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# Colorado Economic Forecast 2017

Colorado-based Business and Economic Research  
Prepared  
January 11, 2017

# The Colorado Economy in 2017

Watch for the following in 2017.

1. 2017 will be a year of extremes – both good and bad.
2. Colorado will benefit from a stronger global economy, as measured by real GDP. It will be 2.9% in 2017.
3. The state will also benefit from stronger real GDP growth for the U.S., 2.2% to 2.4%.
4. Nationally, there will be 1.9 million to 2.1 million jobs added.
5. Interest rates will continue to rise in 2017.
6. Inflation will increase to 2.5% in the U.S. and 3.0% in Colorado.
7. The Colorado population will increase by about 100,000 in each of the years 2015-2017.
8. Colorado is one of the states where the economy is not operating efficiently because the unemployment rate is too low.
9. Colorado will continue to experience moderate employment growth in 2017 (57,000 to 63,000 jobs). There is much more upside potential than downside risk to this forecast.
10. Manufacturing will continue to struggle, except at a few major Colorado companies.

# Overview of Forecast

This chartbook provides a series of graphs, charts, discussions, and data that tell the story about what will drive changes in the economy in 2017. This information is divided into the sections listed below.

## Global and U.S. Economy

- The Global and U.S. Economy
- The Global Economy
  - Real GDP
- The United States Economy
  - Real GDP
  - Productivity, Inflation, and the R-Word
  - Employment and Unemployment
  - Earnings and Real Median Household Income
  - Corporate Profits, S&P Performance and Volatility, and Price of Oil
  - Debt and Savings
  - Housing, Housing Prices, and Mortgage Rates
  - Construction
  - Services, Retail, Trade Weighted Dollar, Manufacturing, and Auto Sales
  - Summary of the U.S. Economy.

## The Colorado Economy

- GDP, Real Median Household Income, and Inflation
- Population and Components of Change
- Unemployment
- Establishments, Housing, Construction, Consumers, and DIA
- Extractive Industries – Oil and Gas
- Colorado State Government
- The Colorado Employment Forecast
- Summary, Opportunities, and Challenges.

## Appendix

- The cber.co Forecast – Review of the 2016 Forecast
- Putting the Forecast in Perspective
- BLS/LMI Data Revision Process and Analysis for Determining Forecast Categories.



# The Global and U.S. Economy

# Summary of Key Data

## United States and Global Economy

### United States

**Real GDP** – In 2017, annual real GDP growth will be stronger than 2016. It will be in the 2.1% to 2.5% range.

**Real Personal Consumption** – Annual personal consumption will be in the 2.4% to 2.8% range for 2017.

**U.S. Employment** – The U.S. will add between 160,000 to 180,000 jobs per month, or 1.9 to 2.1 million jobs in 2017.

**Unemployment Rate** – Average 2016 unemployment was 4.9%; unemployment will be in the 4.6% to 4.8% range in 2017.

**Consumer Price Index** – The CPI is estimated to be 1.3% in 2016 and 2.5% in 2017.

**Real Median Household Income** – In 2015, real median household income was less than 1999 (\$56,516 vs. \$57,909).

**Price of a Barrel of Oil (WTI)** – Oil closed the year at \$53 per barrel. Look for higher prices in 2017.

**Case Shiller Housing Prices** – Y-O-Y U.S. home prices for October will be +5.6%. Appreciation will be slower in 2017.

**Standard and Poor's 500** – The S&P 500 posted a gain of 9.5% in 2016. For the near-term, we are in a bull market.

**The U.S. will post modest job and real GDP growth in 2017.**

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### Global GDP

#### Global and Category Real GDP Growth

- ↑ Global 2.9%
- ↑ Mature 1.9%
- ↑ Emerging 3.6%

#### Mature Economies (1.9%) ↑

- ↑ U.S. 2.3%
- Japan 0.6%
- Eurozone 1.4%

#### Emerging Economies (3.6%) ↑

- ↑ Sub-Saharan Africa 2.3%
- ↑ Russia, Central Asia and Southern Europe 2.0%
- ↑ Latin America 1.2%
- India 6.5%
- China 3.8%
- Middle East and North Africa 2.7%

**The global economy was weaker than originally projected in 2016. The economies of both mature and emerging countries will be stronger in 2017.**



# The Global Economy

## Real GDP

# Global Real GDP Growth

## Real GDP Growth 2016 vs. 2017

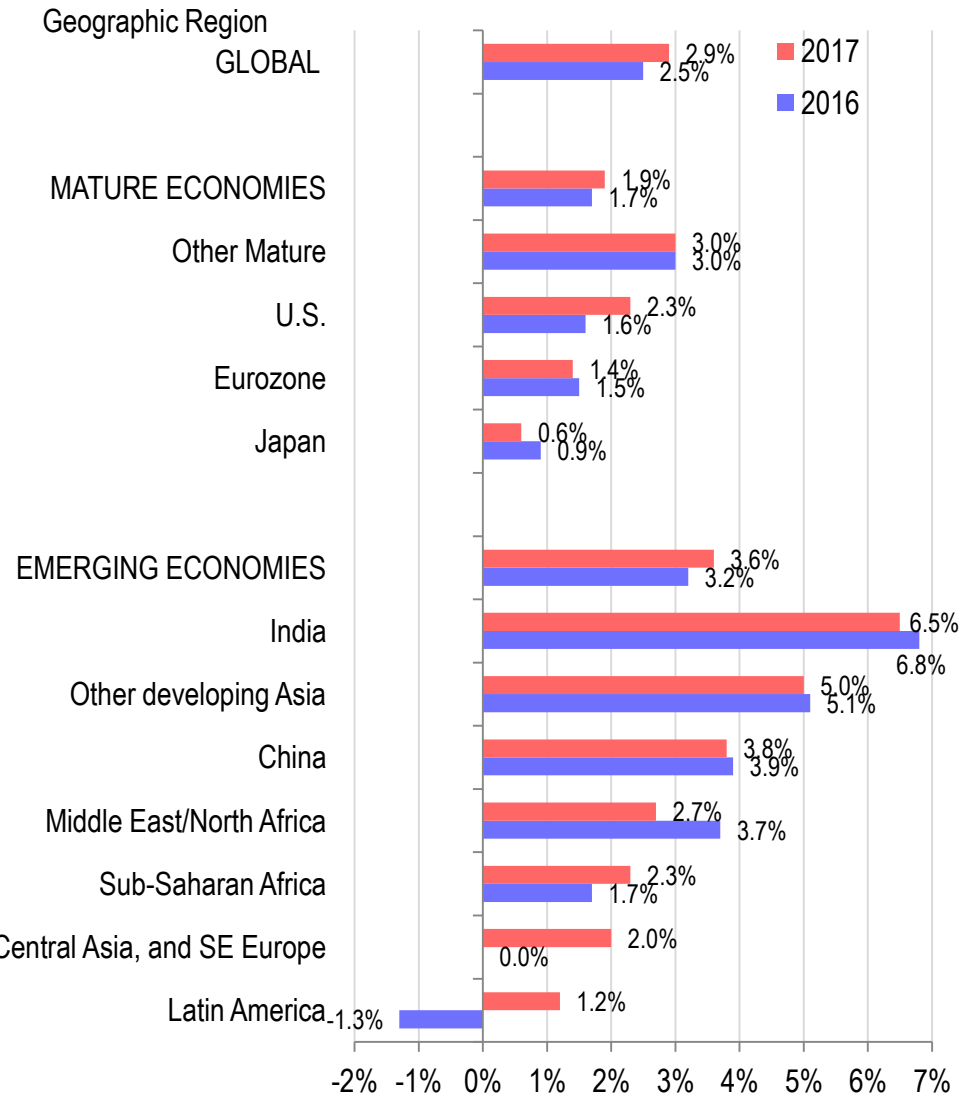
The global real GDP forecast is based on information provided by The Conference Board. Their outlook is often more conservative than the IMF forecast.

The 2017 forecast projects real GDP growth to be 1.9% for the mature economies. The U.S. will continue to expand at a rate of about 2.3%. Japan and the Eurozone will experience slightly weaker growth.

In 2017, the Chinese economy is expected to grow at 3.8%. India will lead the region with a 6.5% rate of growth.

The Latin America economy will turn positive in 2017.

Overall, global real GDP growth will be 2.9% in 2017. This is a slight improvement over 2016.





# The U.S. Economy

## Real GDP



# Quarterly Real GDP Growth United States

Annualized real GDP growth for the 1990s was 3.2% (green line). It was 1.8% for the 2000s (red line) and 2.1% from 2010 to 2016 (purple line).

Quarterly real GDP growth for 2016 has been:

Q1 2016 0.8%

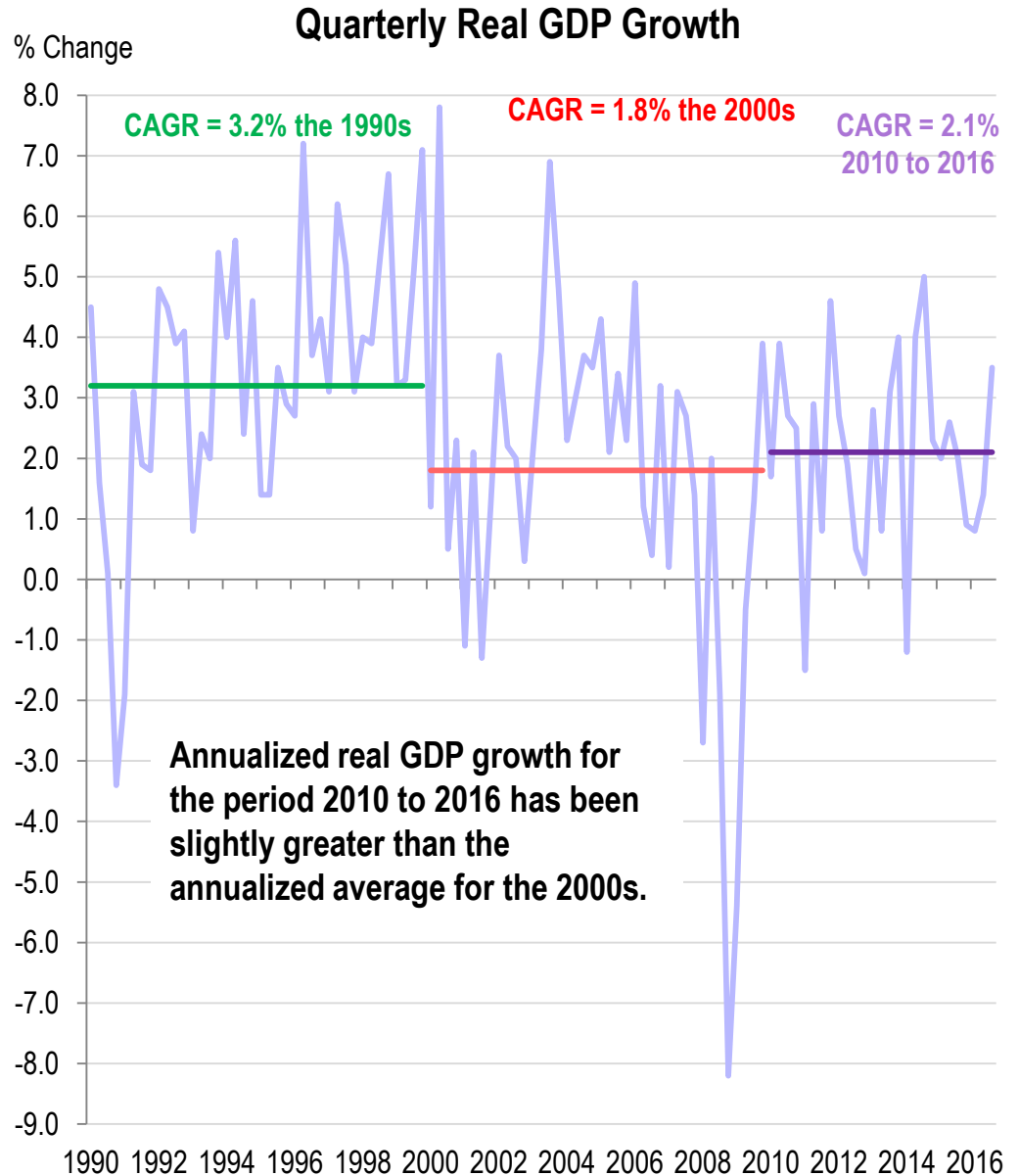
Q2 2016 1.4%

Q3 2016 (3<sup>rd</sup> estimate) 3.5%

Q4 2016 (projected) 2.8% to 3.7%.

The annual real GDP growth for 2016 will be 1.6% (projected).

In 2017, real GDP growth will be in the range of 2.1% to 2.5%.



Source: Bureau of Economic Analysis, cber.co, Note real GDP chained on 2009.

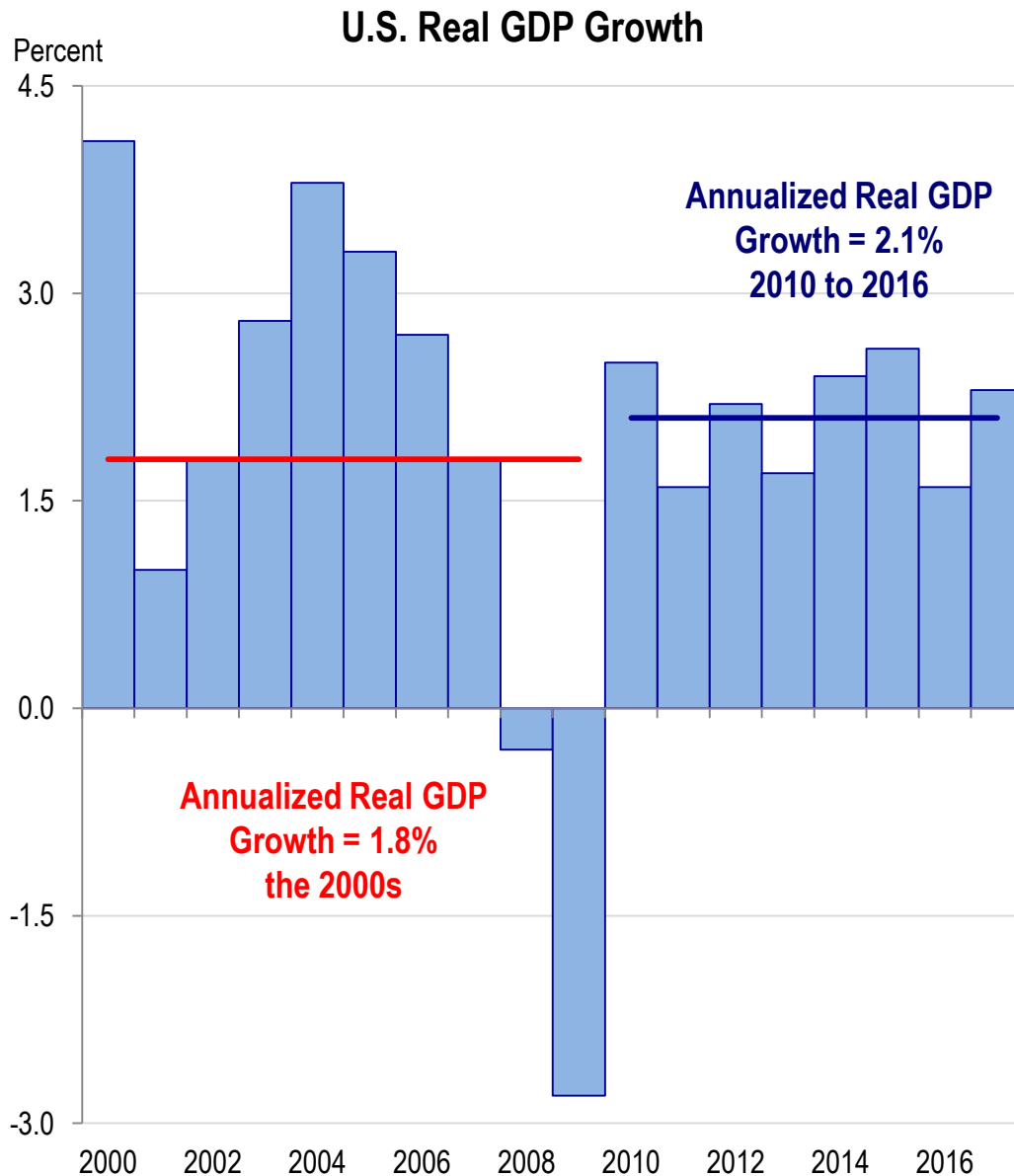
# U.S. Real GDP Growth

## C+I+G+X

Real GDP will grow at a rate between 2.1% to 2.5% in 2017.

