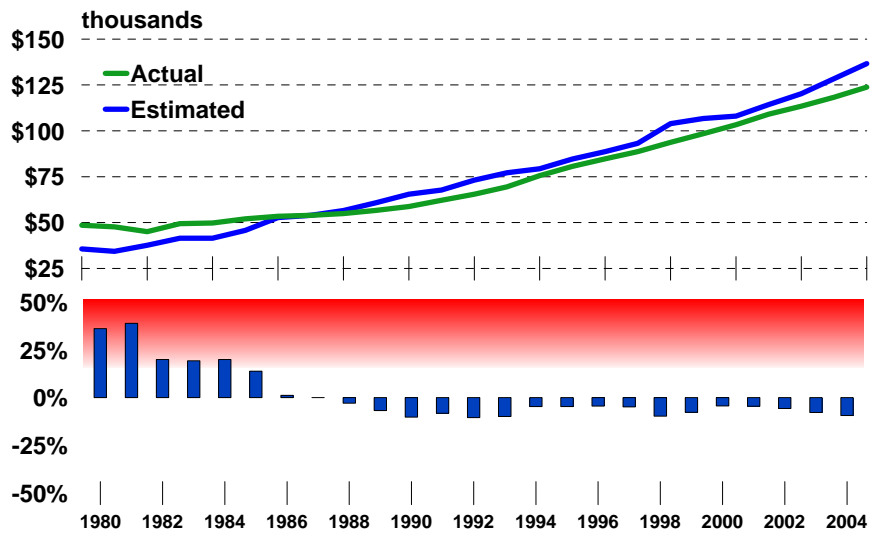
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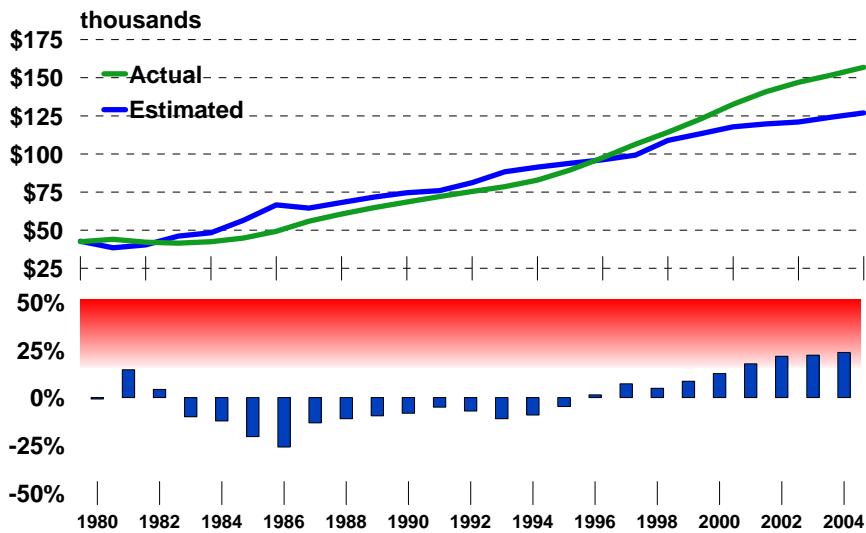
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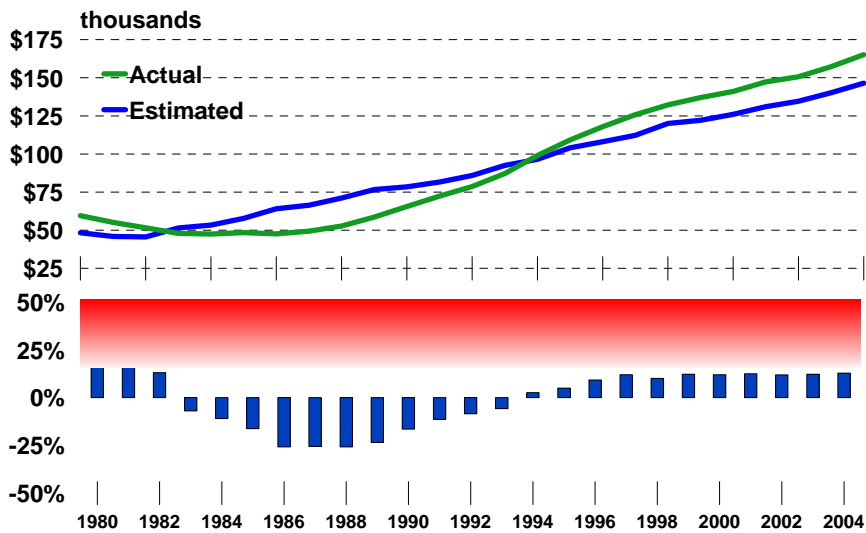
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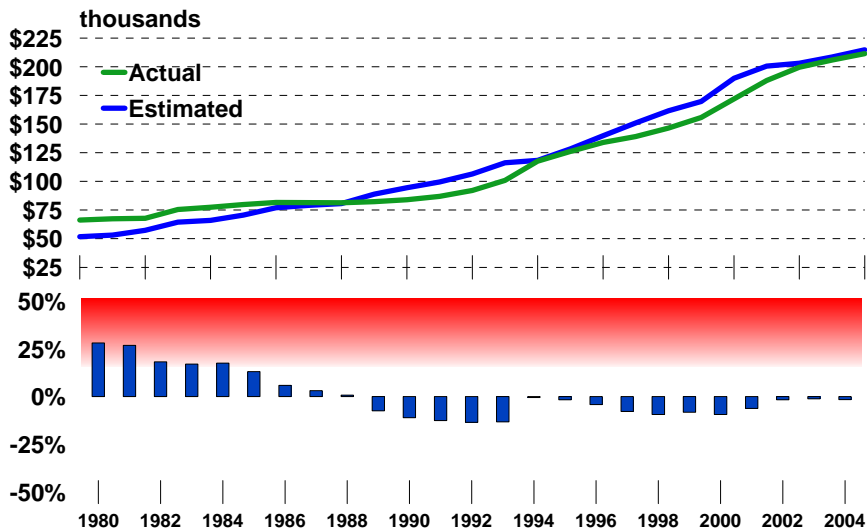
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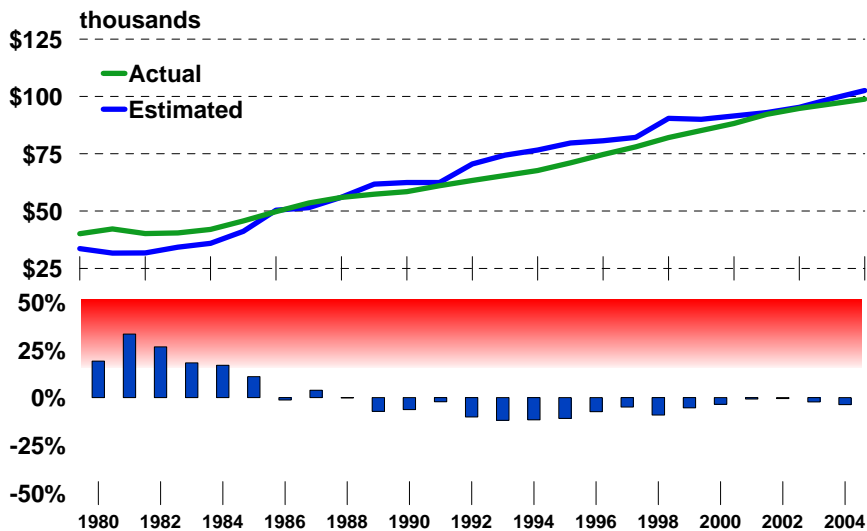
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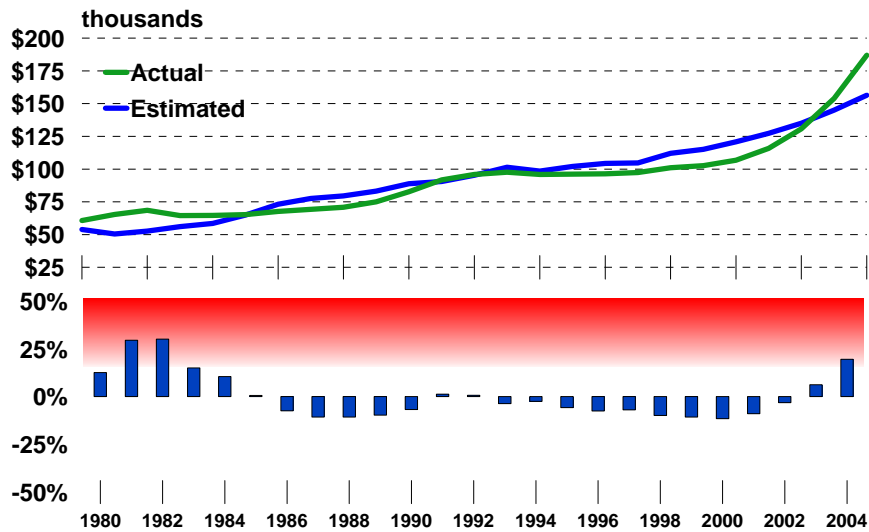
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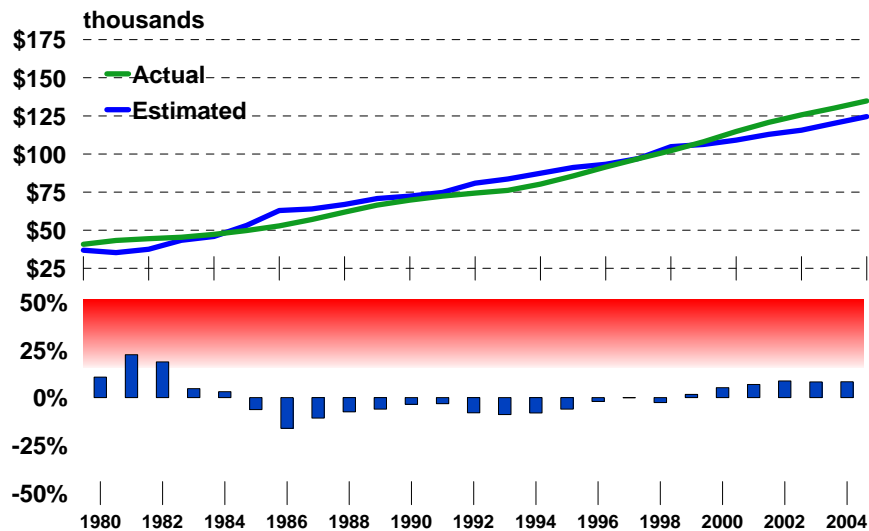
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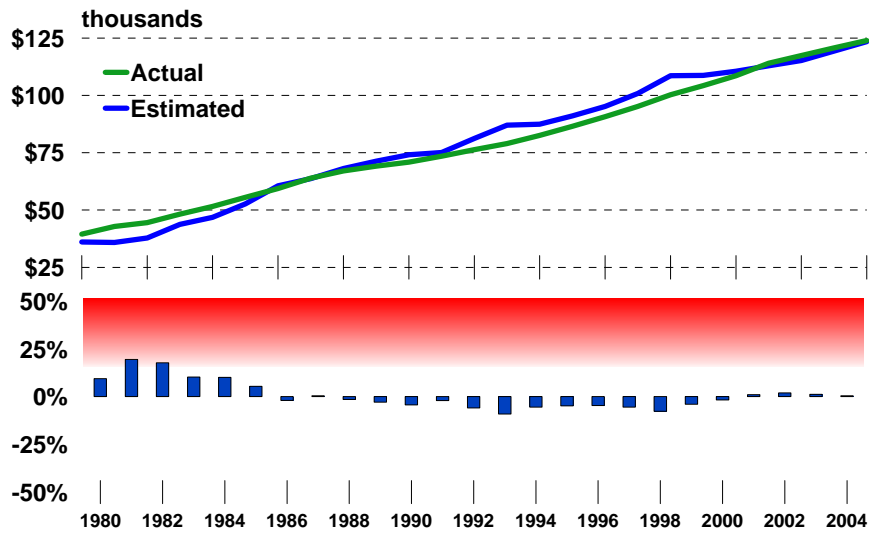
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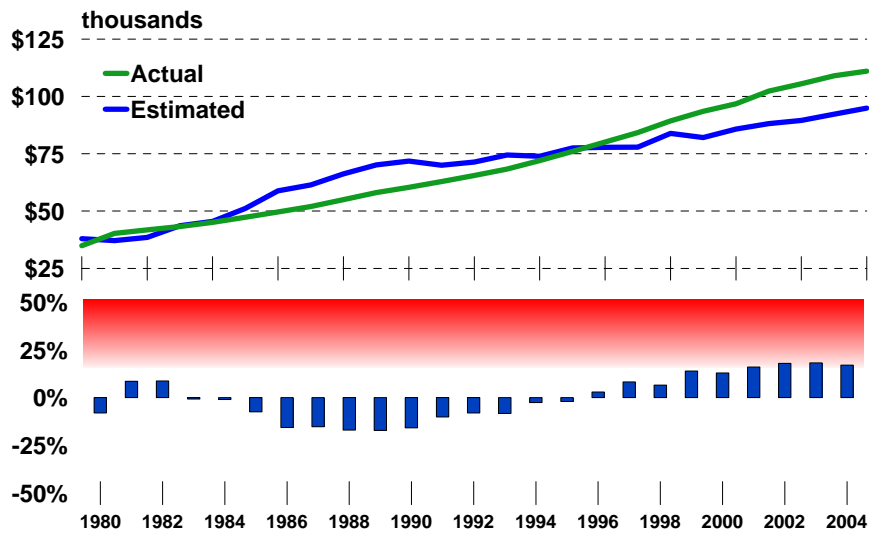
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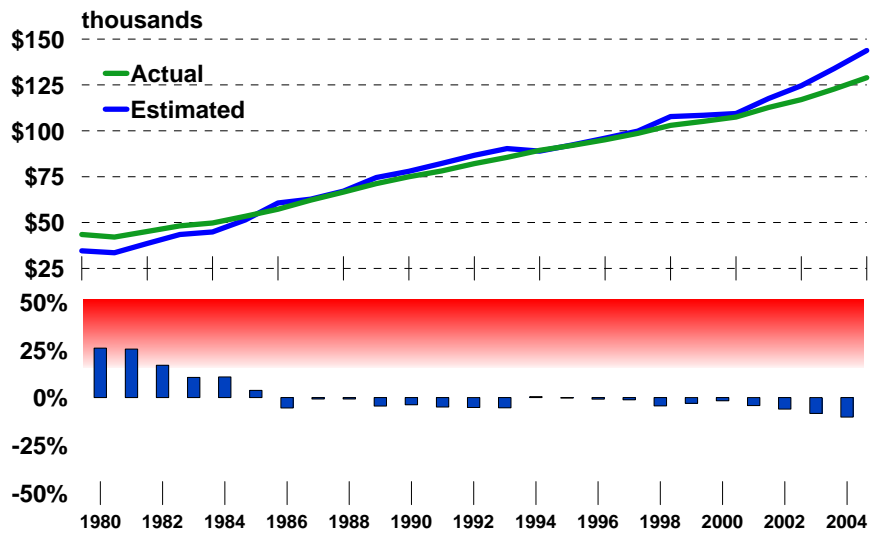
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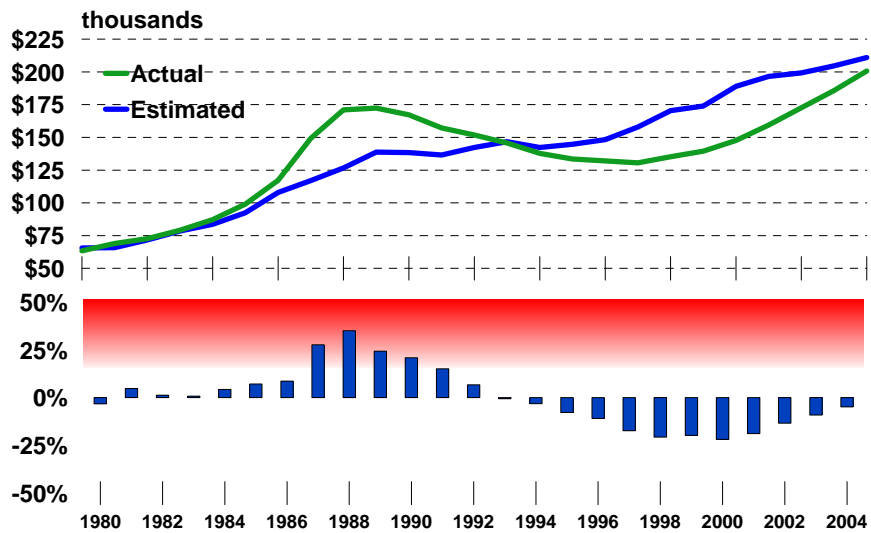
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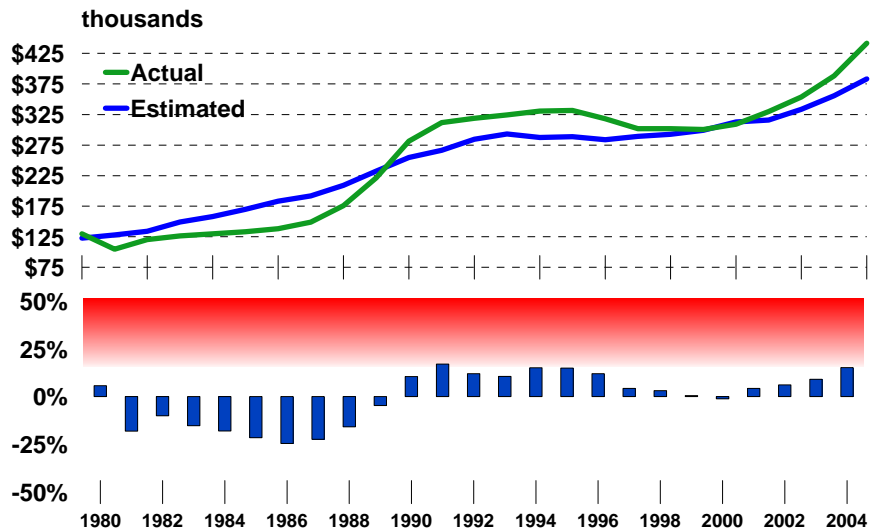
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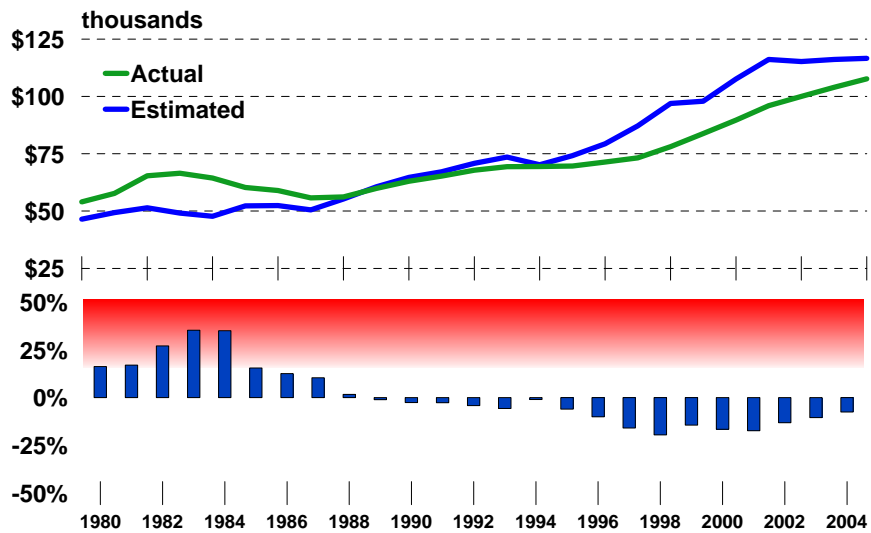
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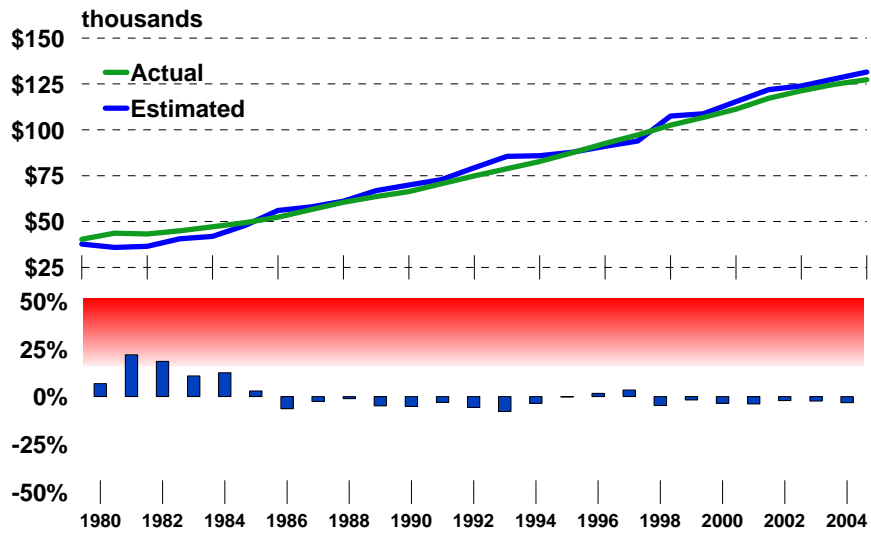
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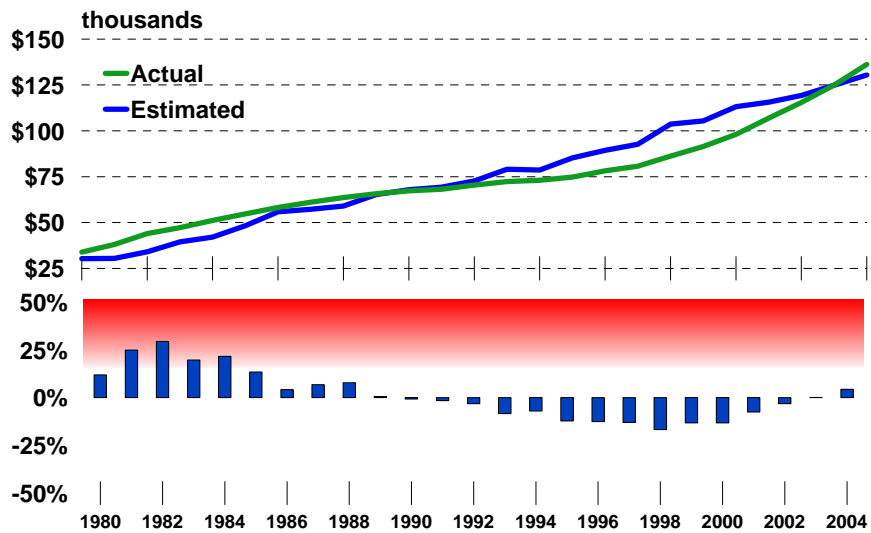
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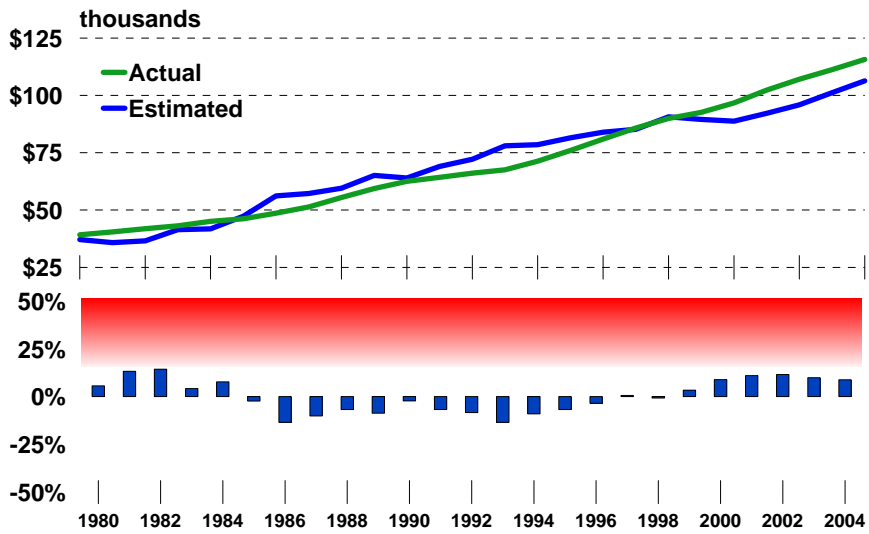
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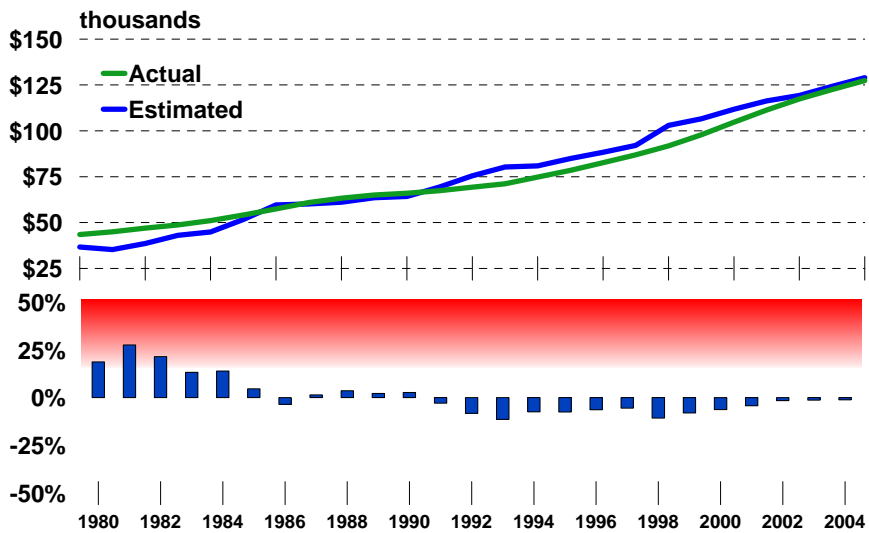
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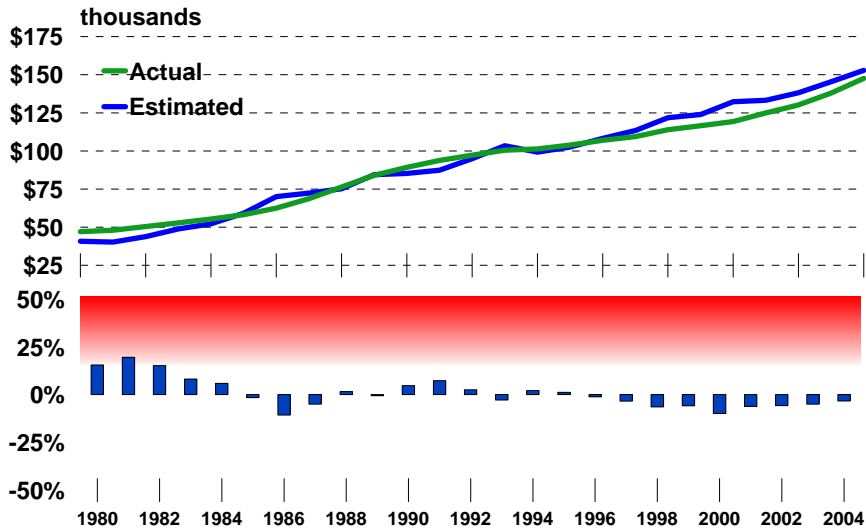
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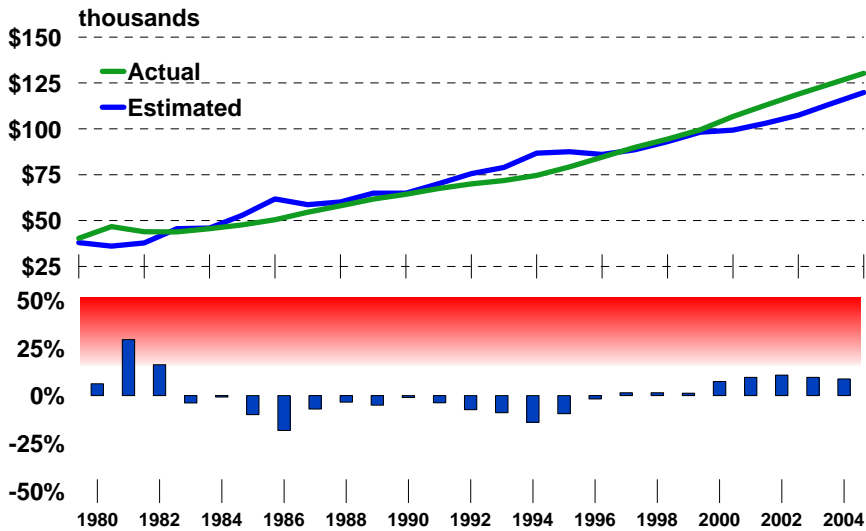