- As is usually the case, personal consumption will drive real GDP growth in 2017. It will increase at a rate slightly greater than the rate of growth for the GDP.
- Business investment will increase if corporate tax rates are lowered. Stronger investment will benefit the economy in many ways.
- Government spending will see a slight increase.
- The trade deficit will increase as a result of the lack of demand caused by a strong dollar.

GDP = Consumption + Private Investment + Government Spending + Net Exports



Source: Bureau of Economic Analysis, [cber.co](http://cber.co), chained in 2009 dollars.

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# U.S. Real Personal Consumption and GDP Growth

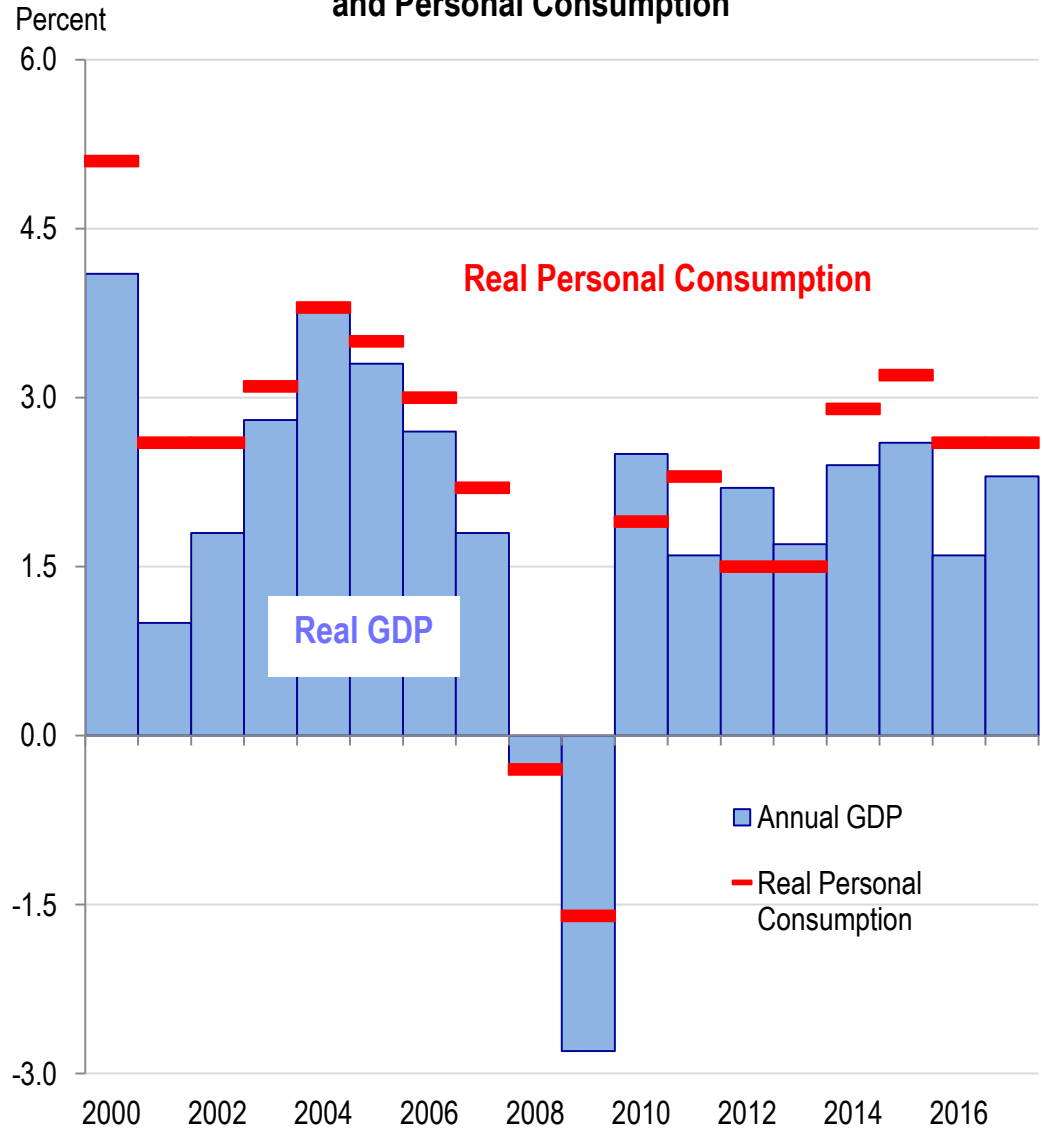
In 1990 personal consumption (red lines) accounted for about 64% of the GDP (blue bars). In 2015, real personal consumption was 68.4% of total GDP.

Consumers drive the economy!

Because consumption is such a high percentage of real GDP there is a strong correlation between the growth rates of these two variables.

Real personal consumption will grow at a rate of 2.4% to 2.8% in 2017.

## U.S. Growth Rate for Real GDP and Personal Consumption



Source: Bureau of Economic Analysis, cber.co, chained in 2009 dollars.

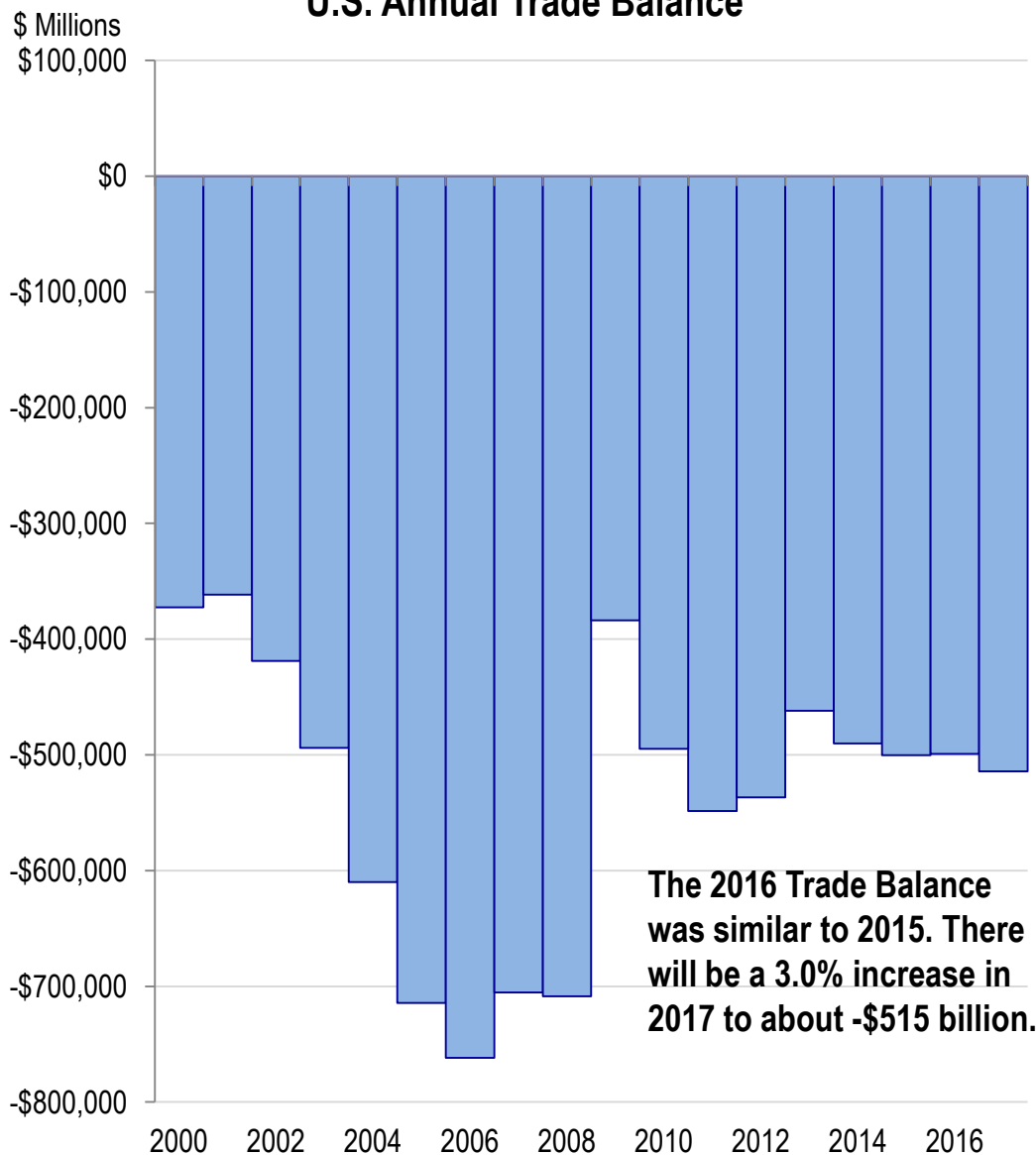
# U.S. Trade Balance

Real GDP will grow at a rate between 2.1% to 2.5% in 2017.

- The trade deficit (exports minus imports) will increase in 2017 in large part because the strong dollar has made American exports less affordable. This will be a drag on real GDP growth.
- As a result of the decrease in the demand for American goods, U.S. manufacturing employment has declined.

GDP = Consumption + Private Investment + Government Spending + Net Exports

## U.S. Annual Trade Balance



Source: Bureau of Economic Analysis, [cber.co](http://cber.co), chained in 2009 dollars.

Colorado-based Business and Economic Research <http://cber.co>

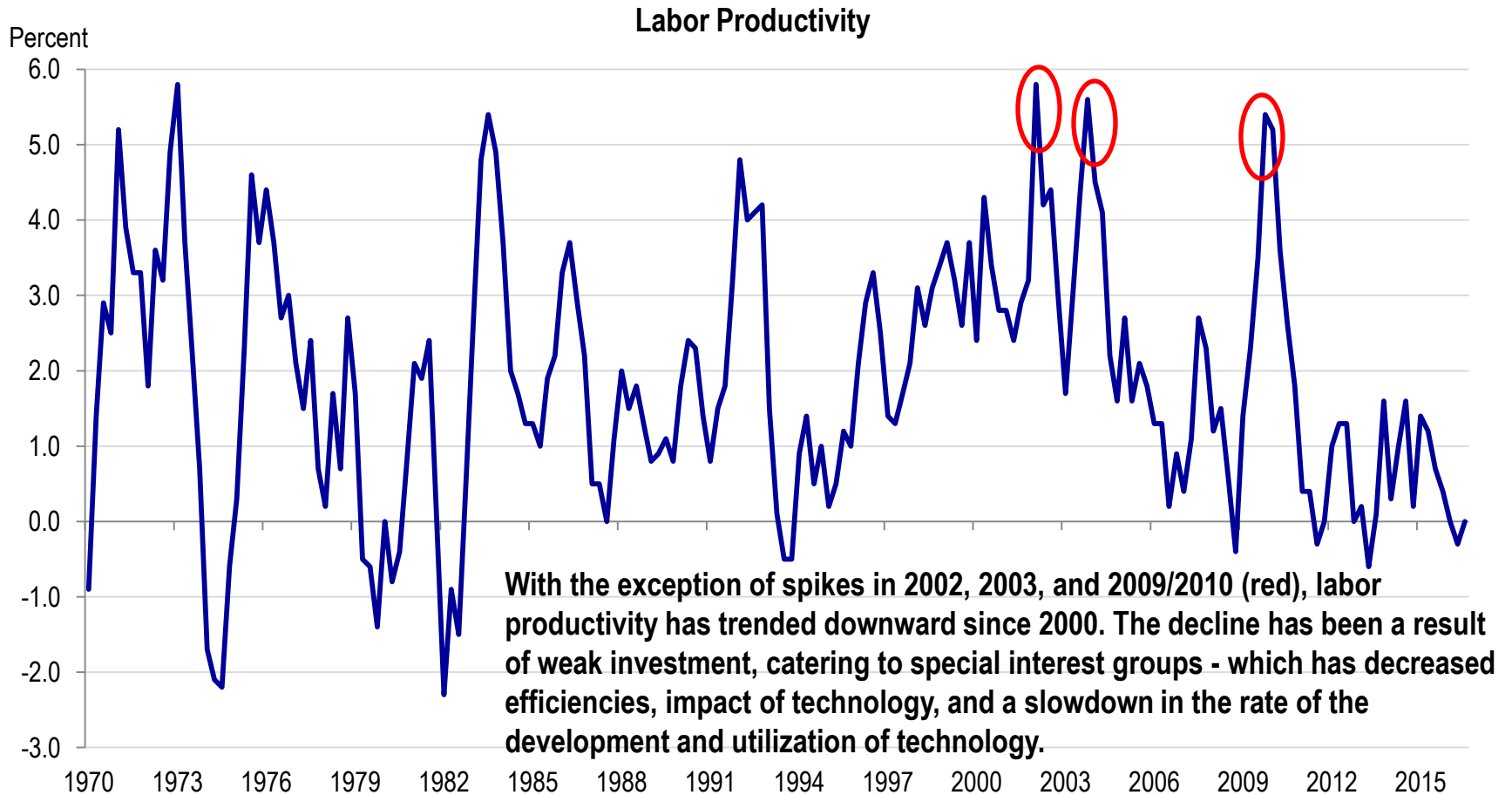


# The U.S. Economy

## Productivity, Inflation, and The R-Word

# U.S. Labor Productivity (Output per Hour)

Percent Change Same Quarter Prior Year Nonfarm Business



Source: Bureau of Labor Statistics, NSA, cber.co.