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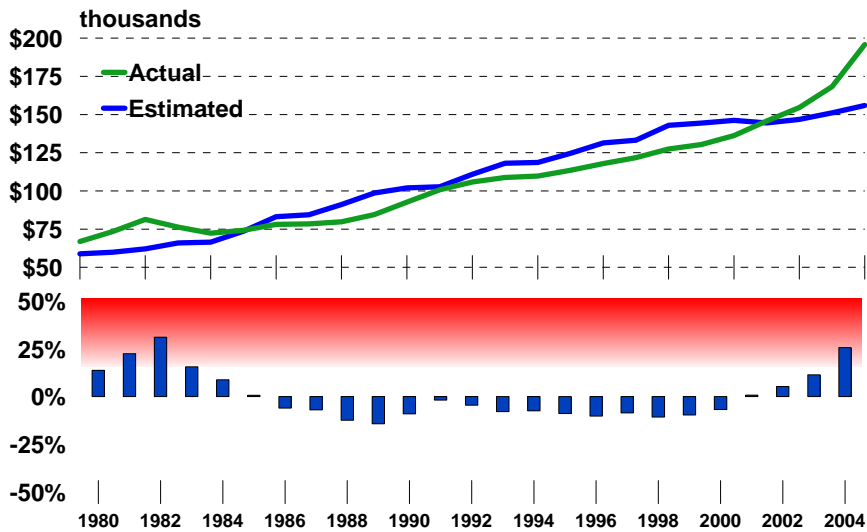
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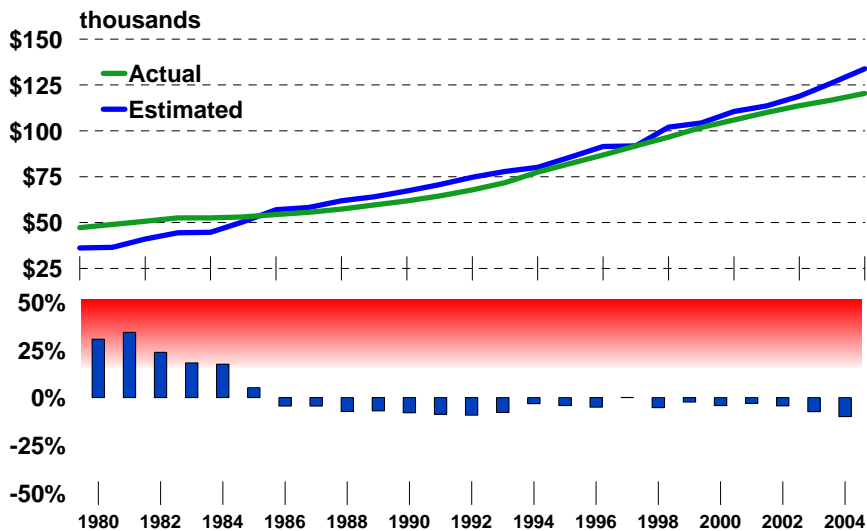
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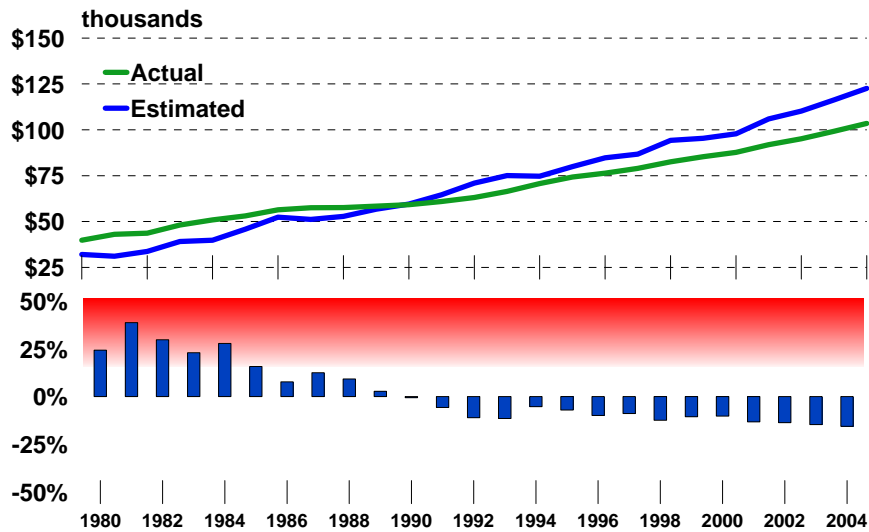
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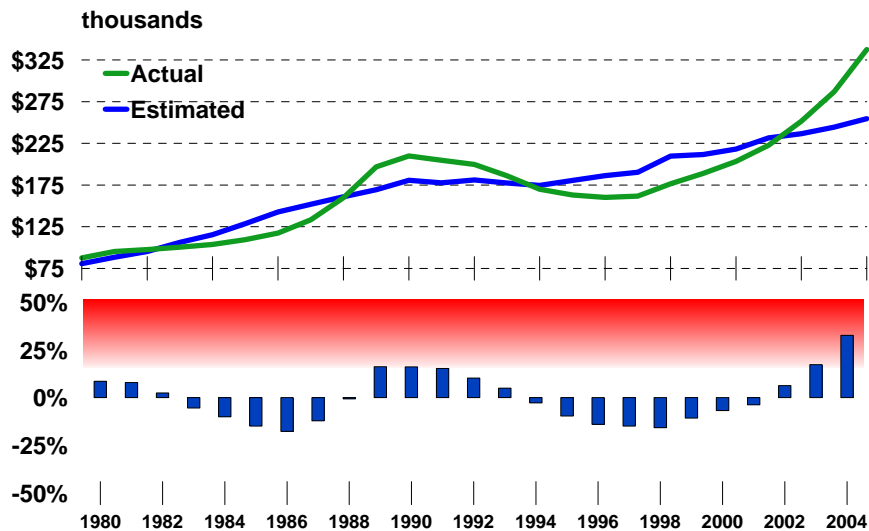
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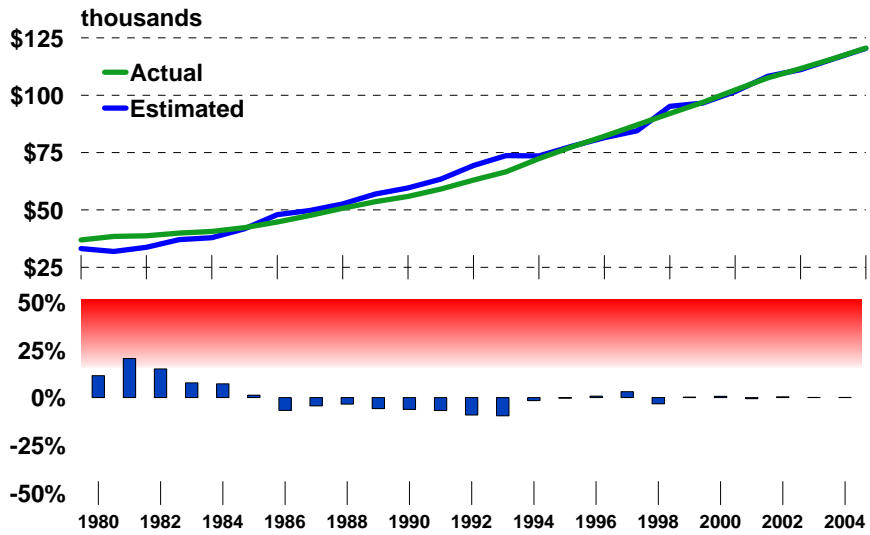
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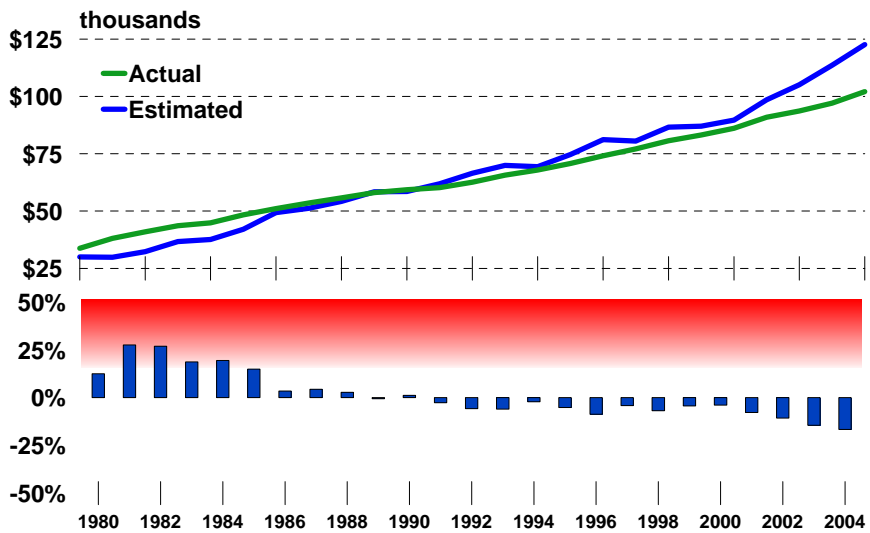
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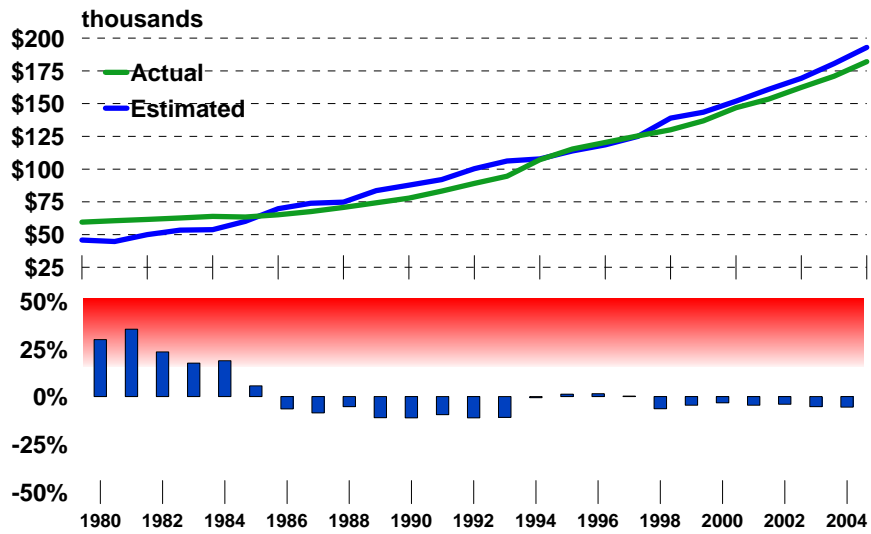
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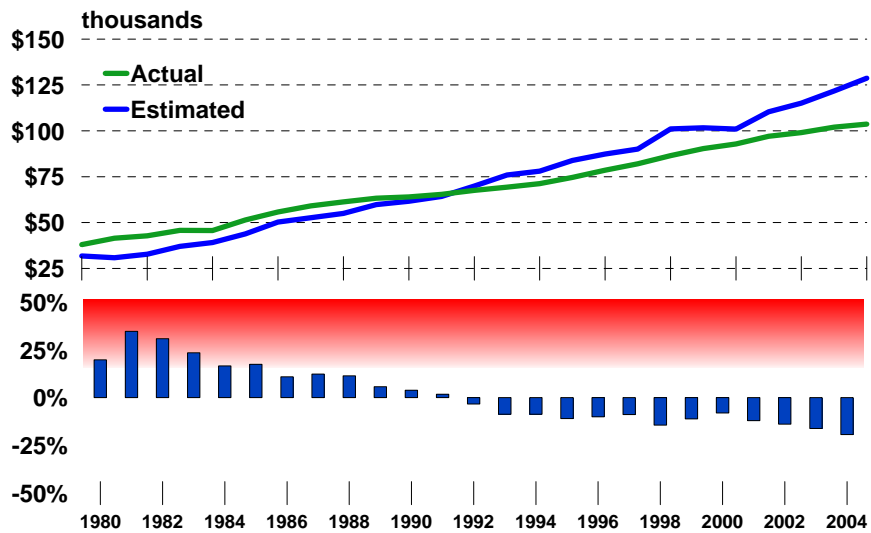
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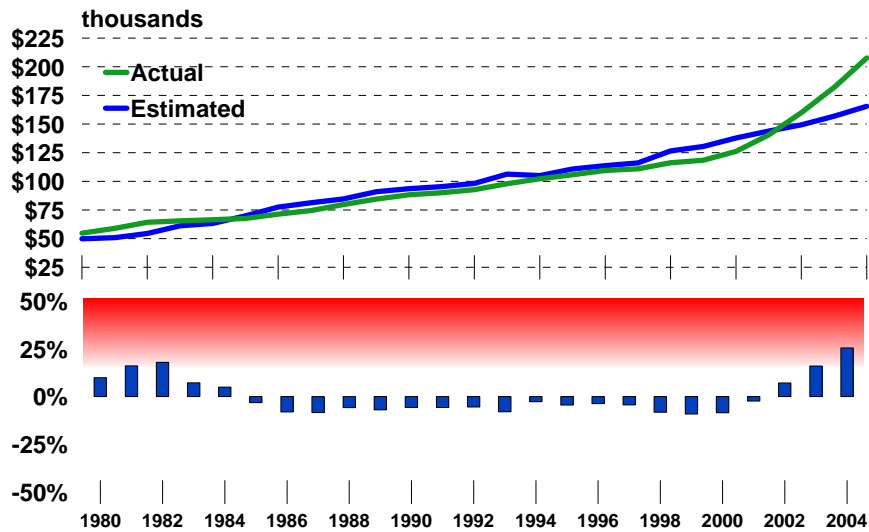