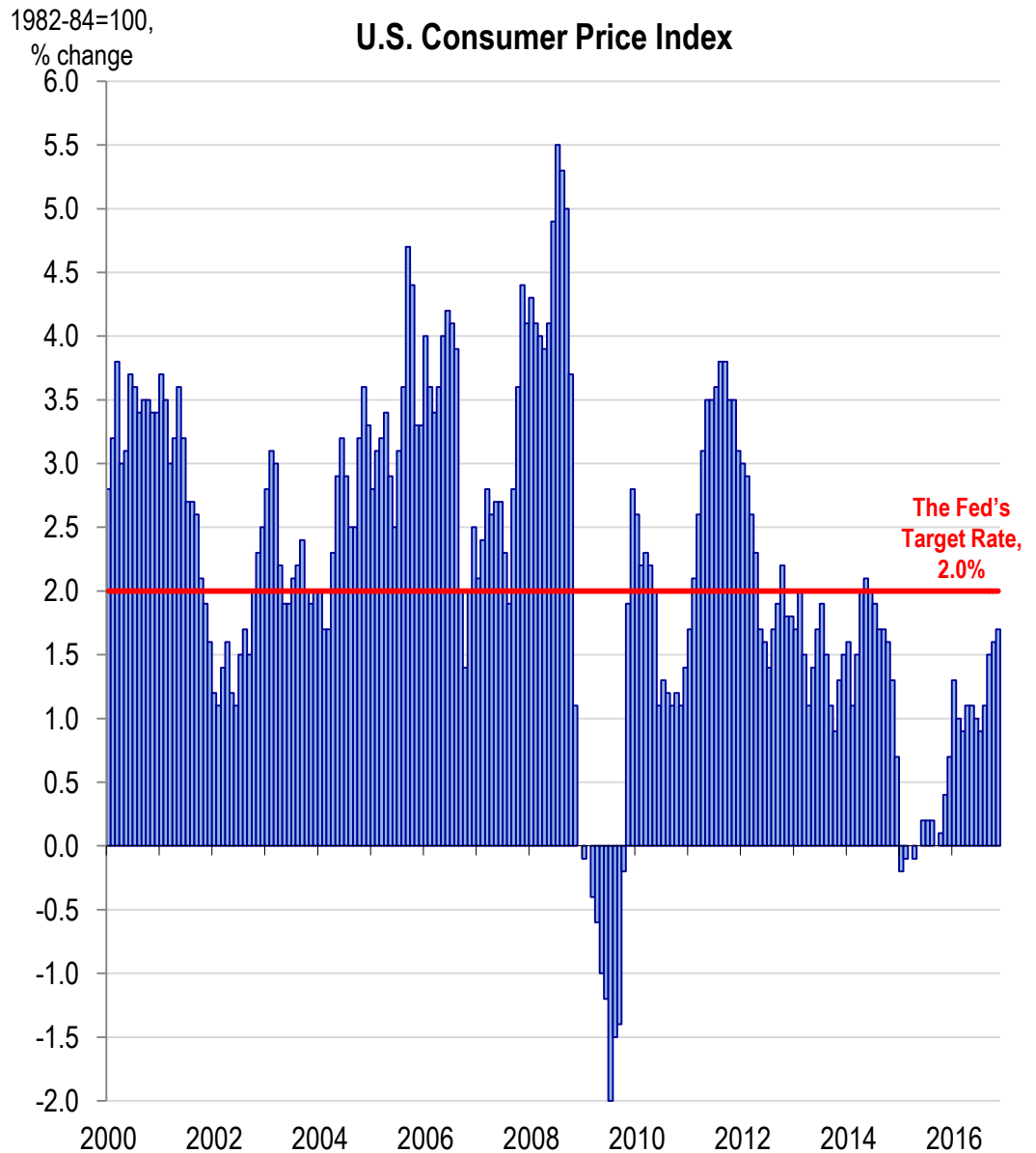
# Consumer Price Index (CPI)

In 2015, U.S. inflation, as measured by the seasonally adjusted CPI, dropped precipitously because of lower fuel costs. In the second half of 2016 it began to increase again.

The 2016 year-end monthly rate of inflation will approach 2.0%, bringing the annual average to 1.3%. Other annual rates are:

- 2012 2.1%
- 2013 1.5%
- 2014 1.6%
- 2015 0.1%
- 2016 1.3%
- 2017 2.5%

In 2017 inflation will increase as a result of higher interest rates, housing costs, health care costs, gasoline prices, and wages.





# The R Word

## Don't Panic - Yet!

### Why the Talk of a U.S. Recession?

Economists and members of the media periodically raise the question. “When is the next recession?”

This occurs most frequently when the business cycle is mature, when the stock market or real GDP growth slows, when jobs are added at a slower rate, when there is uncertainty, or when industries struggle.

The fundamentals of the U.S. economy are currently solid. Admittedly, there are challenges that are preventing the economy from growing at a faster pace, but jobs are being added, GDP growth is again solid, and the unemployment rate is low. At the moment there is little to suggest a recession will occur within the next year.

While it is possible that terrorist attacks, natural disasters, or extended political unrest could cause a downturn, such events cannot be predicted. To that point, it is difficult to forecast a recession.

### How Does our Current Situation Compare to Other Expansions?

A look at past recessions shows the U.S. economy is closing in on the longest time frame for an expansion - 120 months.

The most recent peak was in December 2007. Nine years, or 108 months have passed since the last peak.

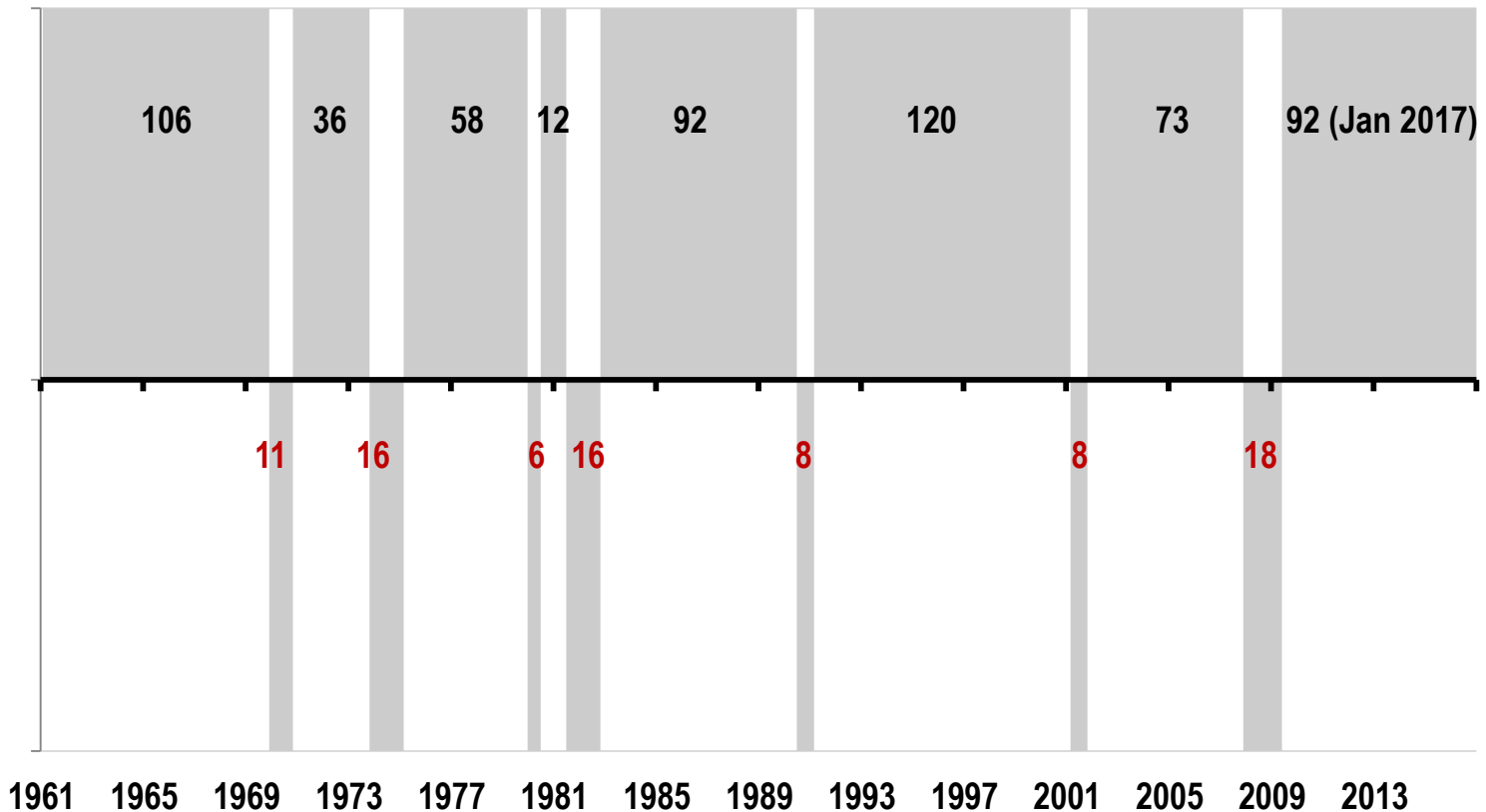
If the length of current and future business cycles are similar to the length of past business cycles, then it is likely the U.S. will see the next recession during President Trump's tenure.



# The R Word

## Length of U.S. Economic Expansions and Contractions

Lengths of Recessions and Recoveries/Expansions (Months)



Source: NBER, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

Red Numbers = Peak to Trough (Contraction).  
Black Numbers = Previous Trough to this Peak (Expansion).



# The R Word

## Length of Cycles

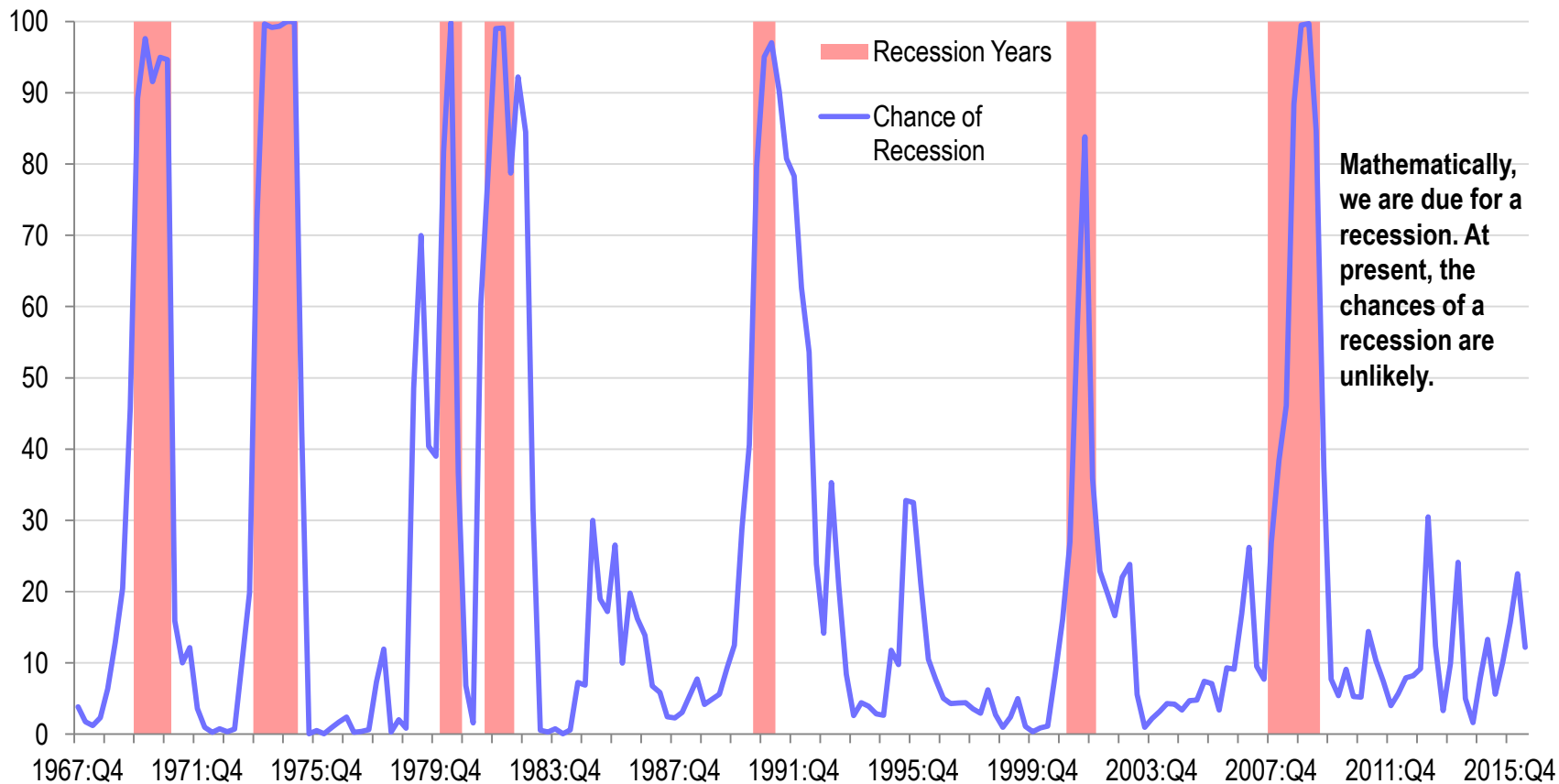
### Length of Cycles

Peak Date/Quarter	Trough Date/Quarter	Peak from Previous Peak	Trough from Previous Trough
August 1957 (III)	April 1958 (II)		
April 1960 (II)	February 1961 (I)	32	34
December 1969 (IV)	November 1970 (IV)	116	117
November 1973 (IV)	March 1975 (I)	47	52
January 1980 (I)	July 1980 (III)	74	64
July 1981 (III)	November 1982 (IV)	18	28
July 1990 (III)	March 1991(I)	108	100
March 2001(I)	November 2001 (IV)	128	128
December 2007 (IV)	June 2009 (II)	81	91
Current Month Jan 2017		108 months since last peak	92 months since last trough

Source: NBER.

# GDP Based Recession Index

Recession Index



**Mathematically, we are due for a recession. At present, the chances of a recession are unlikely.**

Source: Atlanta Federal Reserve, cber.co.

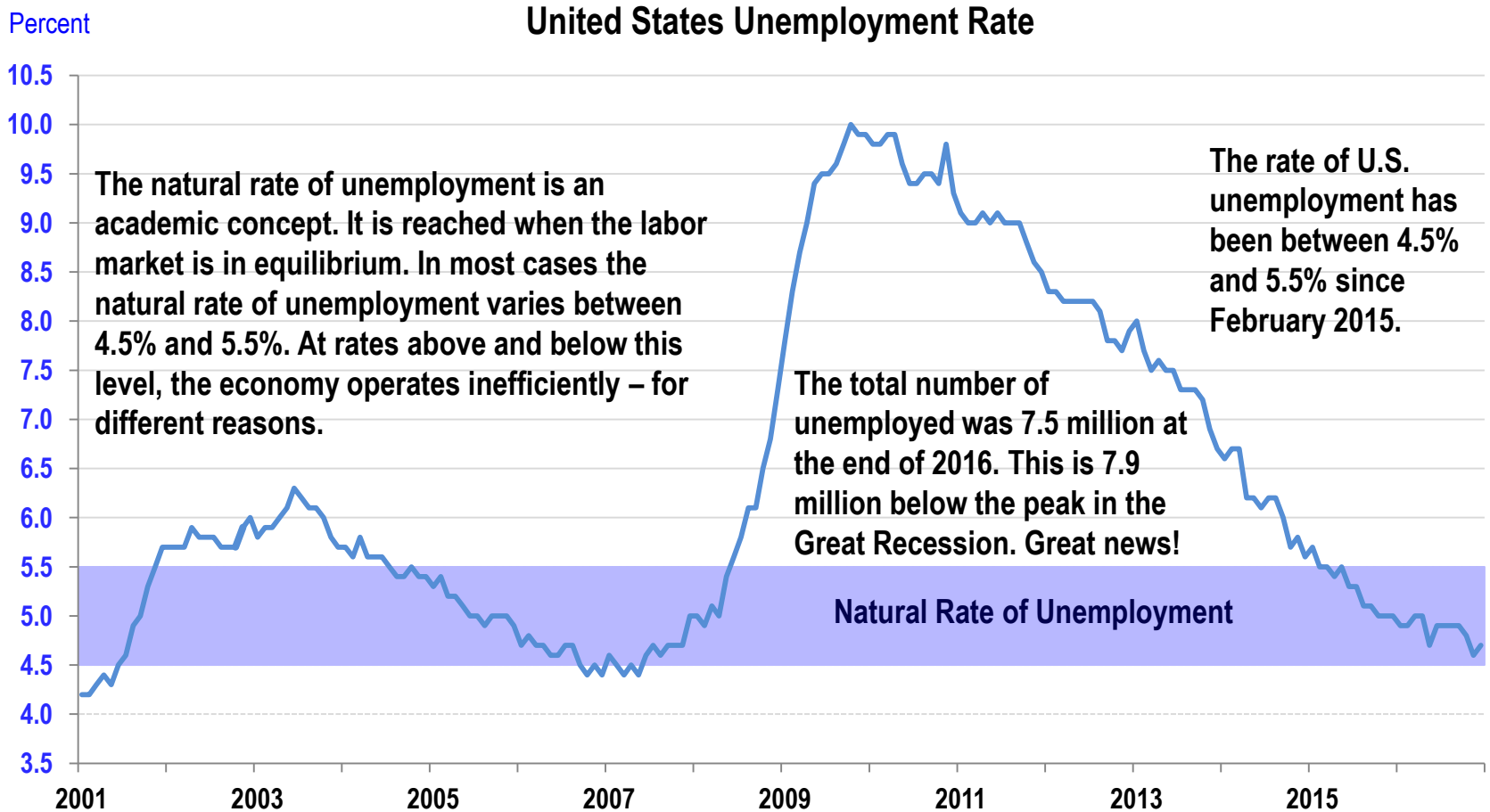


# The U.S. Economy

## Unemployment and Employment

# United States Unemployment Rate

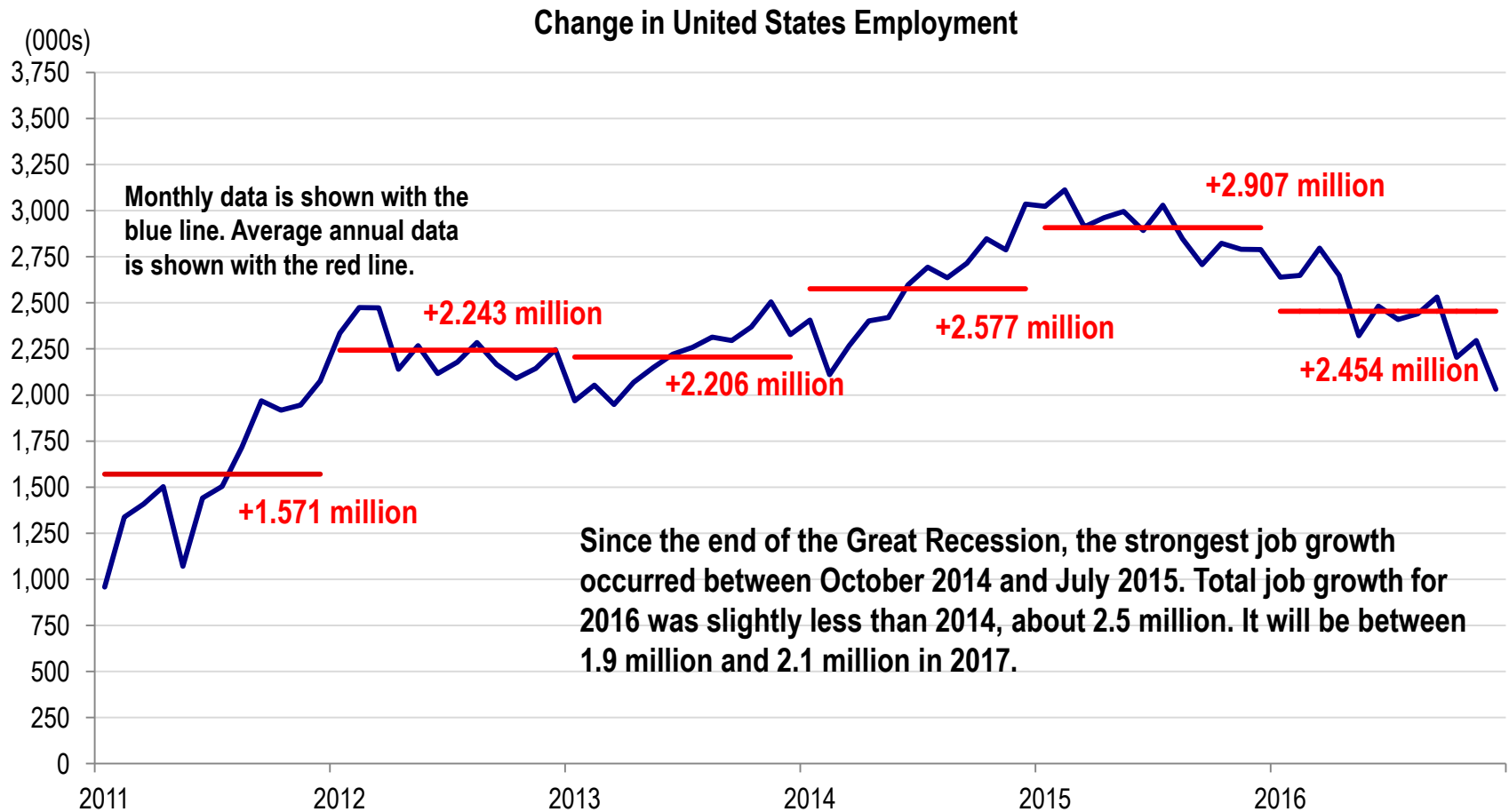
## Unemployment Rate vs. Natural Rate of Unemployment



Source: Bureau of Labor Statistics, SA, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

# Change in United States Employment Year-Over-Year



Source: Bureau of Labor Statistics, NSA; cber.co.

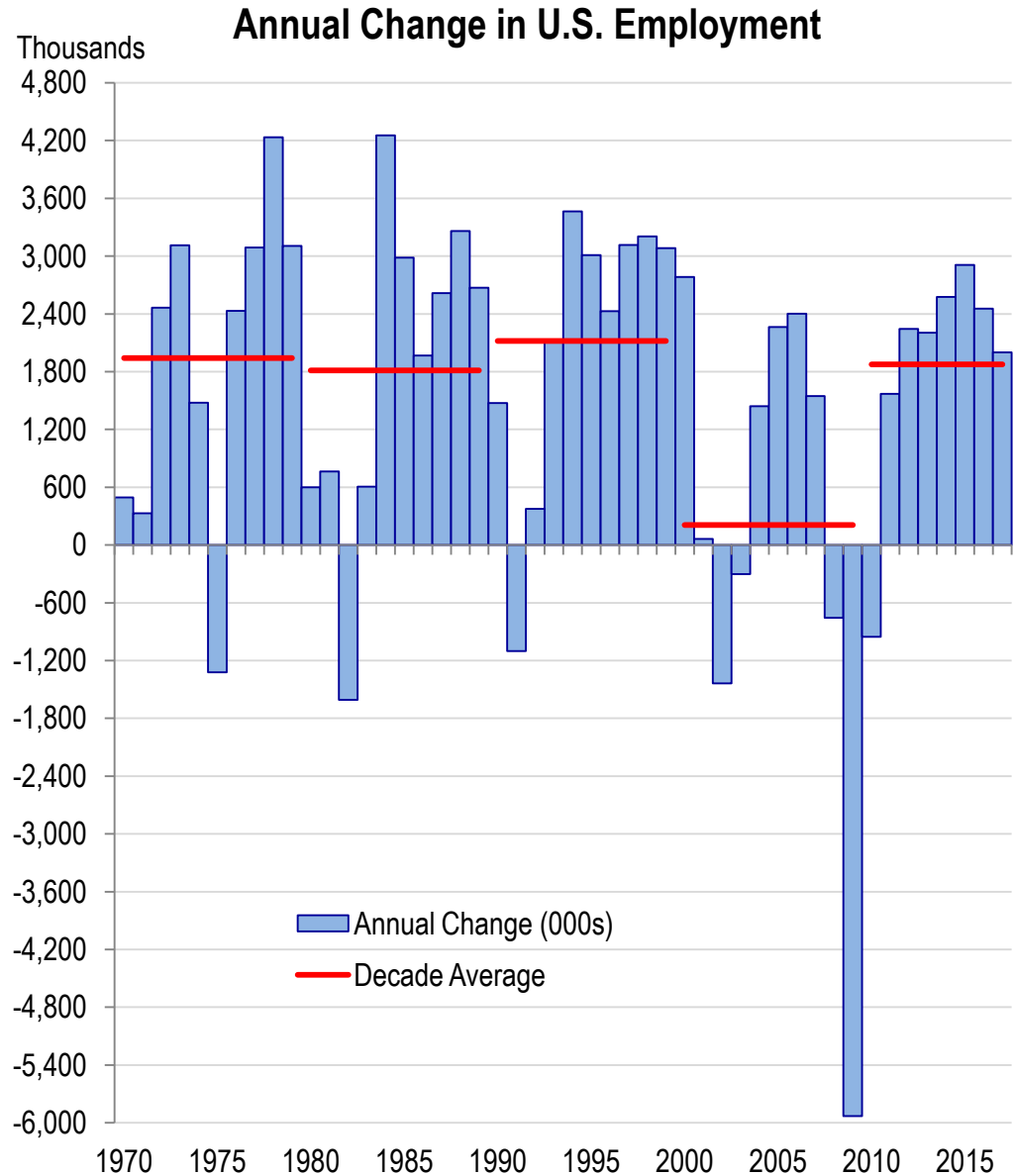
# Annual Change in U.S. Employment

The current average absolute change in employment (for a decade) is similar to the 1970s and 1980s. It is much greater than the 2000s.

The average annual change (red lines) by decade follows:

- 1.9 from 1970 to 1979.
- 1.8 from 1980 to 1989.
- 2.1 million from 1990 to 1999.
- 0.2 million from 2000 to 2009.
- 1.9 million from 2010 to 2017.

The U.S. added slightly less than 2.5 million jobs in 2016. Between 1.9 million and 2.1 million jobs will be added in 2017.

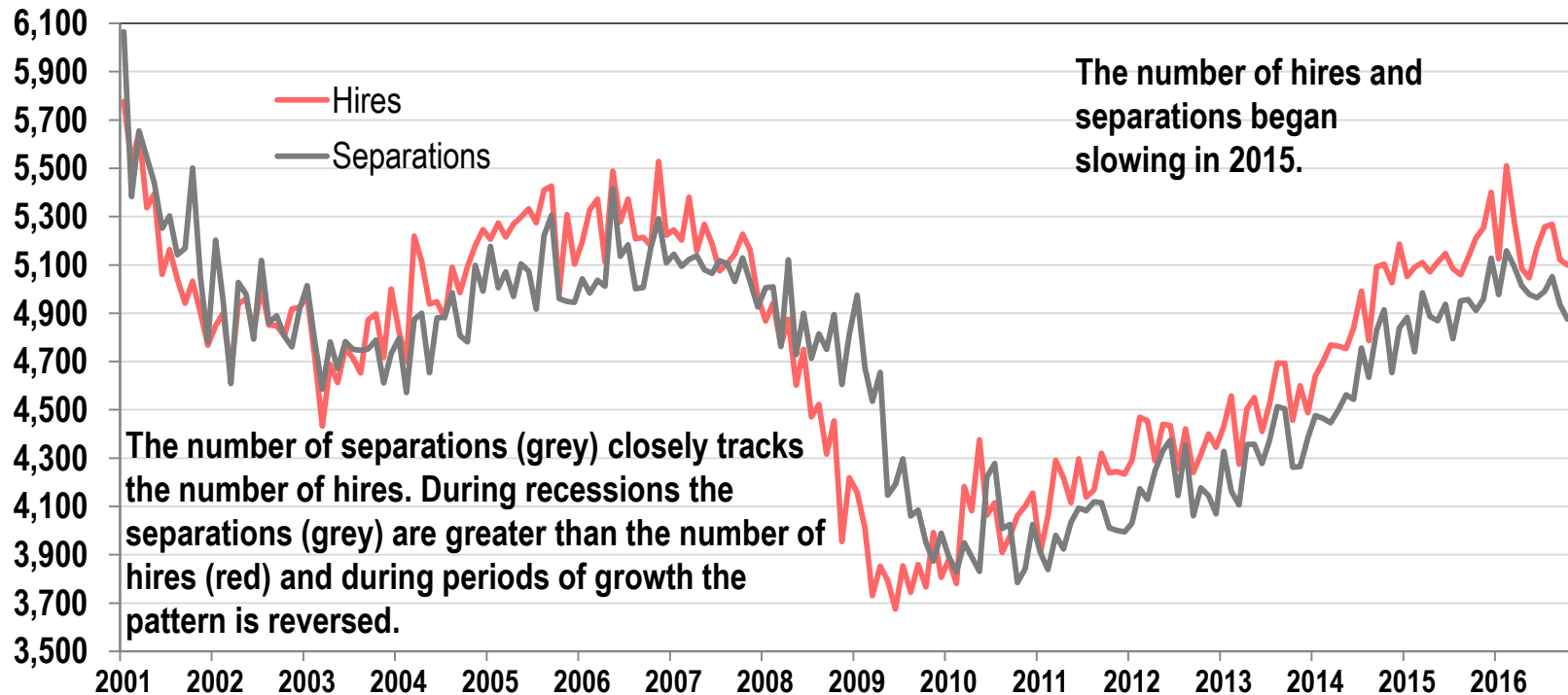


Source: Bureau of Labor Statistics, NSA; cber.co.

# U.S. Hires and Separations

Hires and Separations

Thousands



Source: Bureau of Labor Statistics, SA; cber.co.

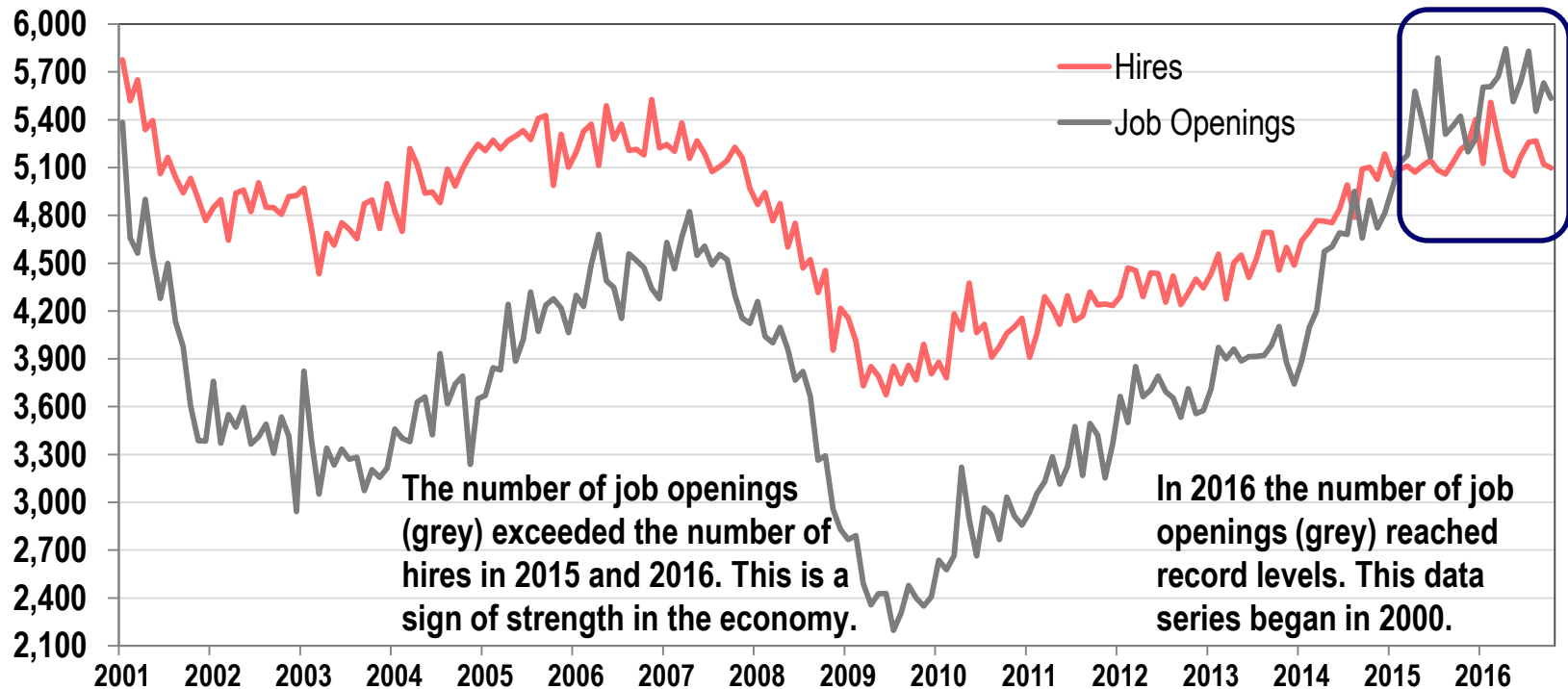
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# U.S. Job Openings and Hires

Job Openings and Hires

Thousands



Source: Bureau of Labor Statistics, SA, cber.co.