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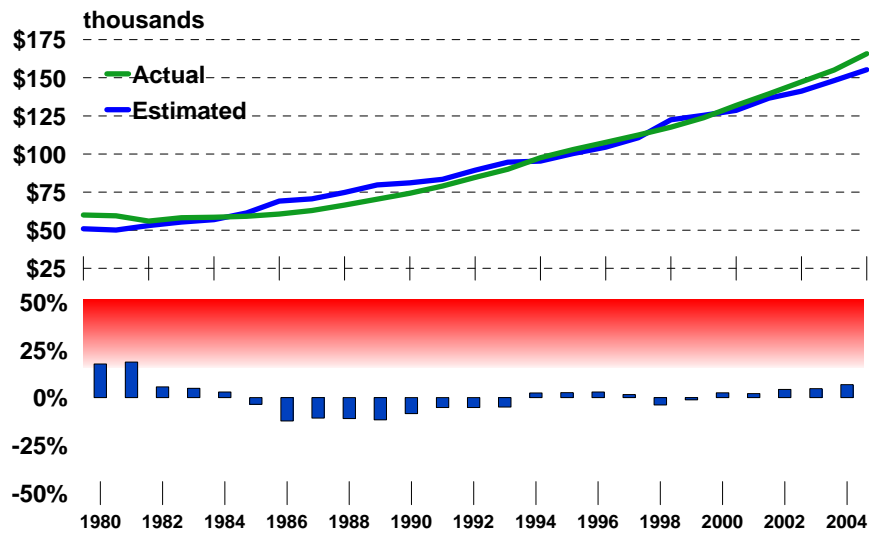
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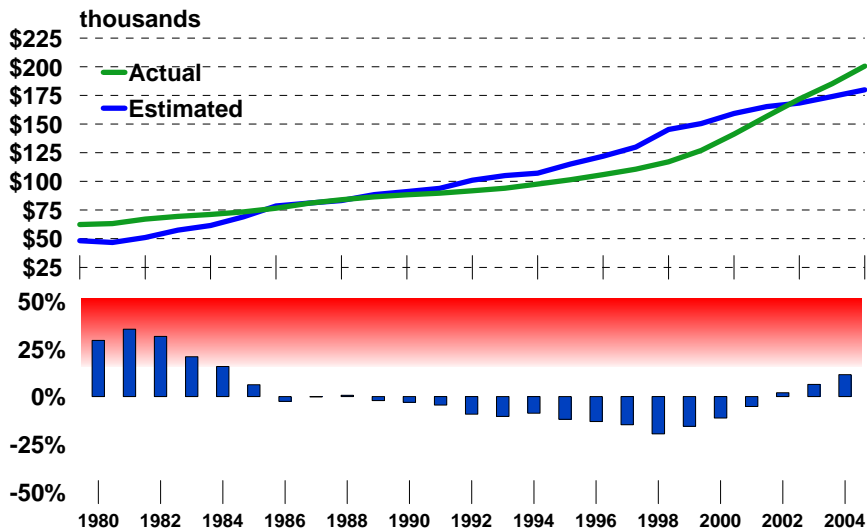
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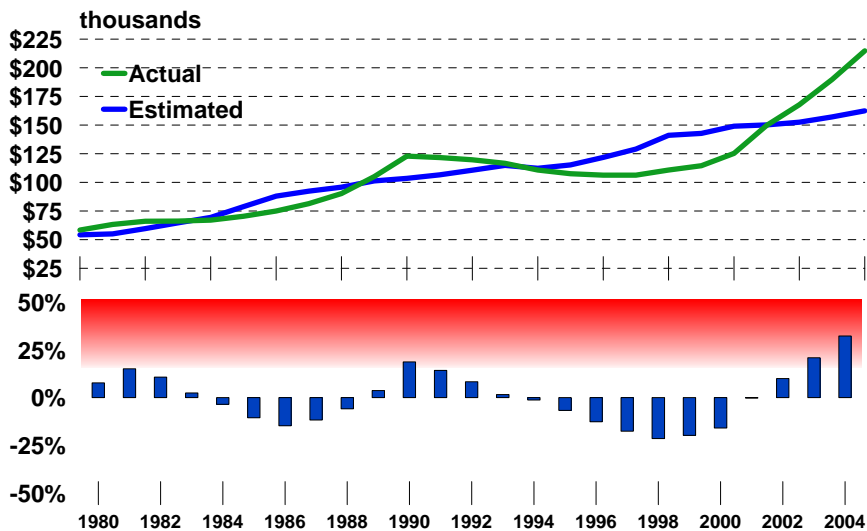
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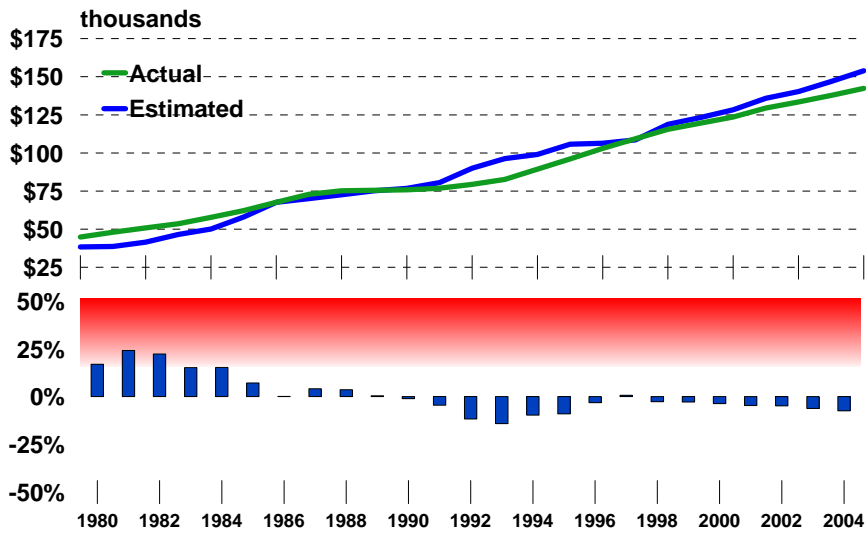
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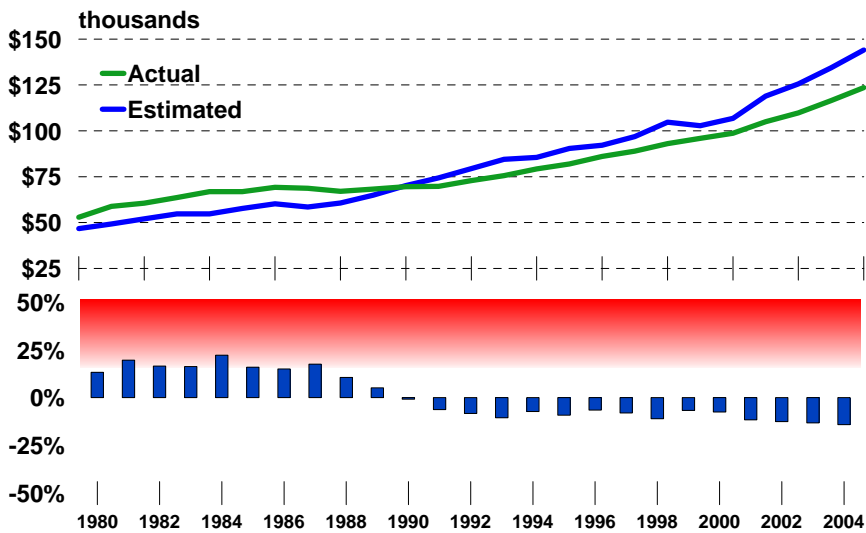
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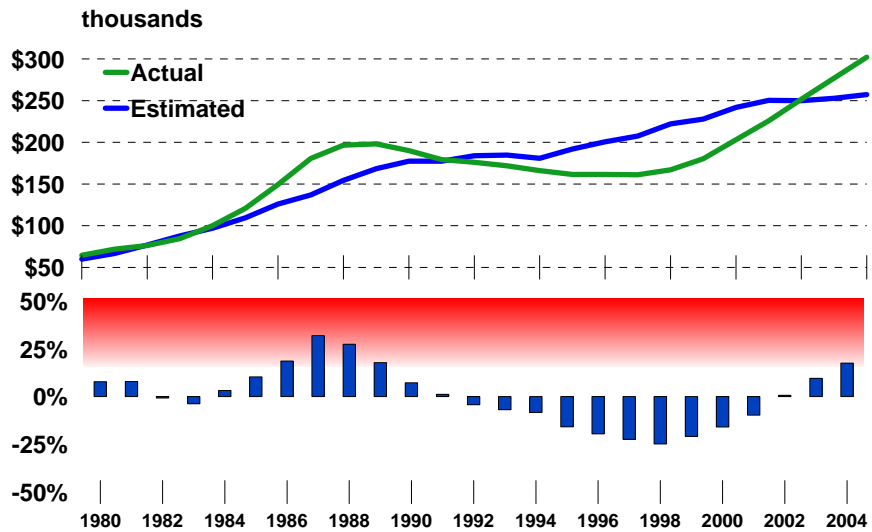
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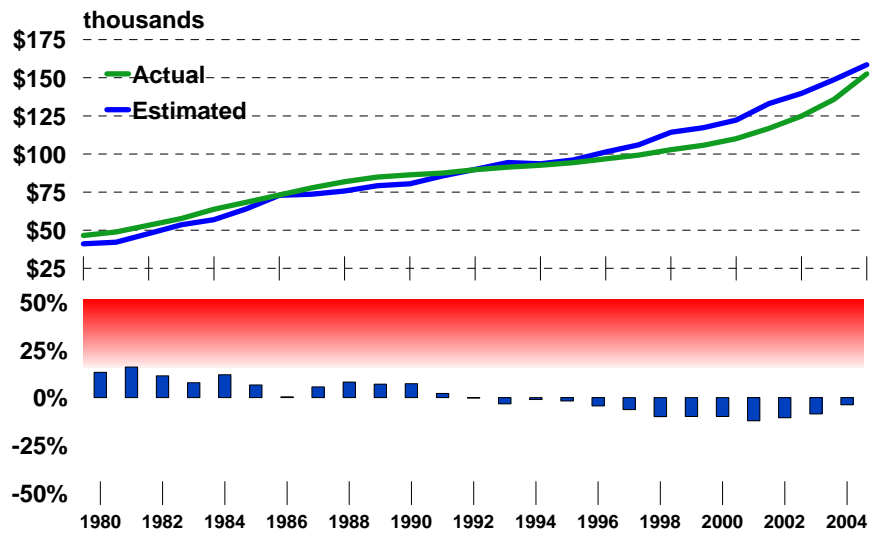
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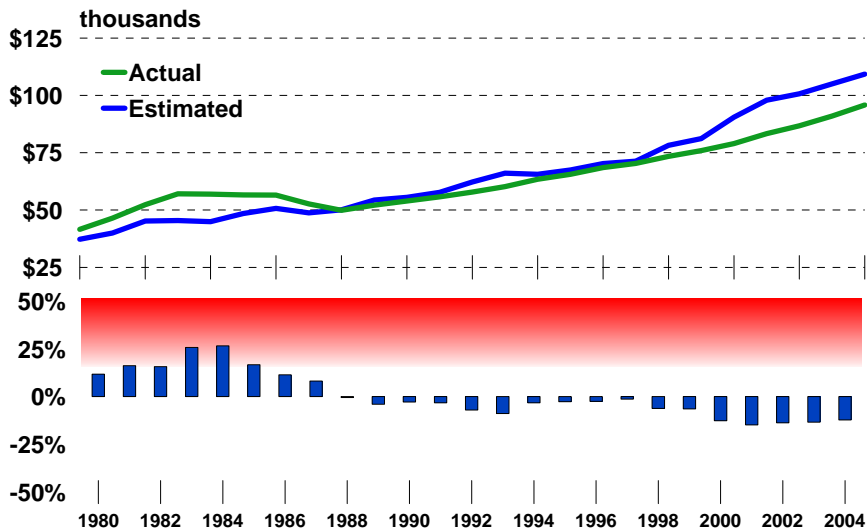
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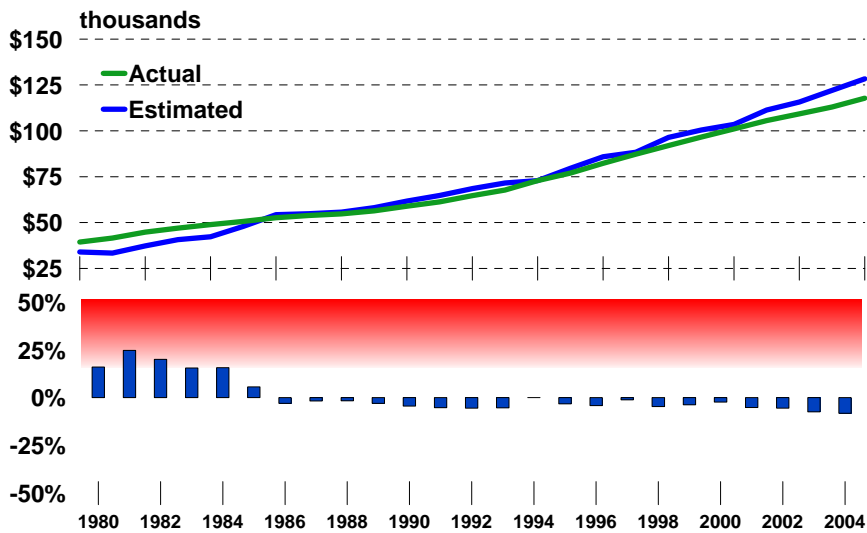
# Norfolk, VA



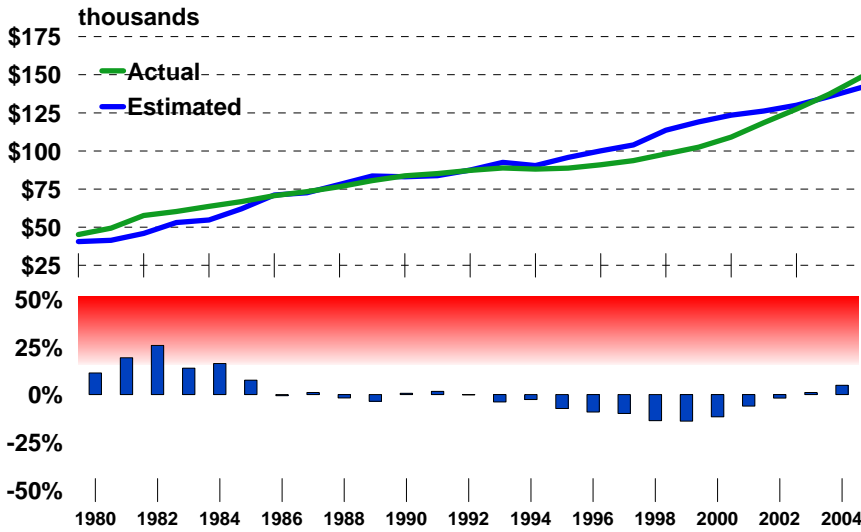
# Oklahoma City, OK



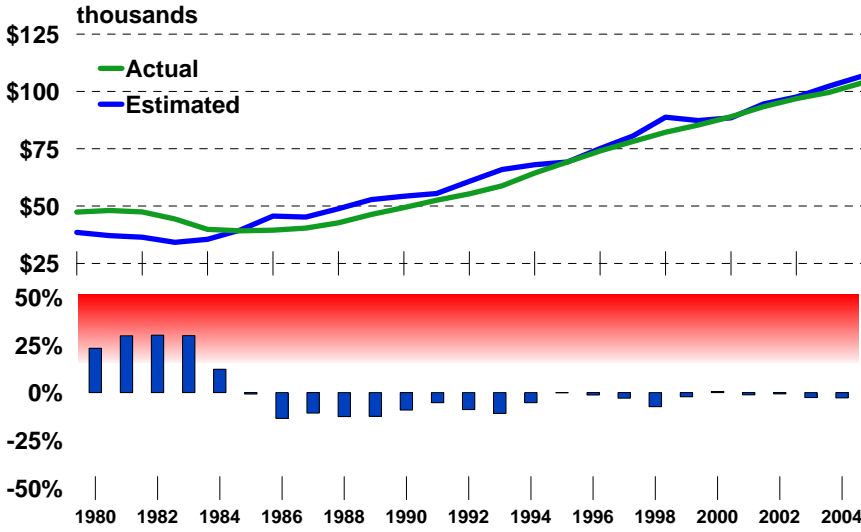
# Omaha, NE



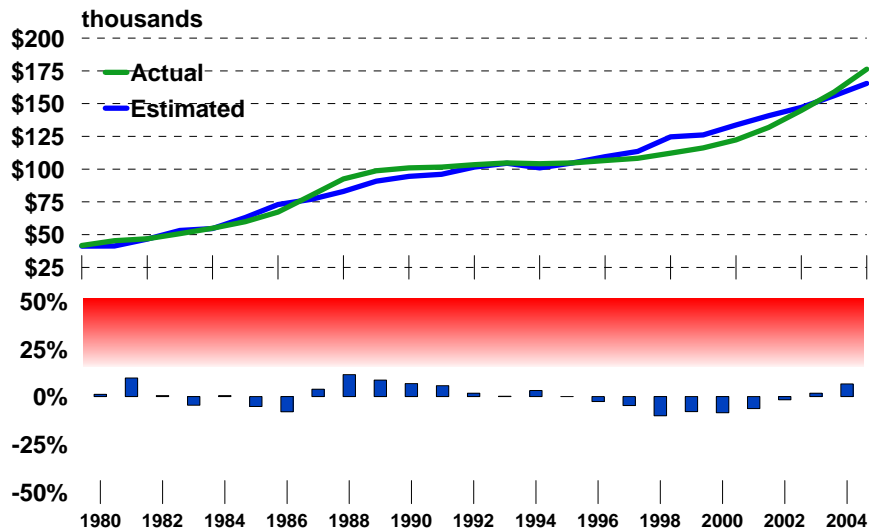
# Orlando, FL



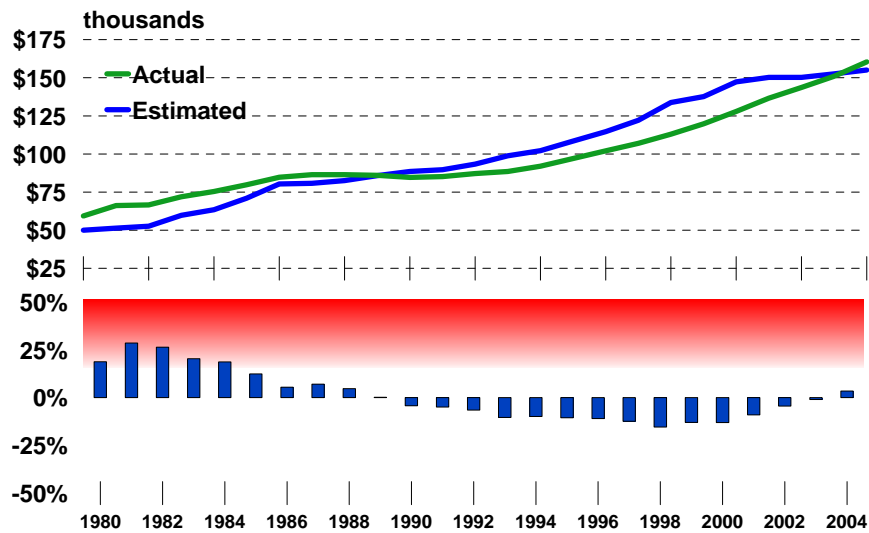
# Peoria, IL



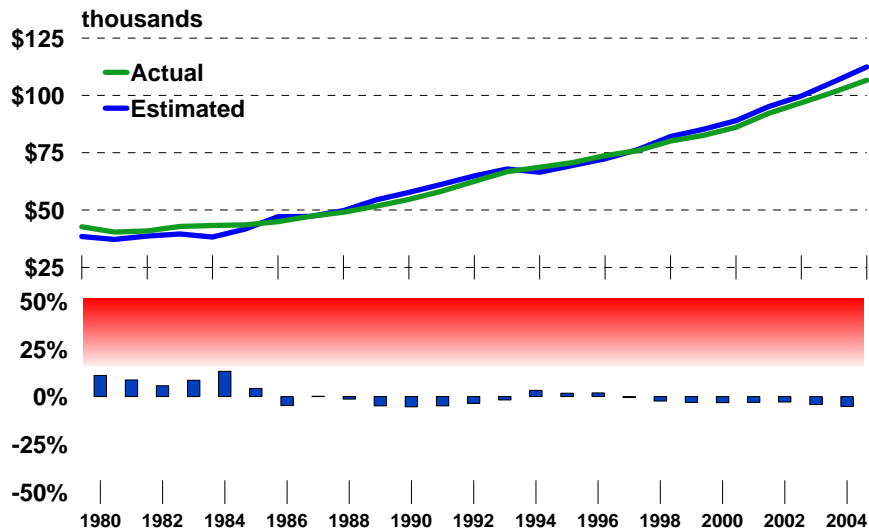
# Philadelphia, PA



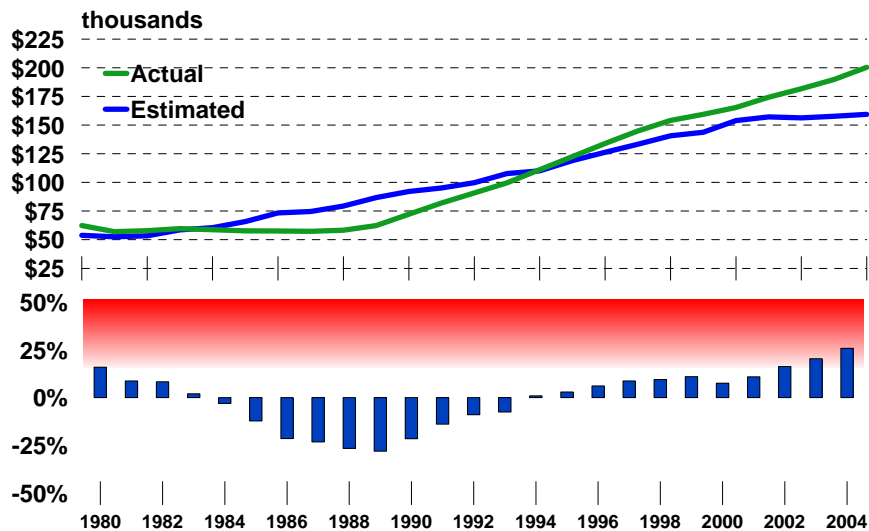
# Phoenix, AZ



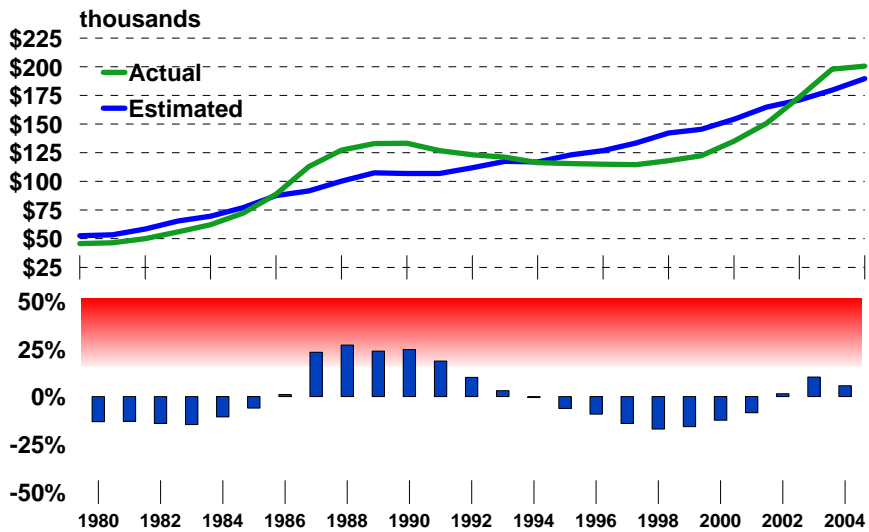
# Pittsburgh, PA



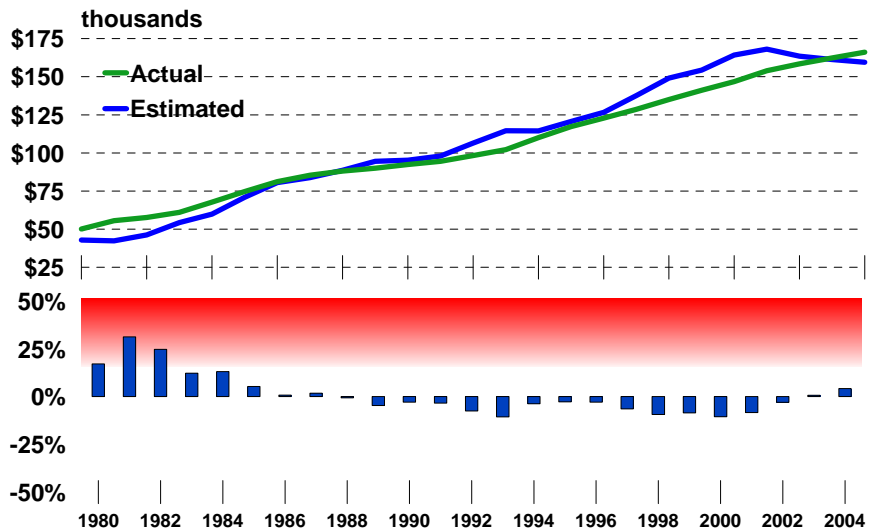
# Portland, OR



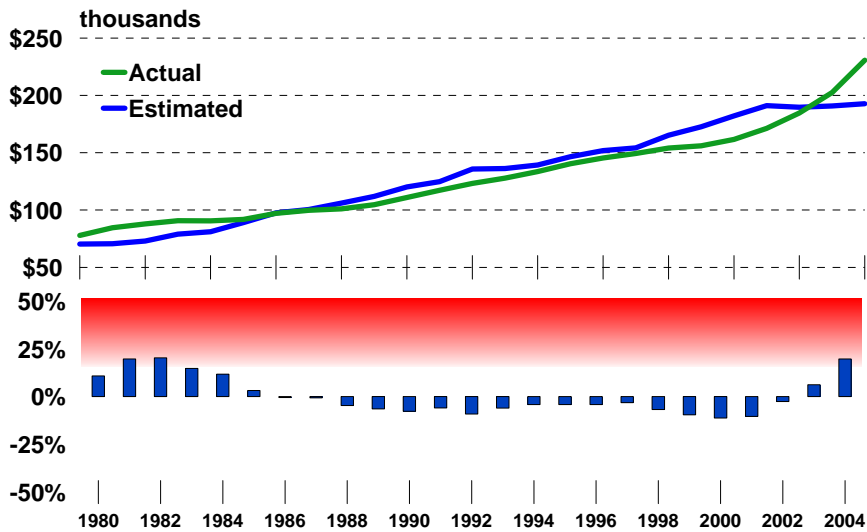