Colorado-based Business and Economic Research <http://cber.co>



# The U.S. Economy

## Earnings and Real Median Household Income

# U.S. Average Weekly Earnings of All Employees (Private Sector)

- U.S. Average Weekly Earnings (NSA) for all employees were:
- 2012 \$809.83
  - 2013 \$825.37
  - 2014 \$845.00
  - 2015 \$864.59
  - 2016 \$881.74

The rate of increase for these wages was:

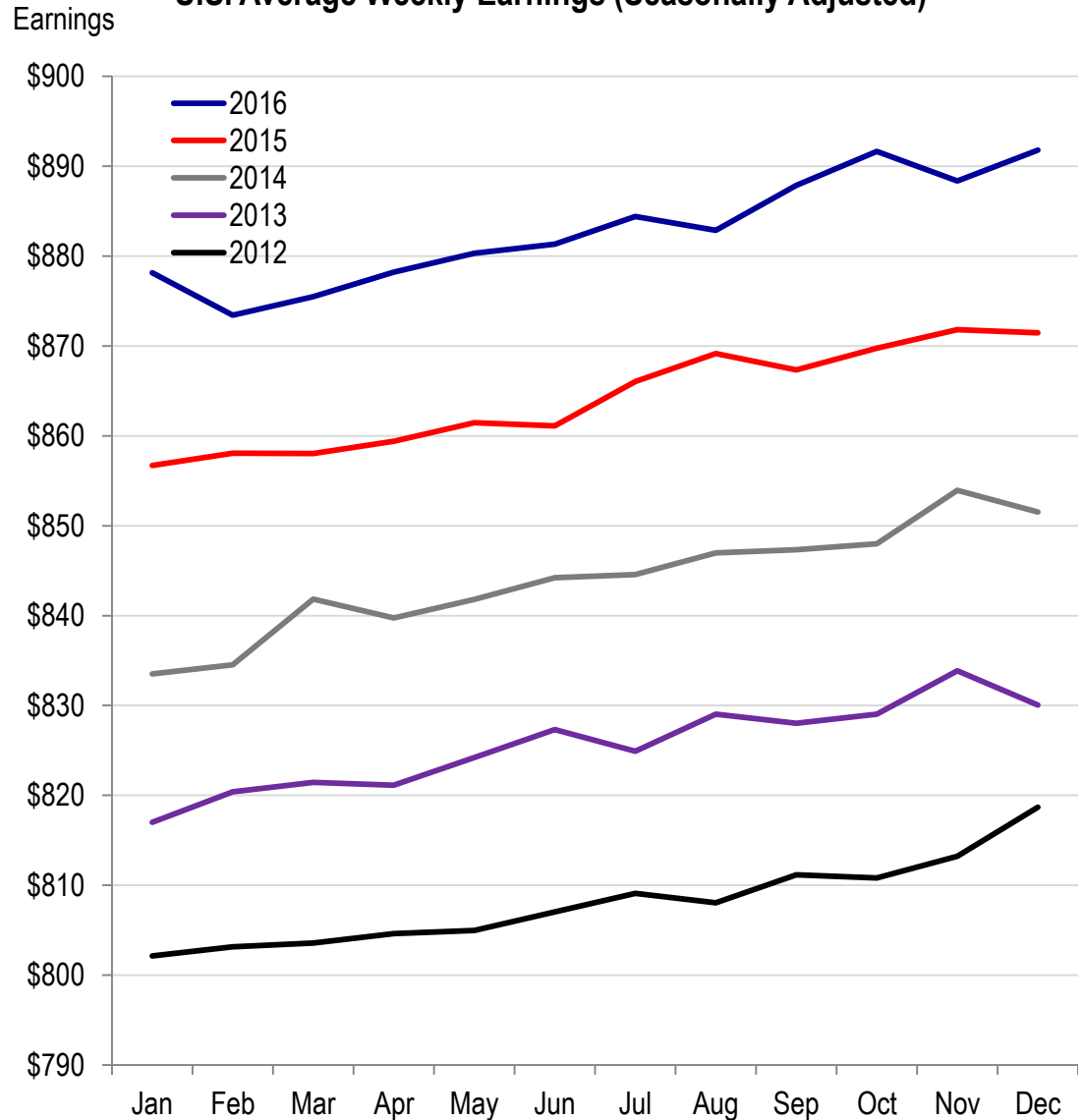
- 2012 2.4%
- 2013 1.9%
- 2014 2.4%
- 2015 2.3%
- 2016 2.0%

The increase in the CPI for these years was:

- 2012 2.1%
- 2013 1.5%
- 2014 1.6%
- 2015 0.2%
- 2016 1.3%

Wage increases have been greater than the rate of inflation through since 2012. Stronger wage growth is expected in 2017 because the demand for qualified workers and is greater than the supply.

## U.S. Average Weekly Earnings (Seasonally Adjusted)



Source: Bureau of Labor Statistics, SA, cber.co.

# Real Median Household Income 2015

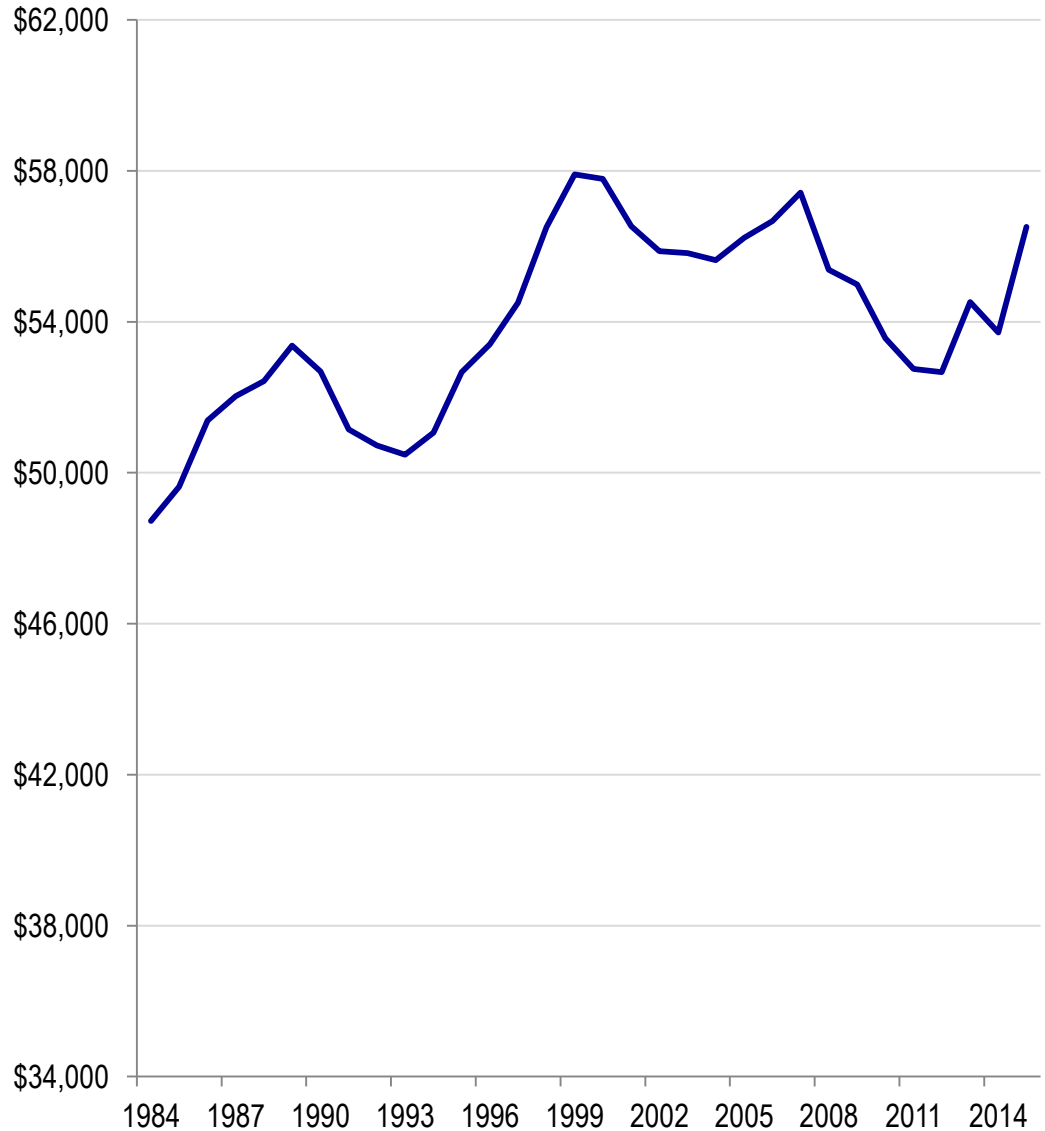
(CPI-U-RS Adjusted Dollars, Not Seasonally Adjusted)

In 2015, the most current data, real median household income was less than 1999 (\$56,516 vs. \$57,909).

In the 31 years between 1984 and 2015, real median household income increased at an annualized rate of 0.48%.

Household income is the total income of all individuals 15 years old and over in a household, whether or not they are related.

### Real Median Household Income



Source: Federal Reserve, cber.co

Colorado-based Business and Economic Research <http://cber.co>

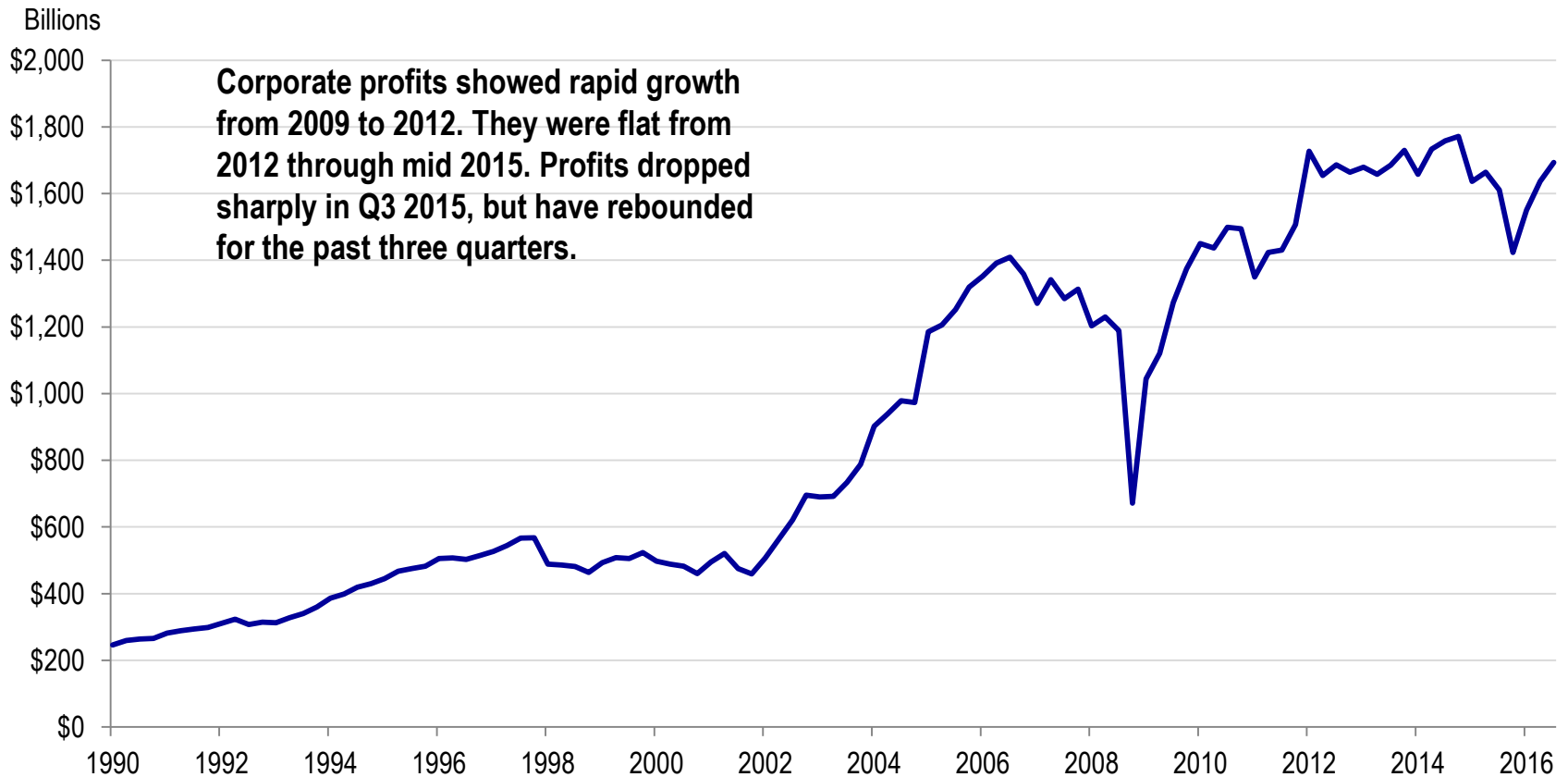


# United States Economy

Corporate Profits, S&P Performance and Volatility, and  
the Price of Oil

# Corporate Profits After Tax (without IVA and CCAdj)

## Corporate Profits After Tax



Source: FRED, BEA.

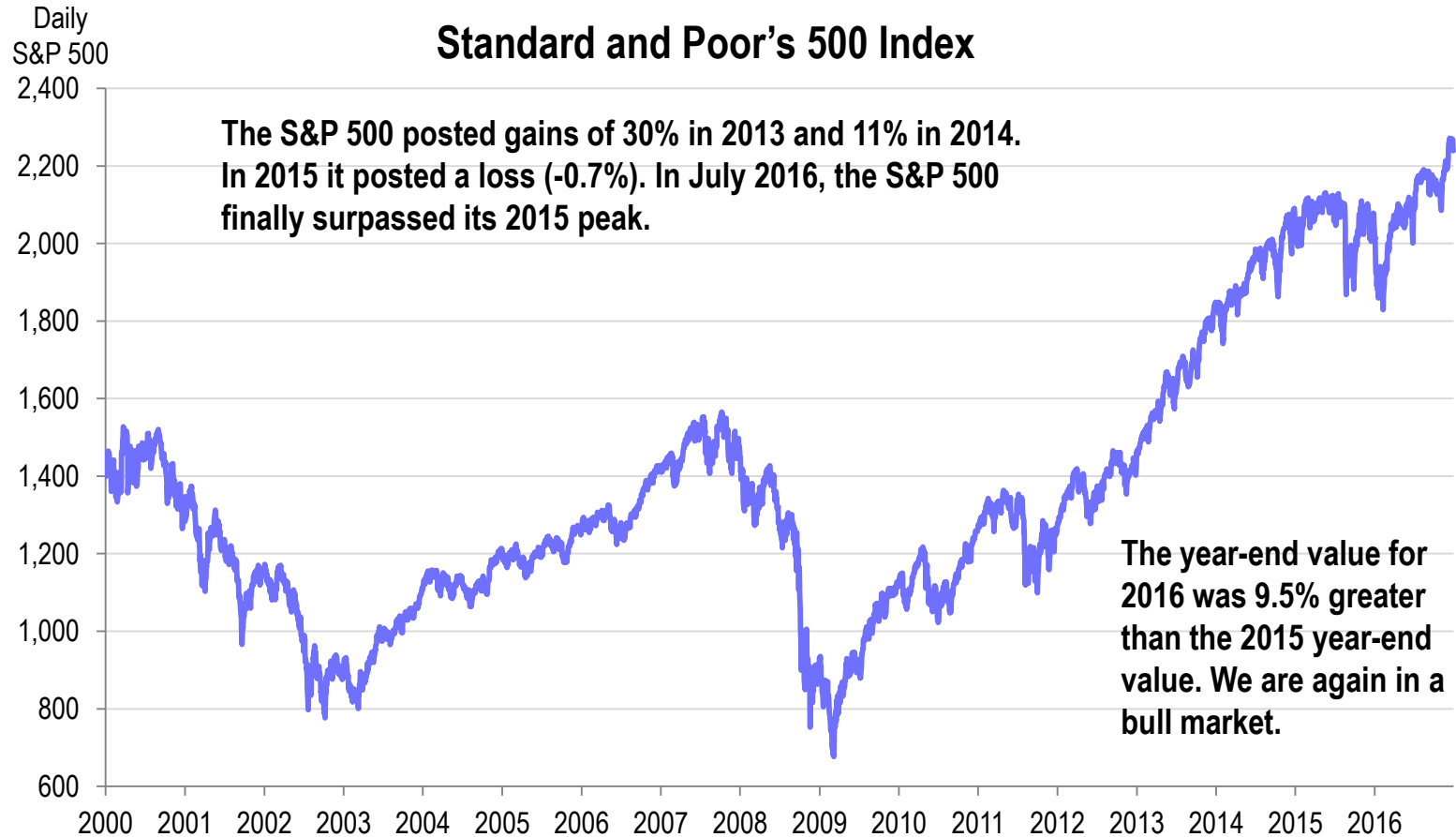
# The Equity Markets

The equity markets are an important part of the economy, but the performance of the equity markets is not synonymous with the performance of the economy.

At times they move together, but it is also possible for investments and the equity markets to increase during a bad economy and vice versa.

Changes in the equity markets are important because they can cause investor wealth and consumer confidence to increase or decrease.

# Standard and Poor's 500 Index

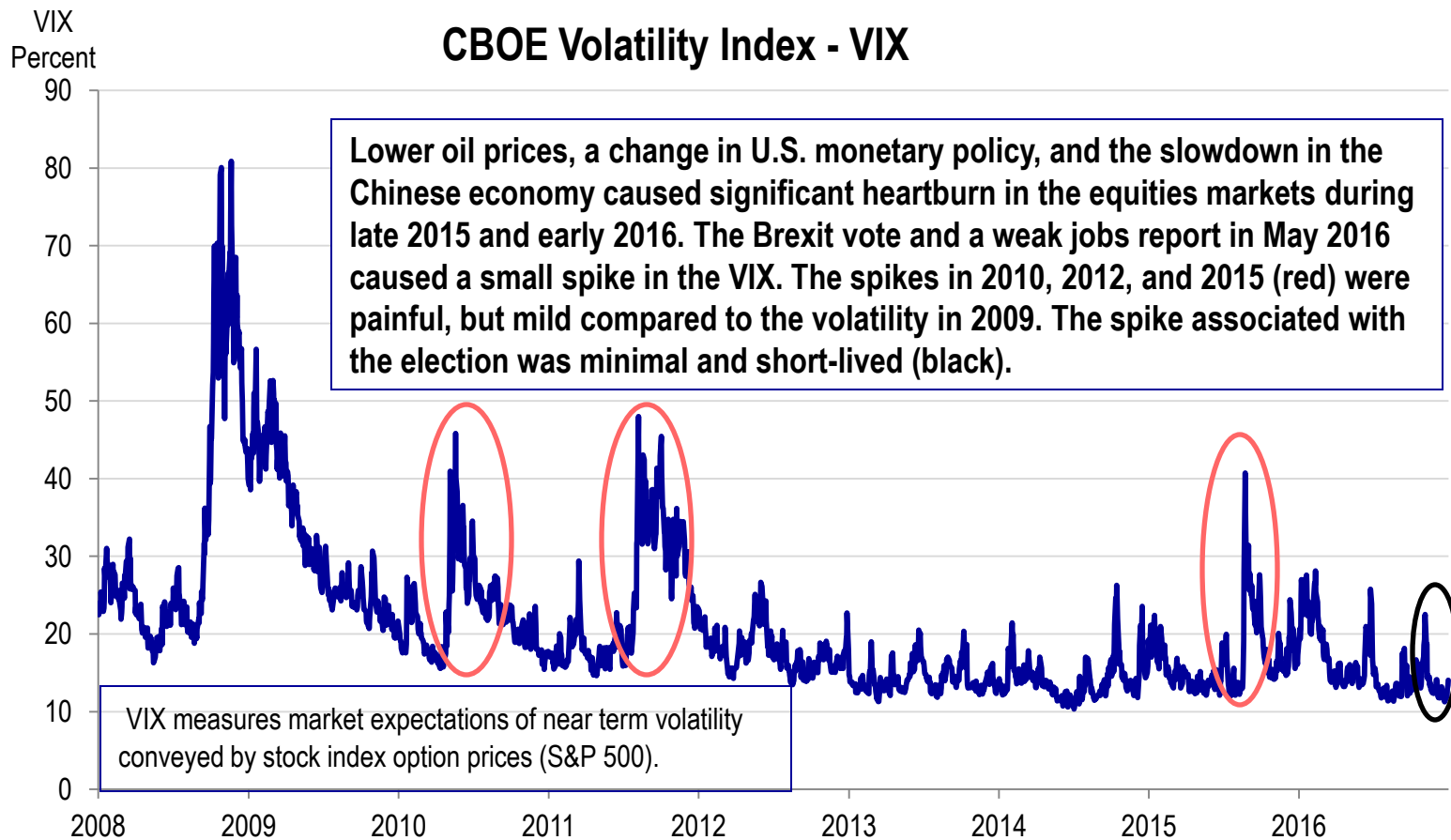


Source: FRED, S&P 500, cber.co.



# CBOE Volatility Index

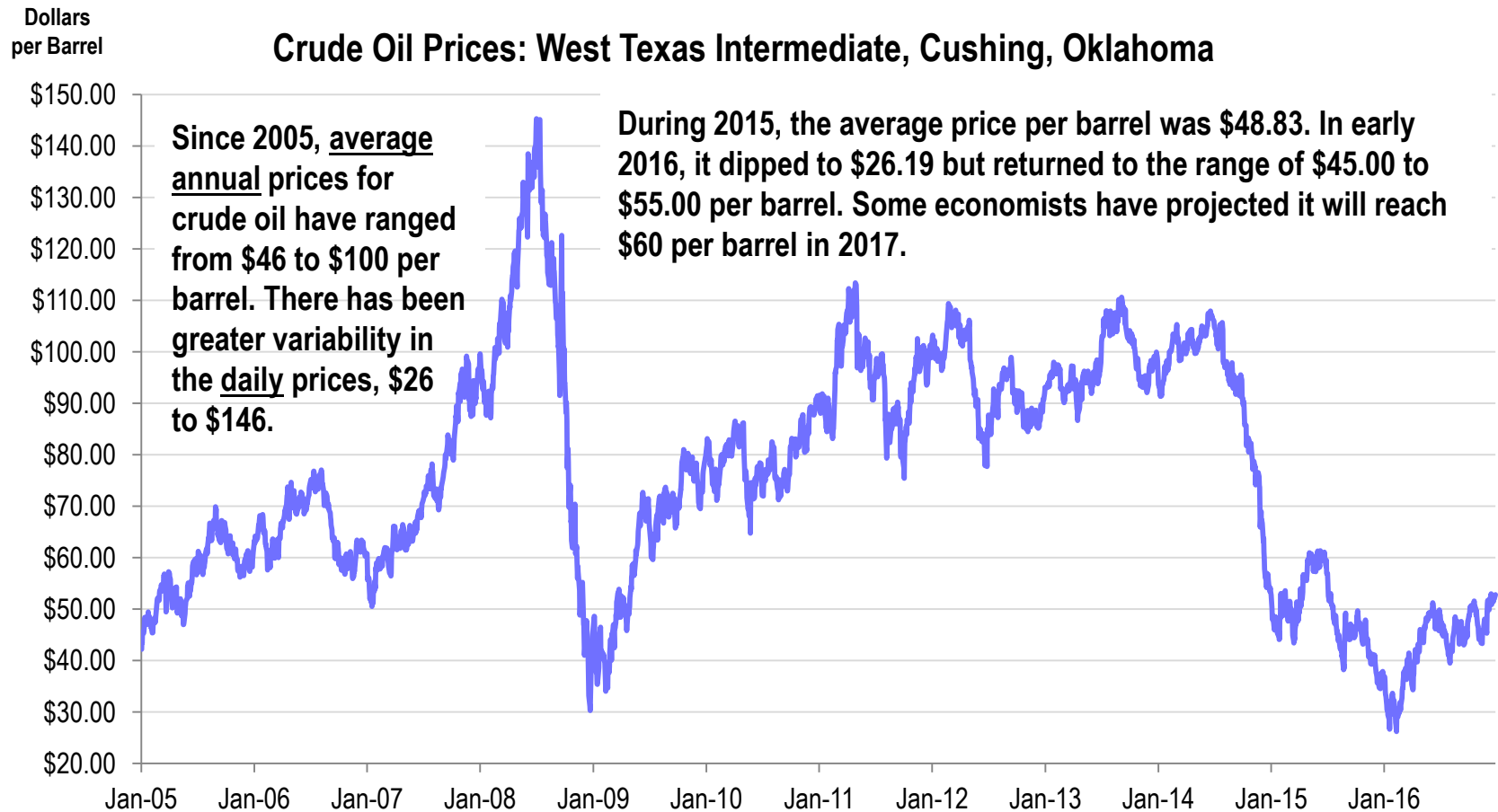
## VIX (VIXCLS)



Source: FRED, Chicago Board Options Exchange, cber.co.

# Crude Oil Prices

## West Texas Intermediate



Source: FRED, EIA, cber.co.



# The U.S. Economy

## Debt and Savings

# Debt – Reason for Concern

Debt is good if it is responsibly used to make purchases that stimulate consumption and growth.

Debt is bad if debt service obligations prevent consumption and growth.

Whether or not you believe debt is good for the economy, one thing is for sure – consumer and government debt has increased!

## Federal Debt

- In Q1 2006 the federal debt was \$8.4 trillion.
- In Q2 2016 the federal debt was \$19.6 trillion.

## Consumer Credit Outstanding

- In January 2006 consumer credit outstanding was \$2.4 trillion.
- In October 2016 consumer credit outstanding was \$3.7 trillion.

## Student Loans

- In Q1 2006 student loans outstanding were \$500 billion.
- In Q3 2016 student loans outstanding were \$1.4 trillion.

## Motor Vehicle Loans

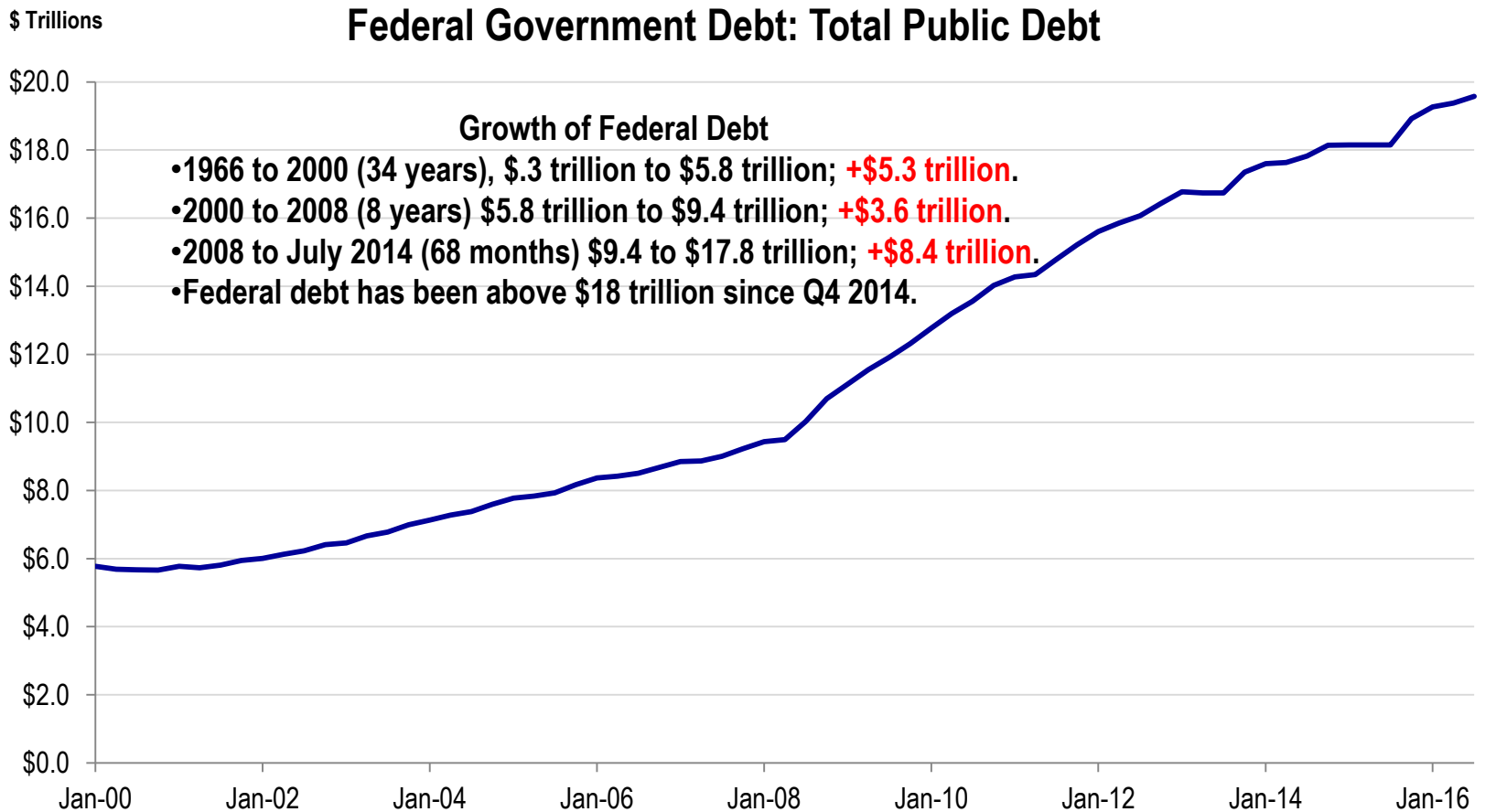
- In Q1 2006 motor vehicle loans outstanding were \$.780 billion.
- In Q3 2016 motor vehicle loans outstanding were \$1.1 trillion.

For the past year the personal savings rate has been in the range of 5.5% to 6.2%, even with an increased level of credit and spending.