# Providence, RI



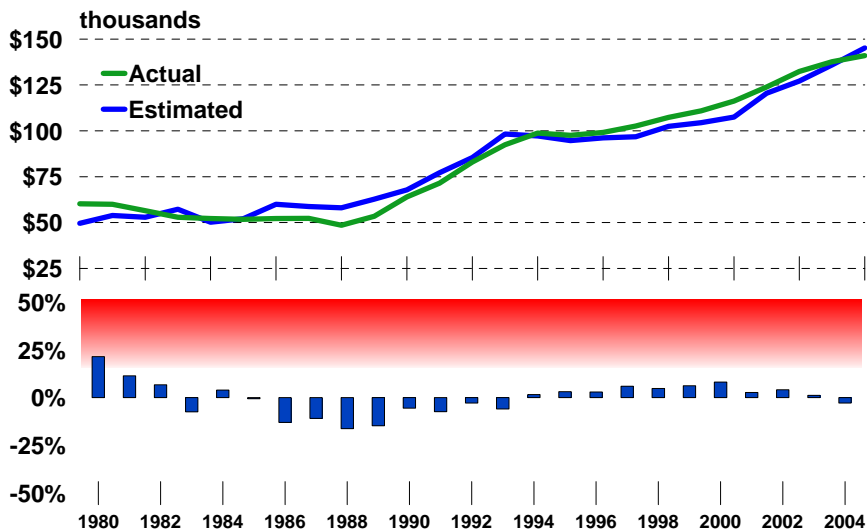
# Raleigh, NC



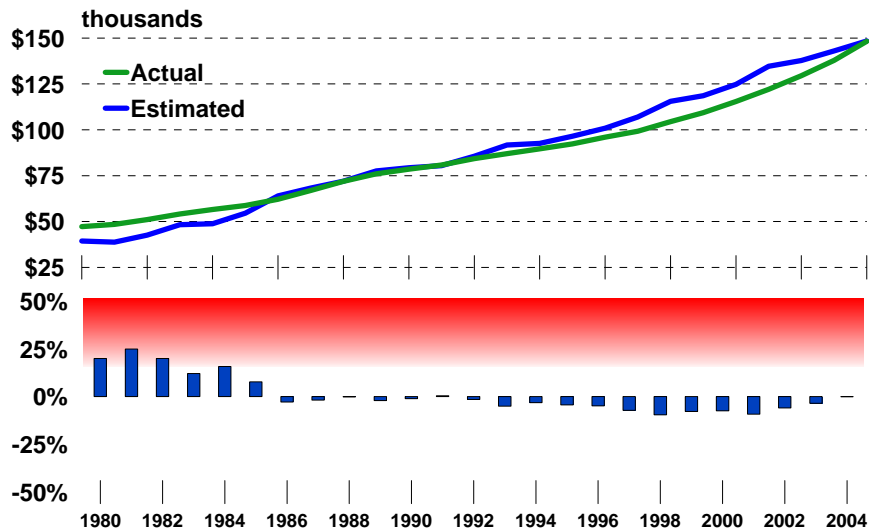
# Reno, NV



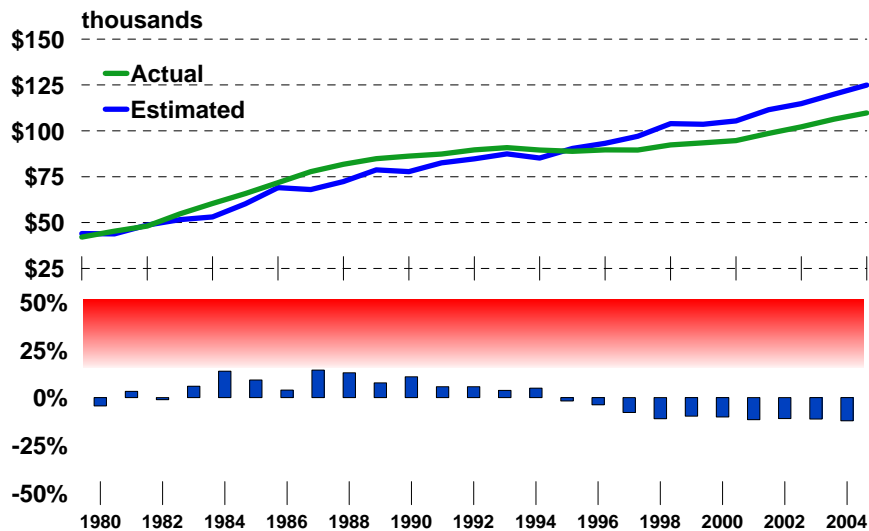
# Richland, WA



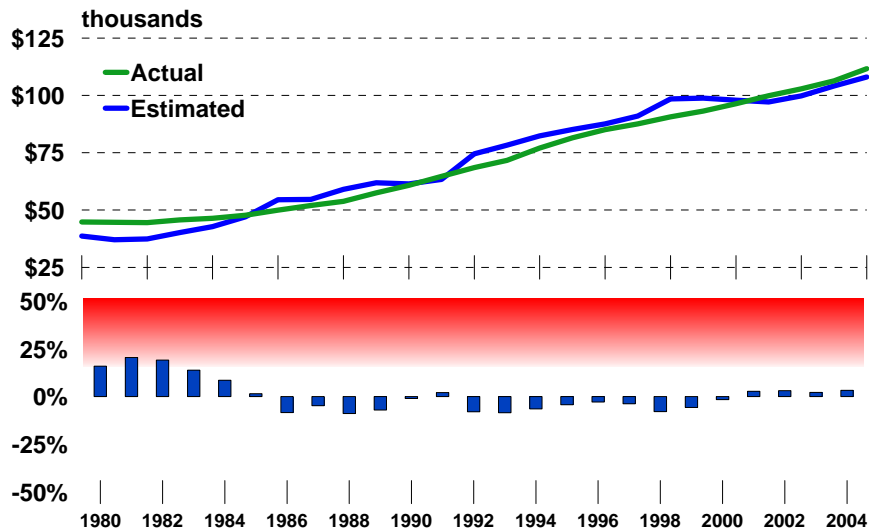
# Richmond, VA



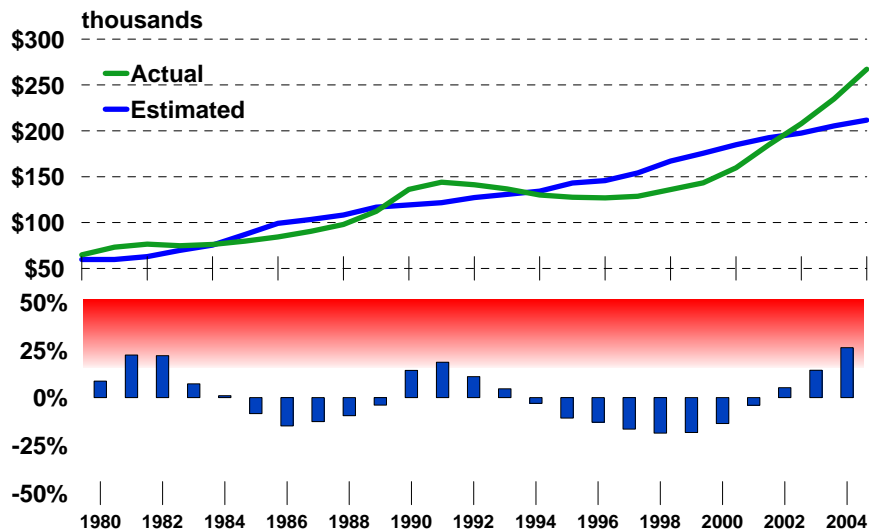
# Rochester, NY



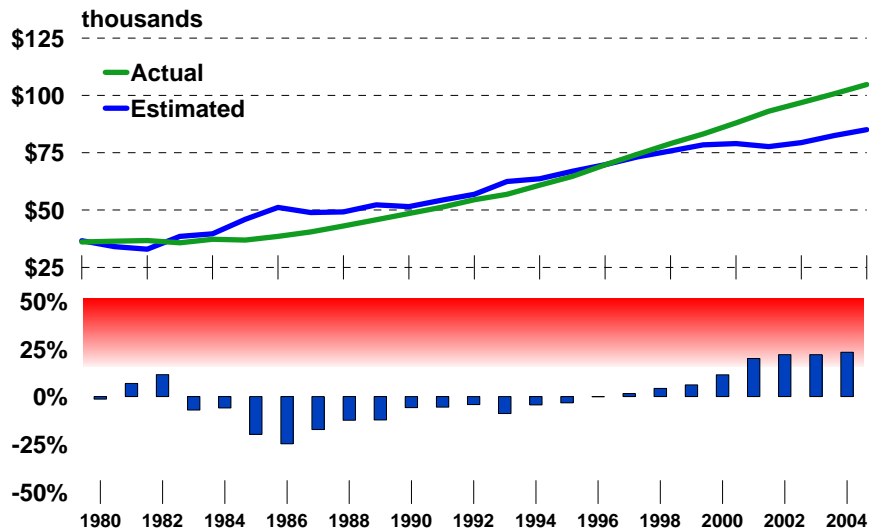
# Rockford, IL



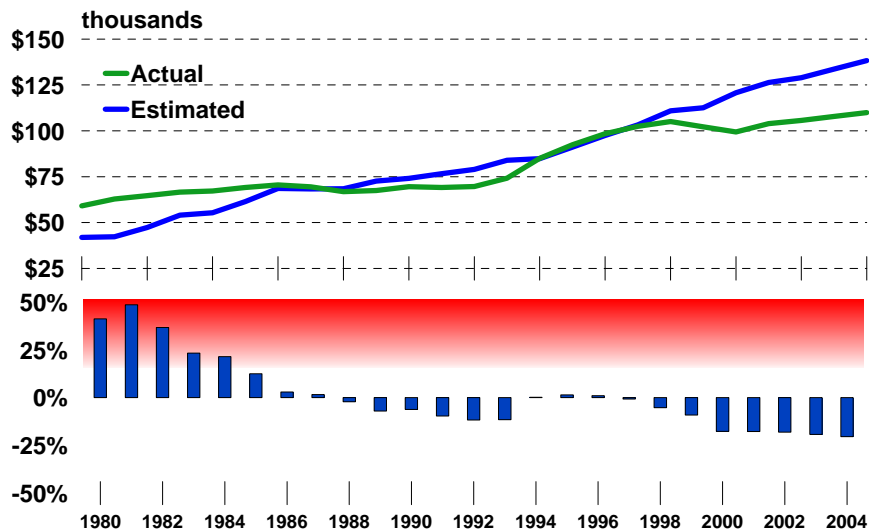
# Sacramento, CA



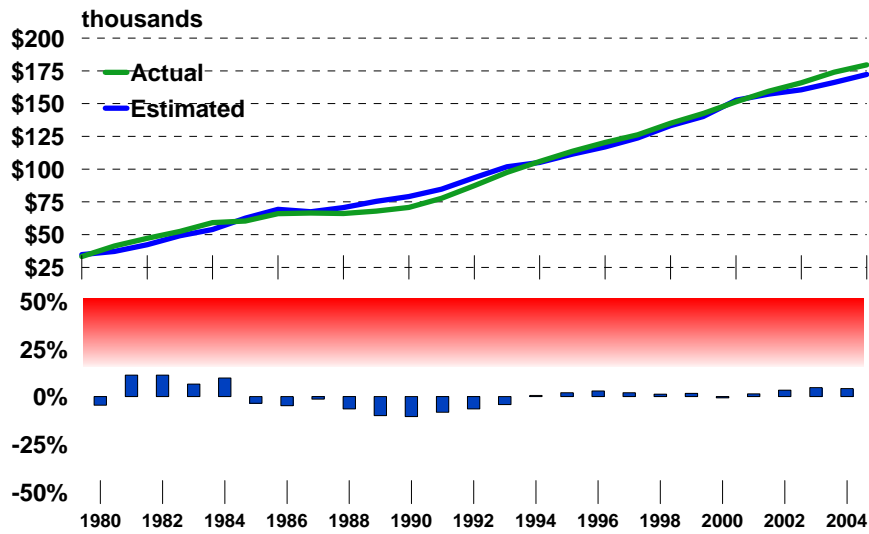
# Saginaw, MI



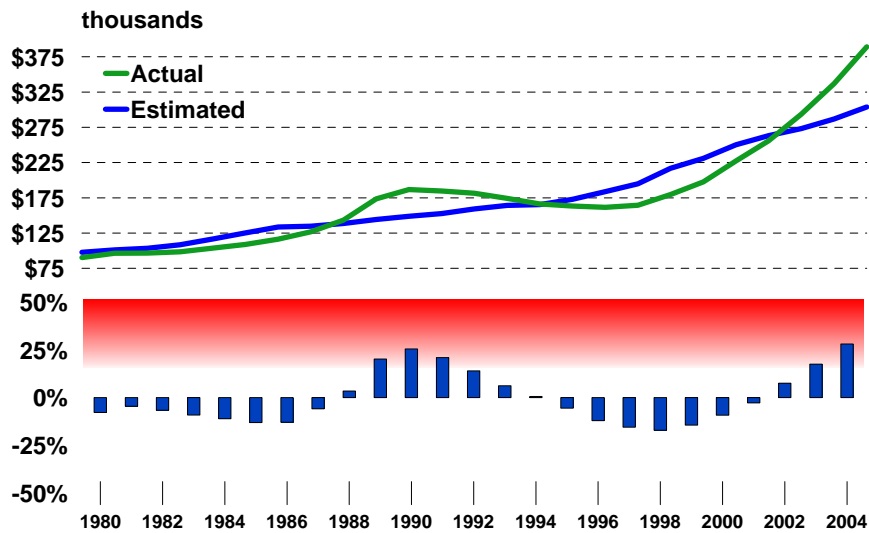