*“It is the debtor that is ruined by hard times.”*

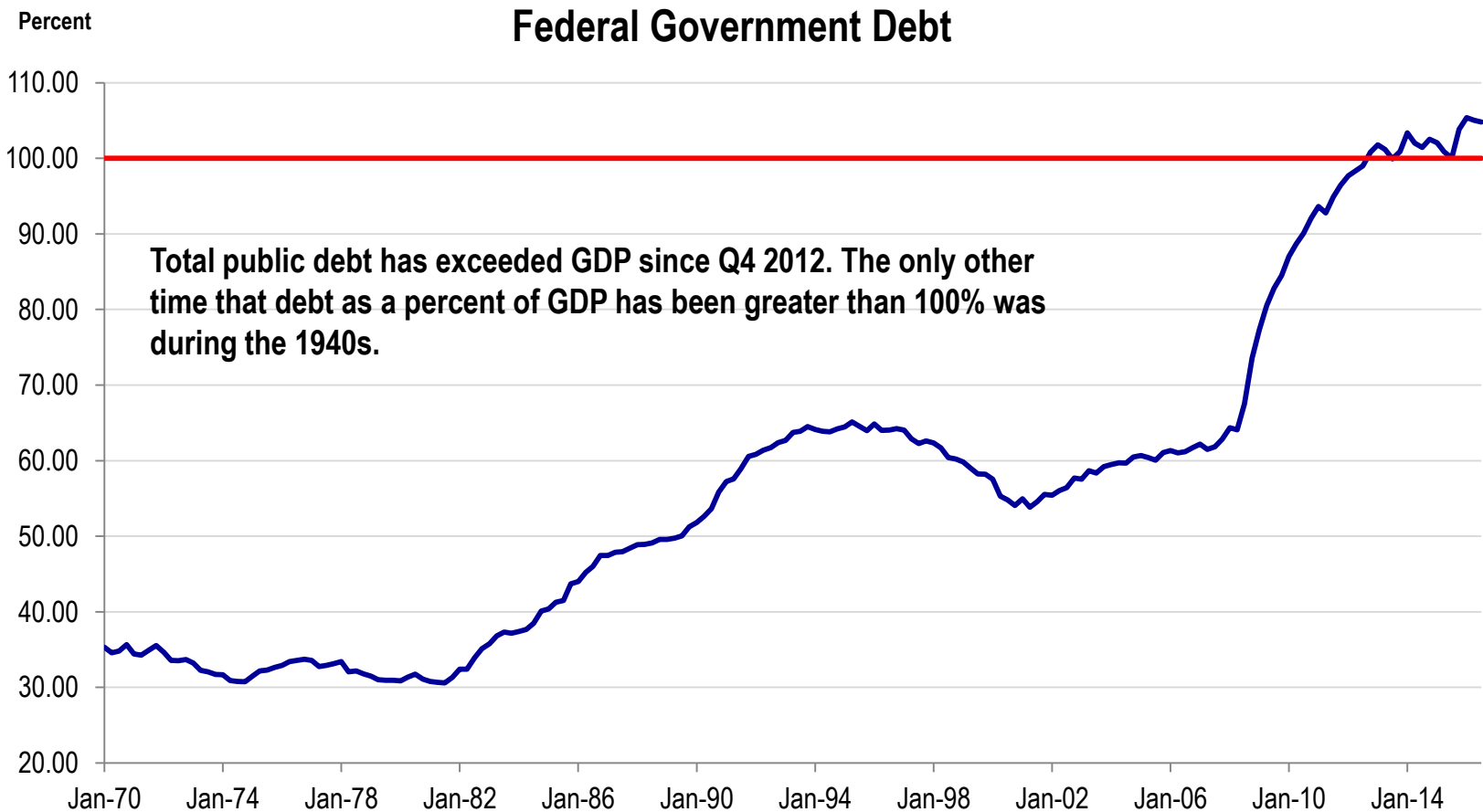
-Rutherford B. Hayes

# U.S. Federal Government Debt



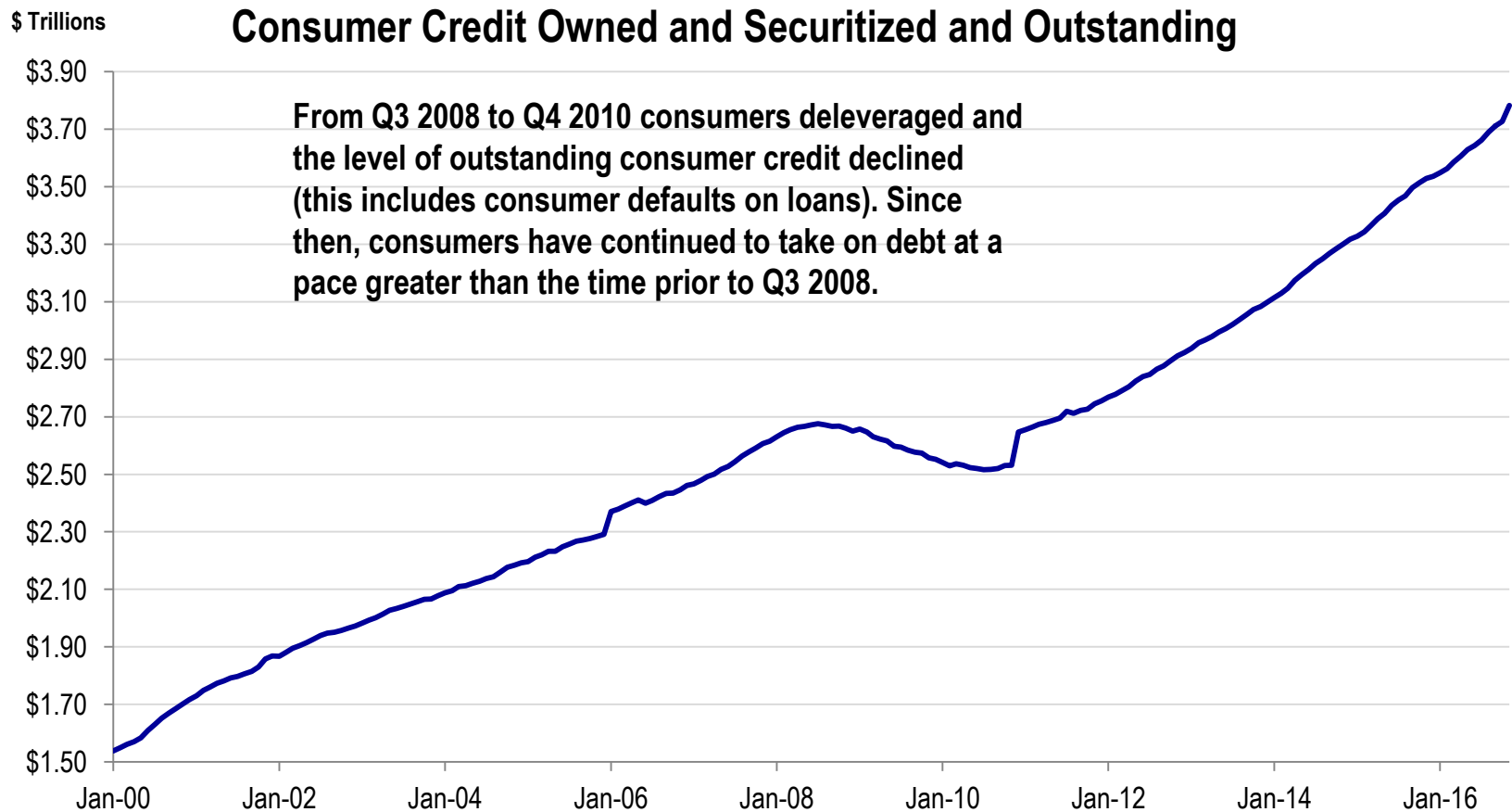
Source: FRED, cber.co.

# U.S. Public Debt as a Percent of GDP



Source: FRED.

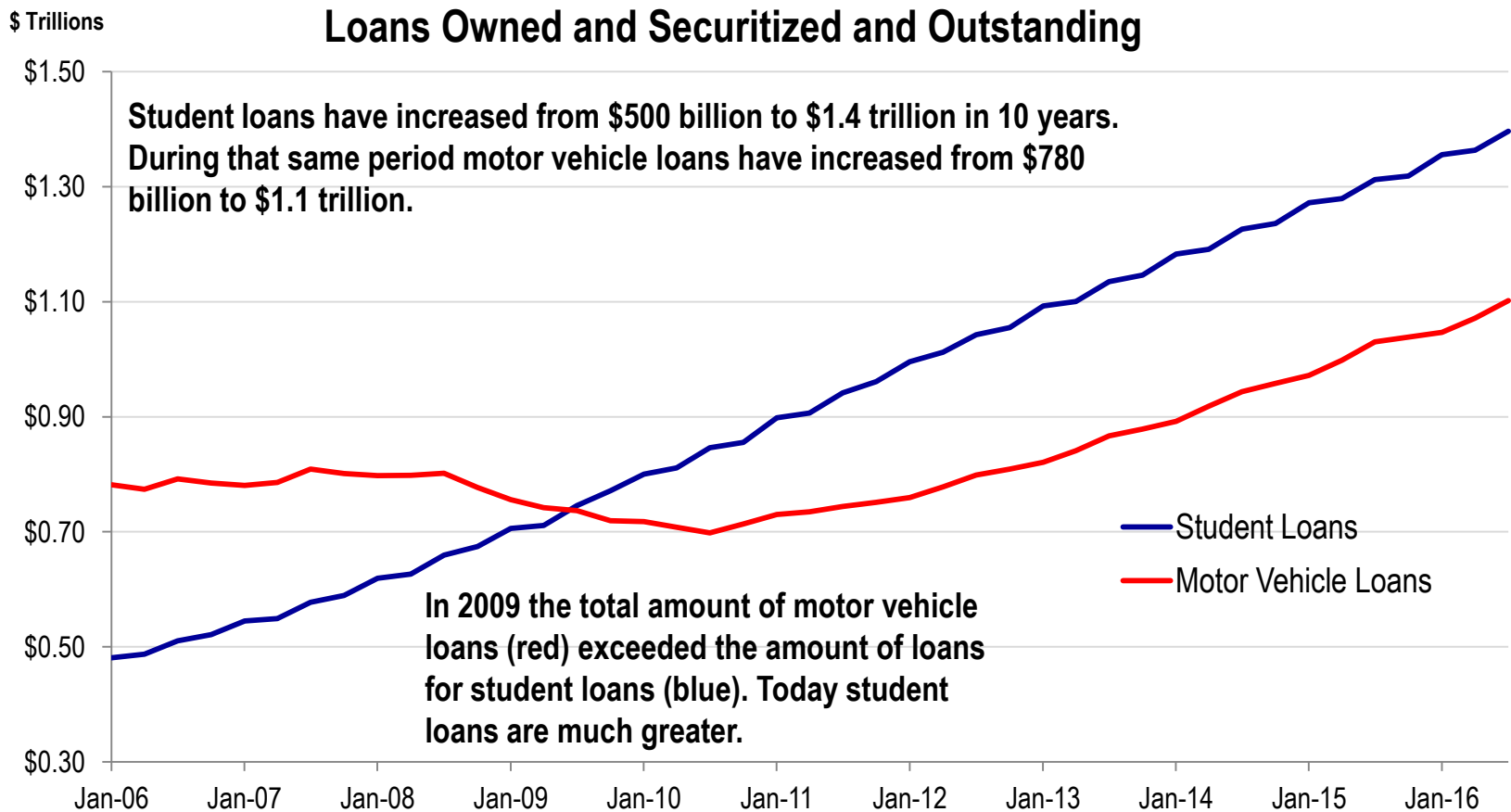
# U.S. Consumer Credit Outstanding



Source: FRED, Federal Reserve, G.19, SA.

# U.S. Loans Outstanding

## Student Loans vs. Motor Vehicle Loans

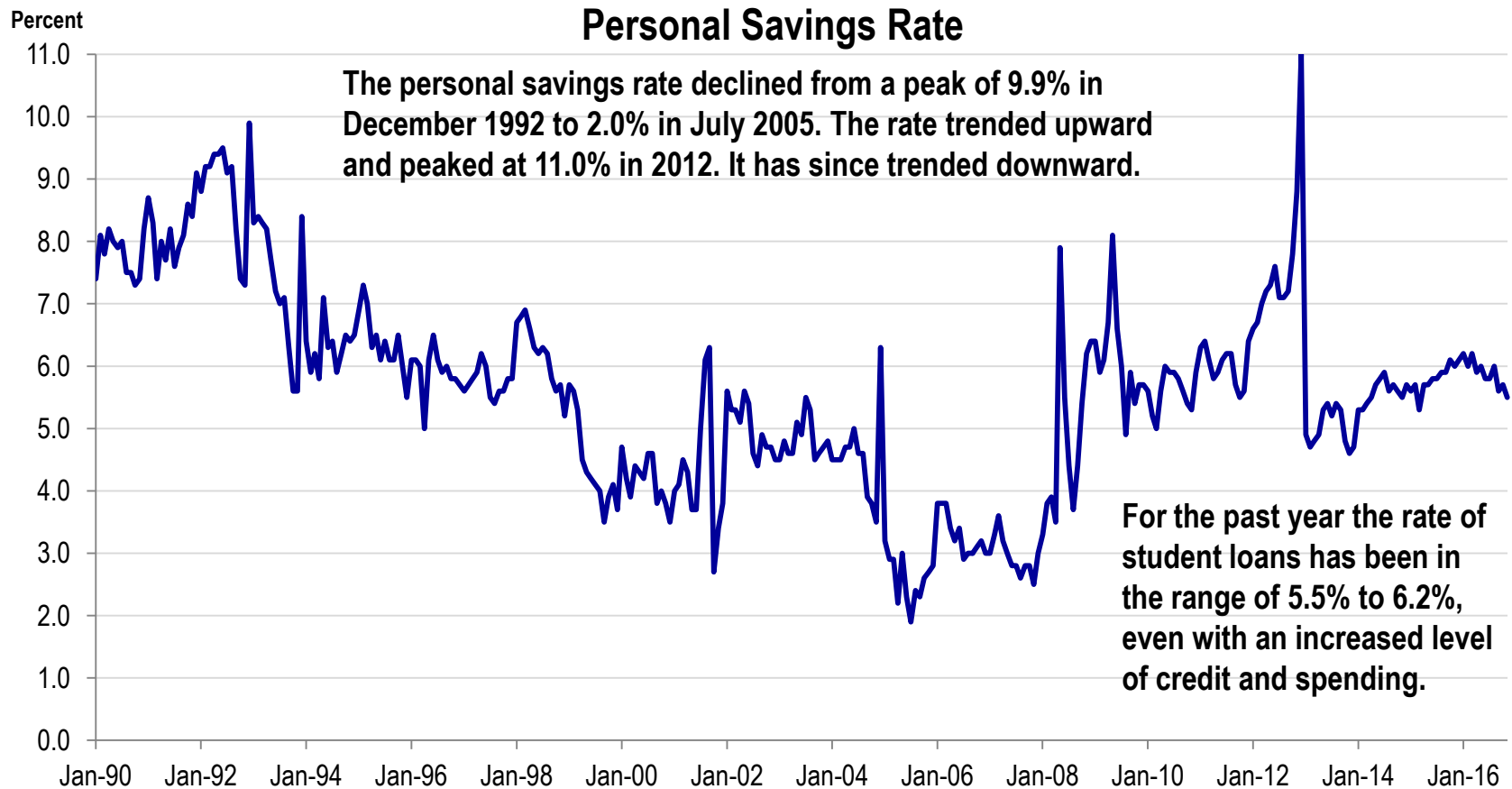


Source: FRED, cber.co.



# U.S. Personal Savings Rate

## Percentage of Disposable Personal Income



Source: FRED, SA.