# Salt Lake, UT



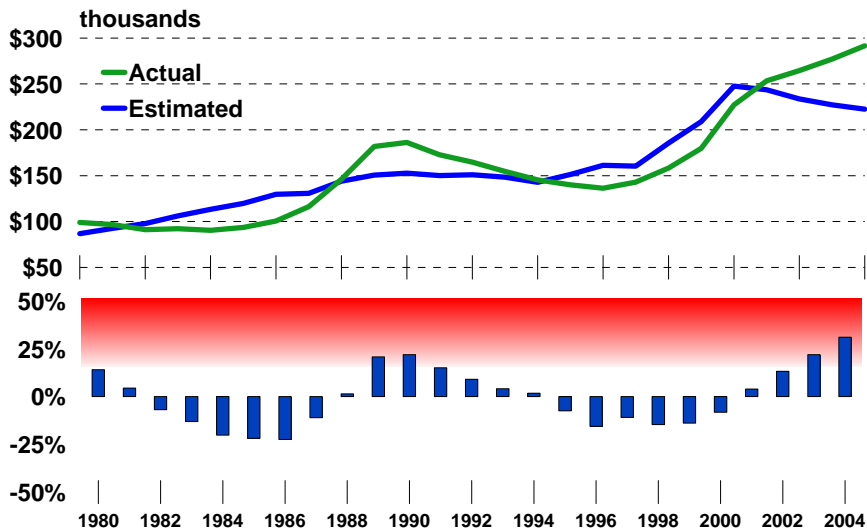
# San Antonio, TX



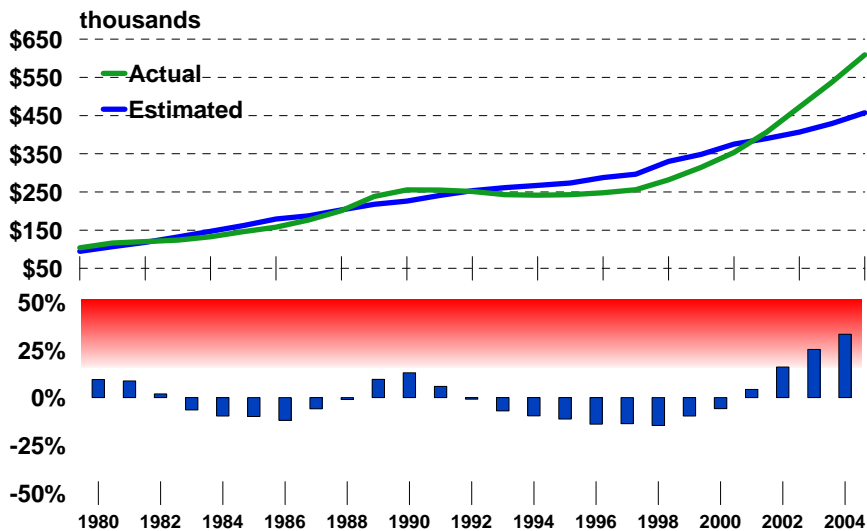
# San Diego, CA



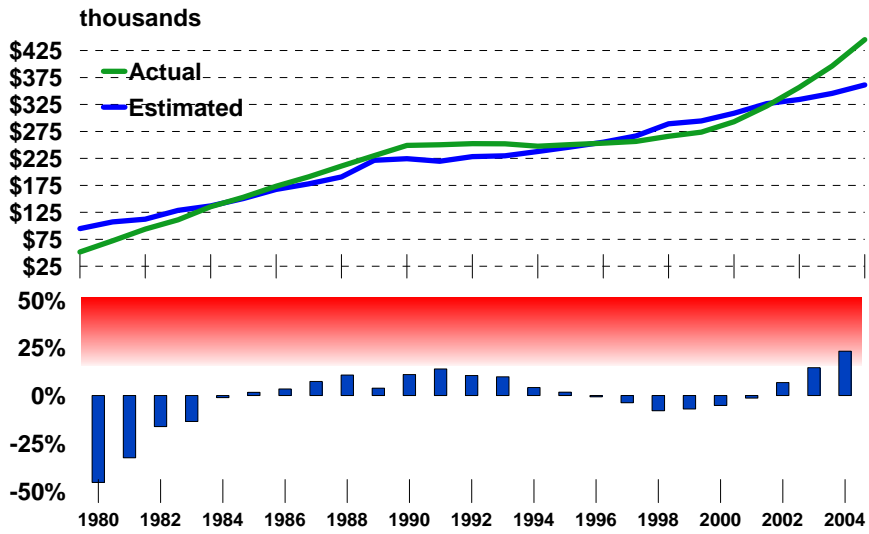
# San Francisco, CA



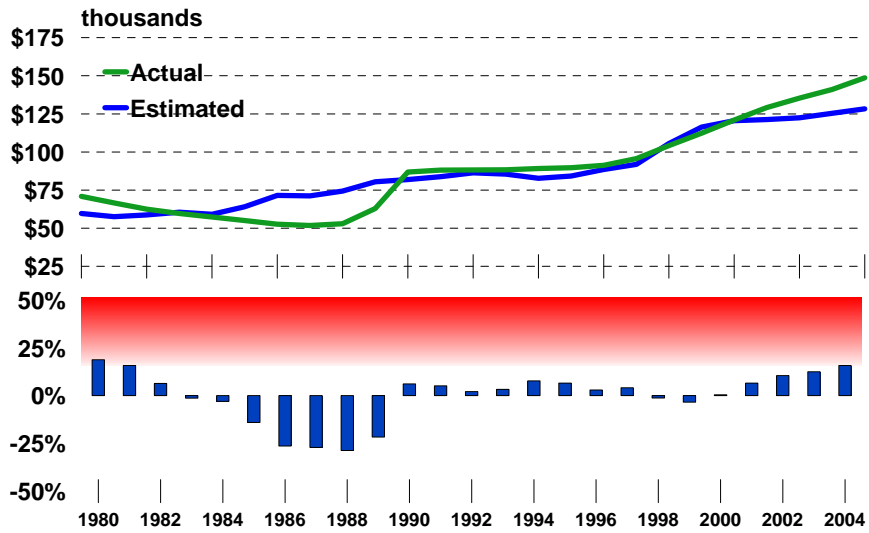
# Santa Barbara, CA



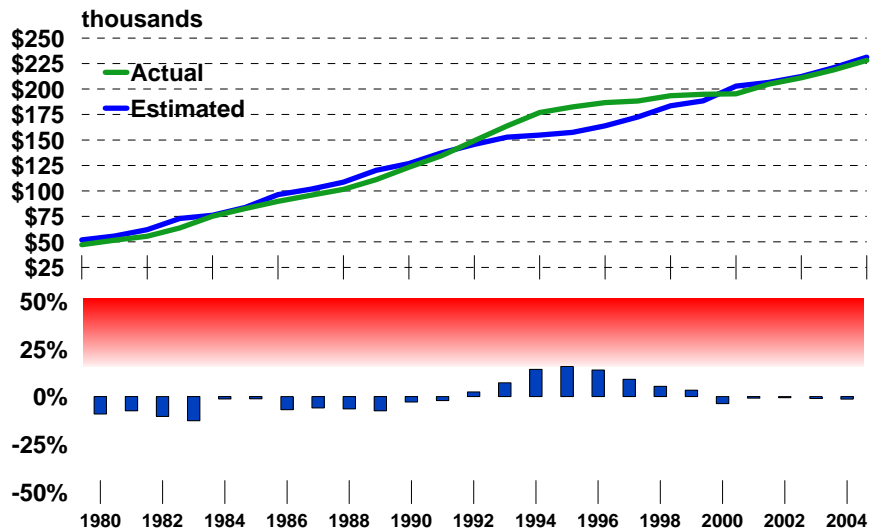
# Sarasota, FL



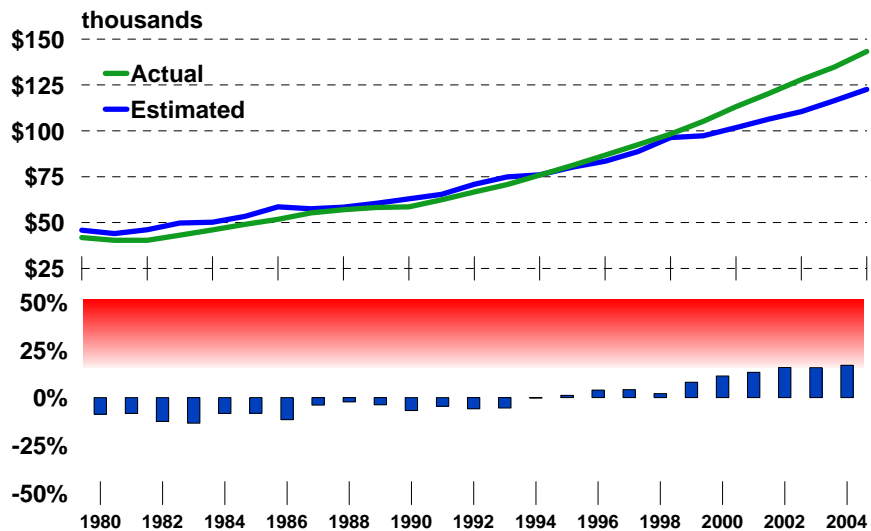
# Seattle, WA



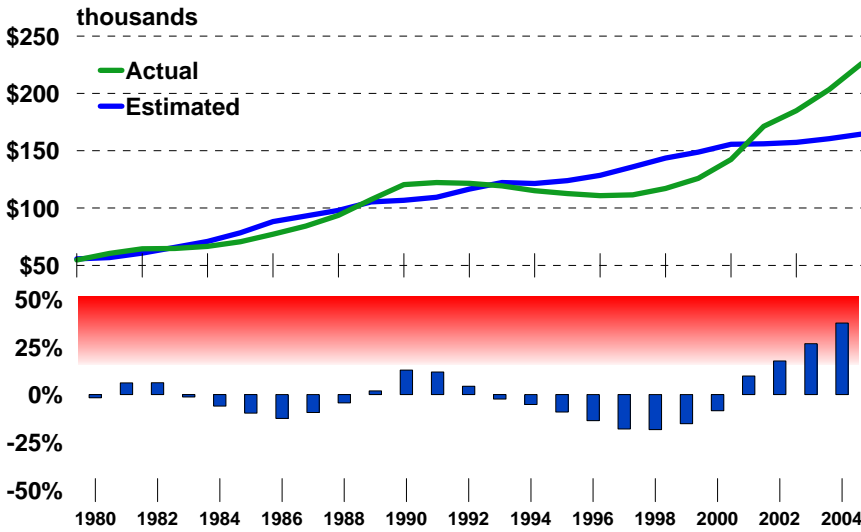
# Spokane, WA



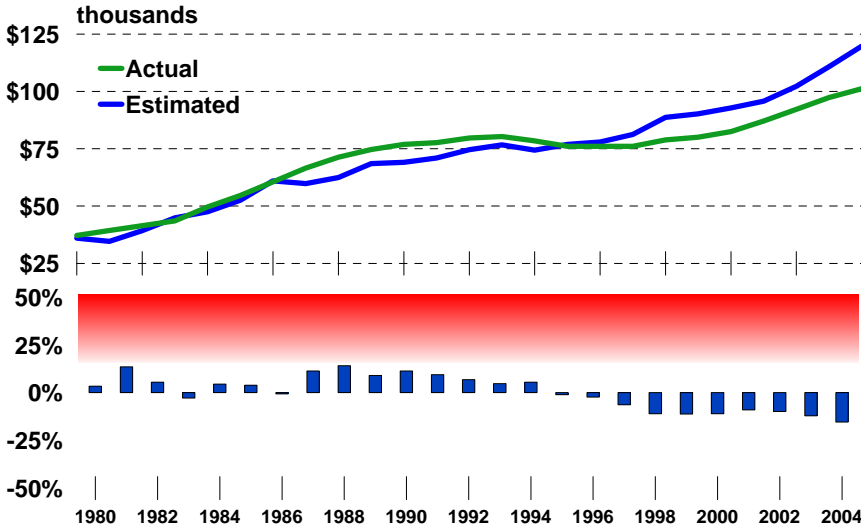
# St. Louis, MO



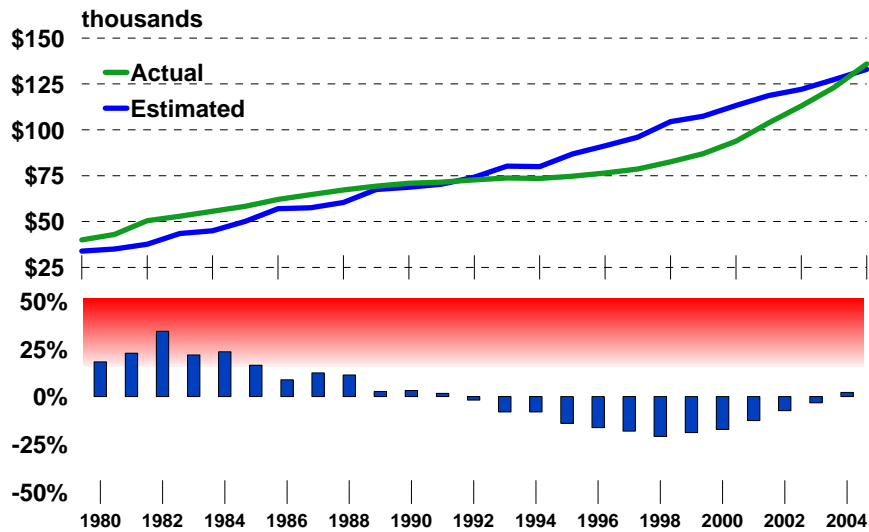
# Stockton, CA



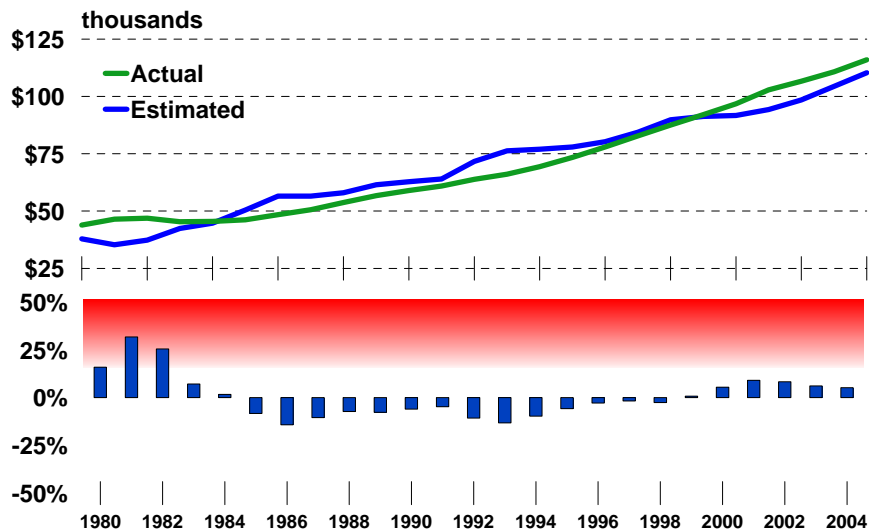
# Syracuse, NY



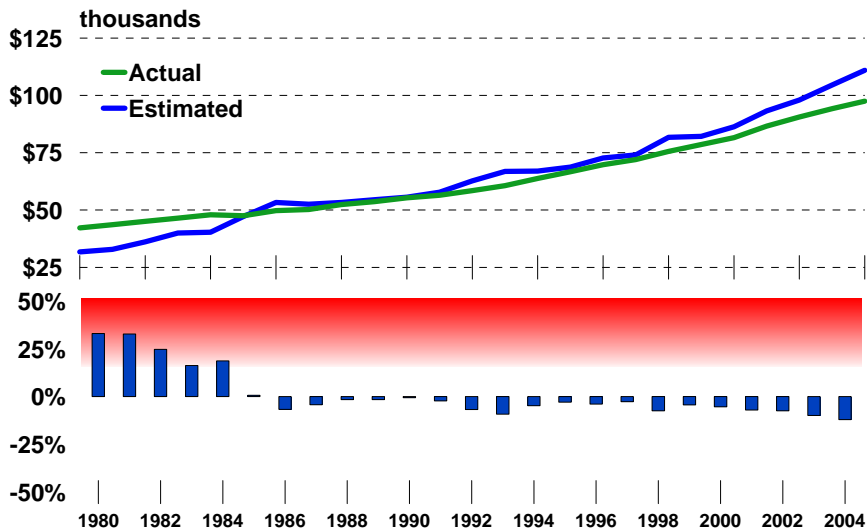
# Tampa, FL



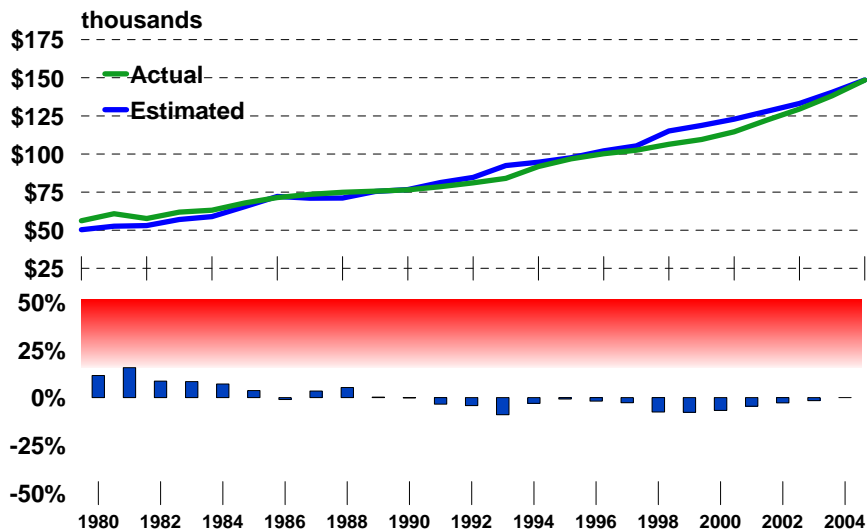
# Toledo, OH



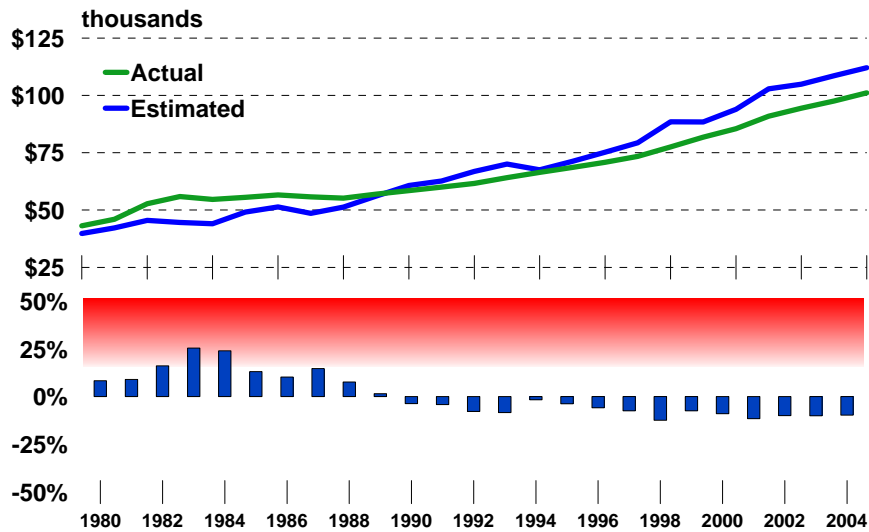
# Topeka, KS



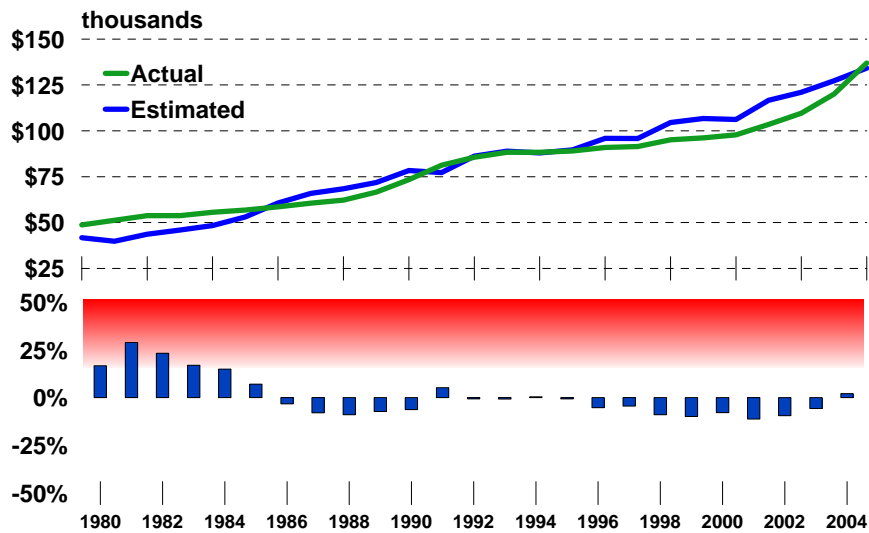
# Tucson, AZ



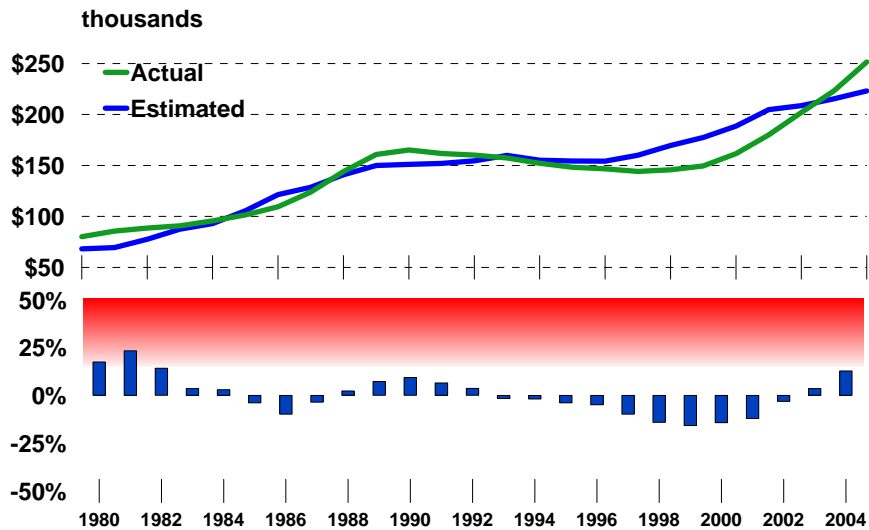
# Tulsa, OK



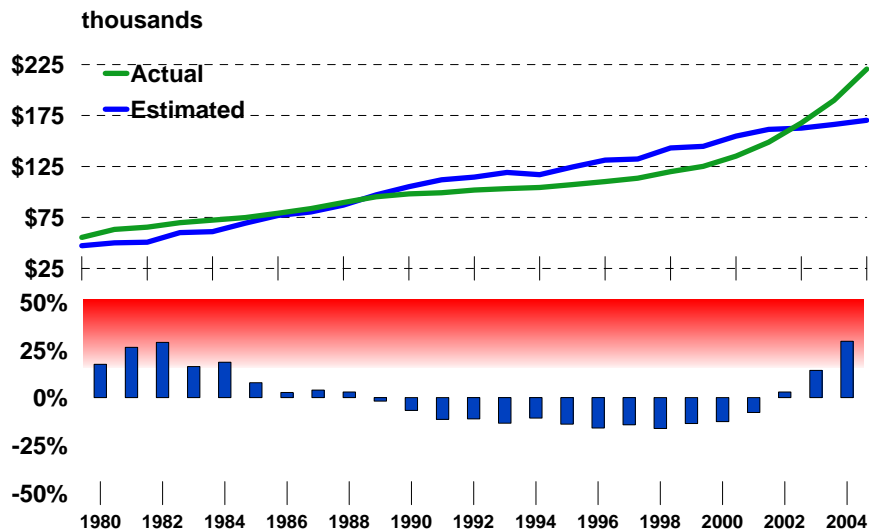
# Visalia, CA



# Washington, DC



# W. Palm, FL



# Wichita, KS