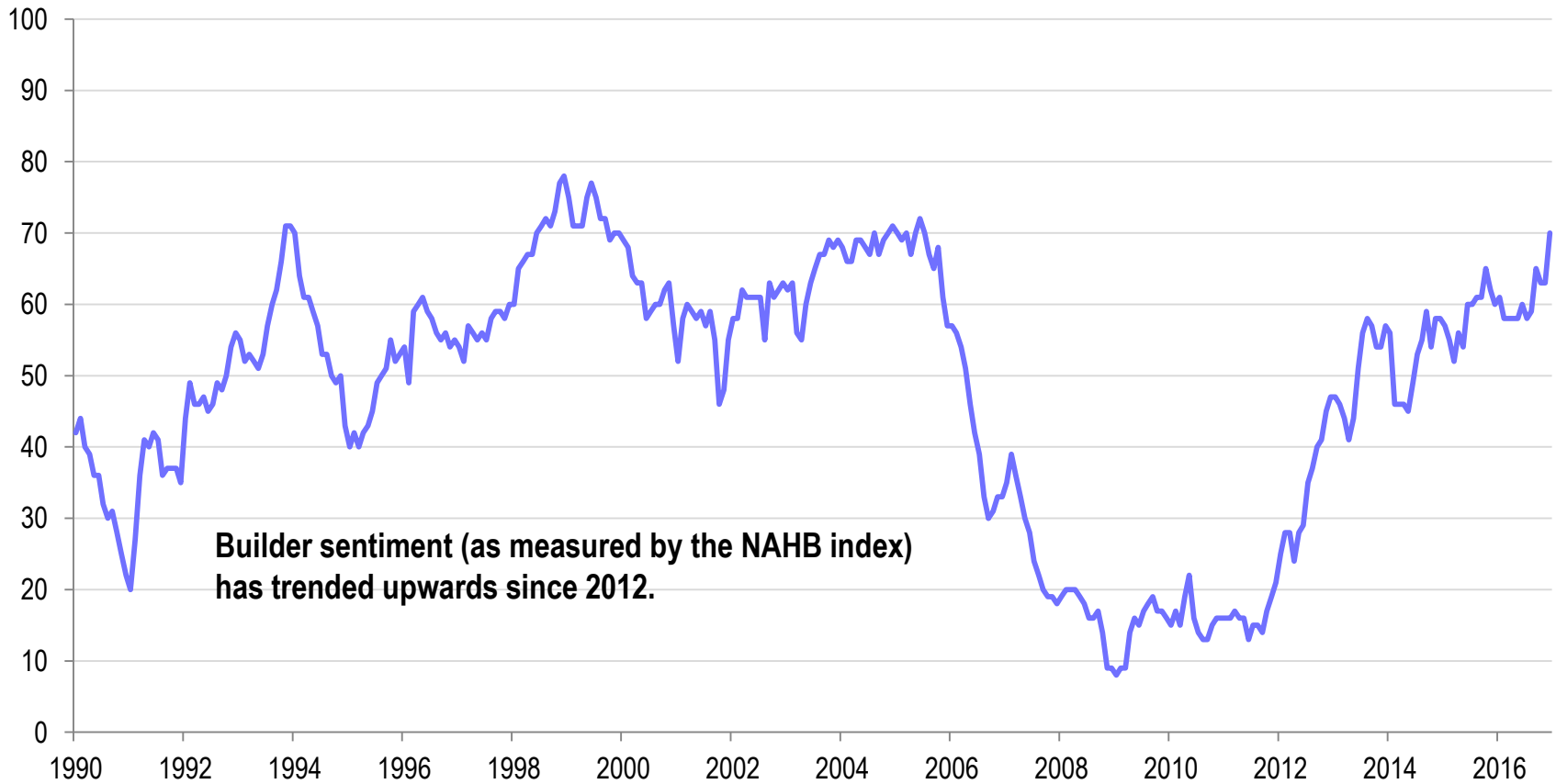
# The U.S. Economy

Housing, Housing Prices, and Mortgage Rates

# Wells Fargo NAHB Market Index



## Wells Fargo NAHB Market Index



**Builder sentiment (as measured by the NAHB index) has trended upwards since 2012.**

Source: NAHB, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

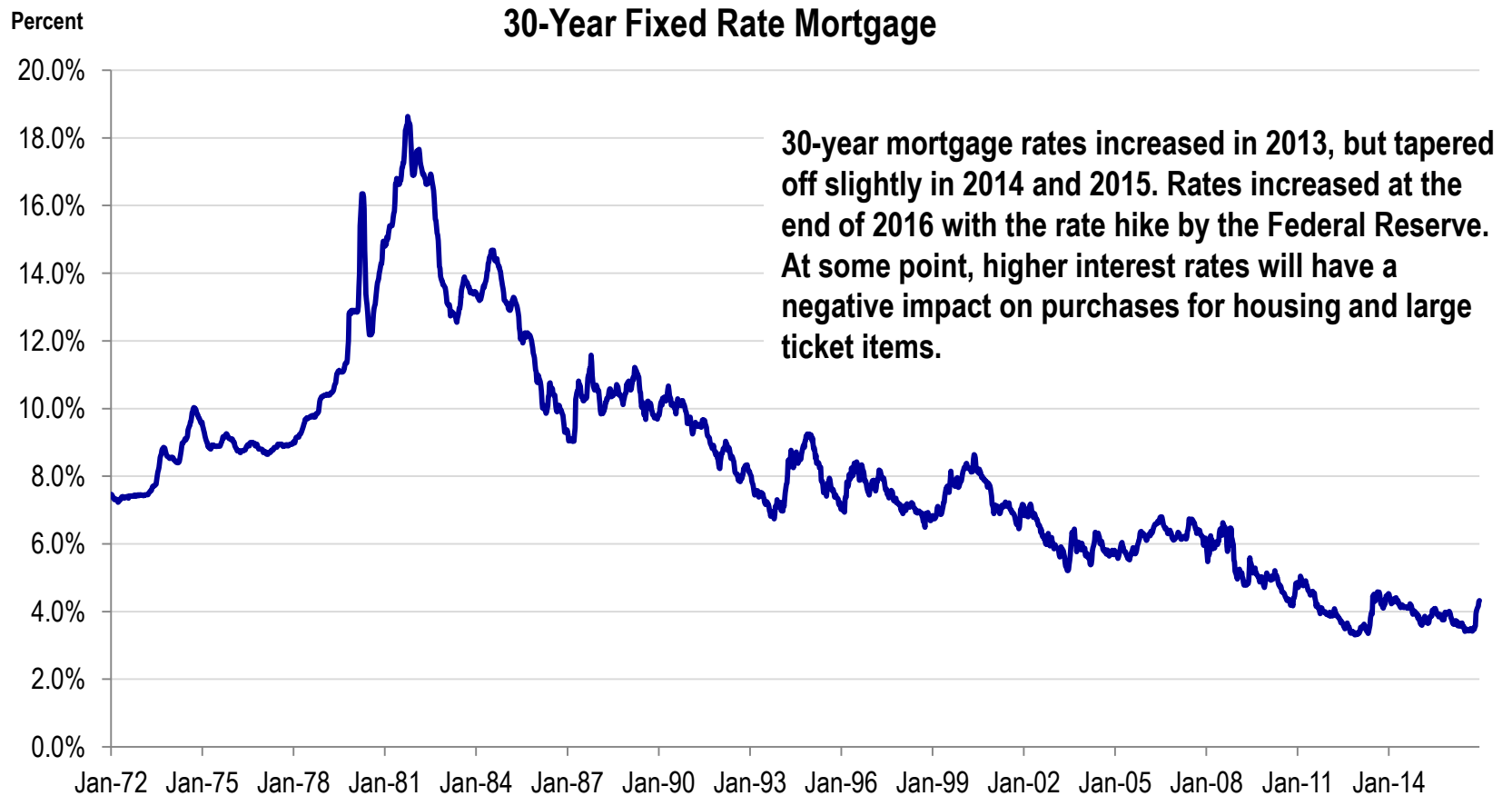
# Case Shiller Home Price Index

## National Index



Source: S&P Case-Shiller.

# 30-Year Fixed Rate Mortgage

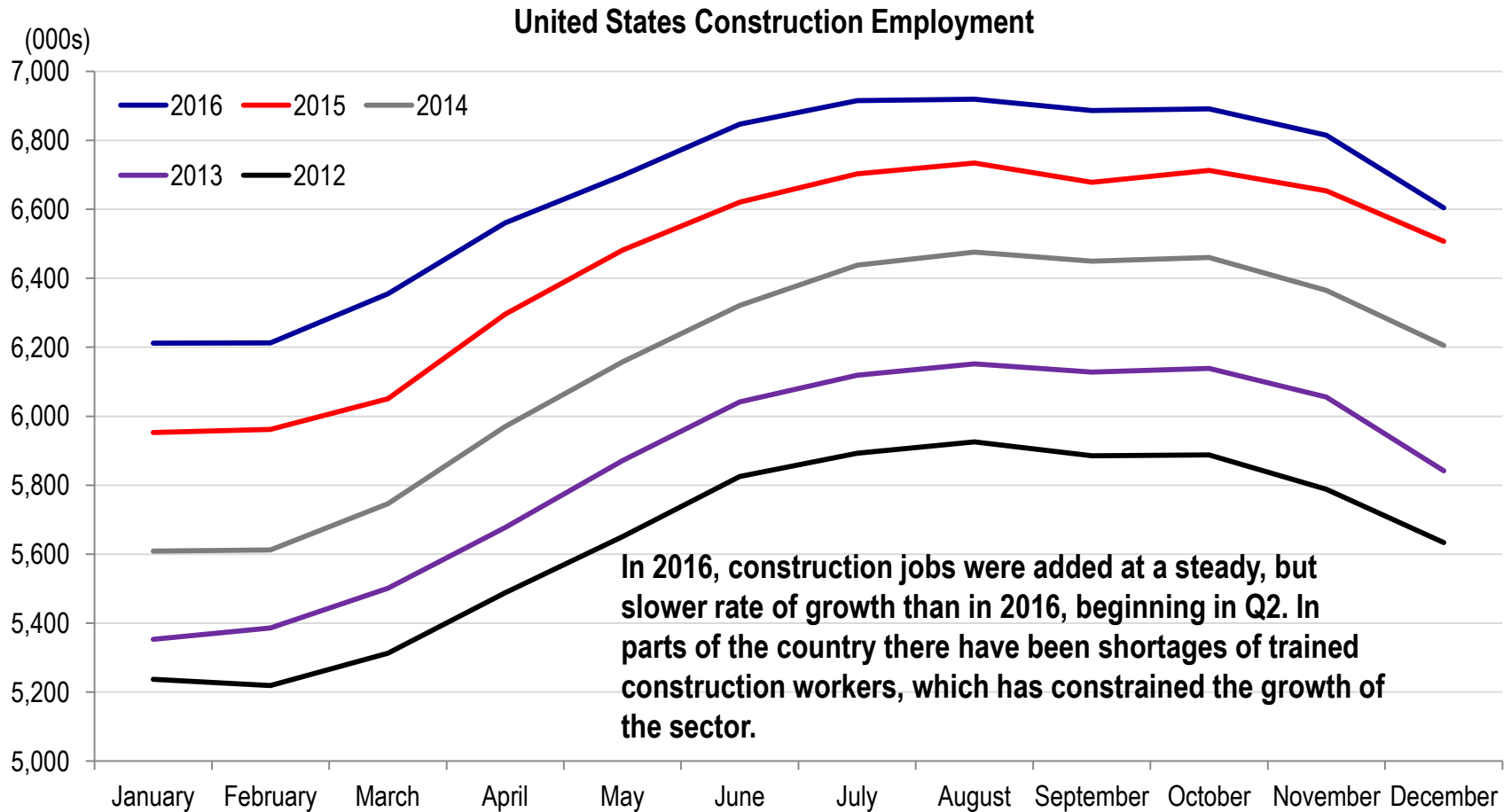


Source: FRED, Freddie MAC, cber.co.



# The U.S. Economy Construction

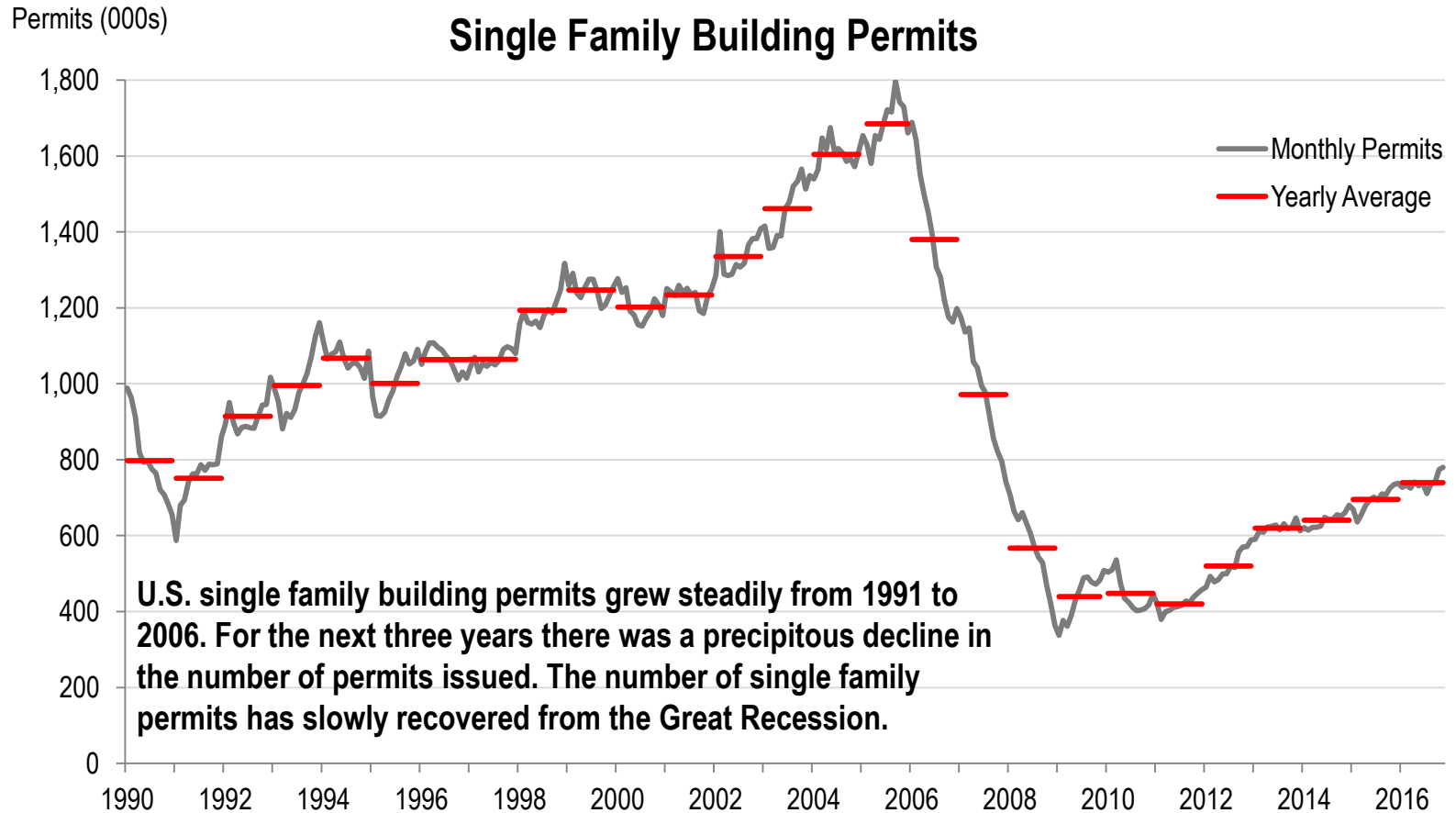
# United States Construction Employment



Source: Bureau of Labor Statistics, NSA, cber.co.

# New Single Family Building Permits

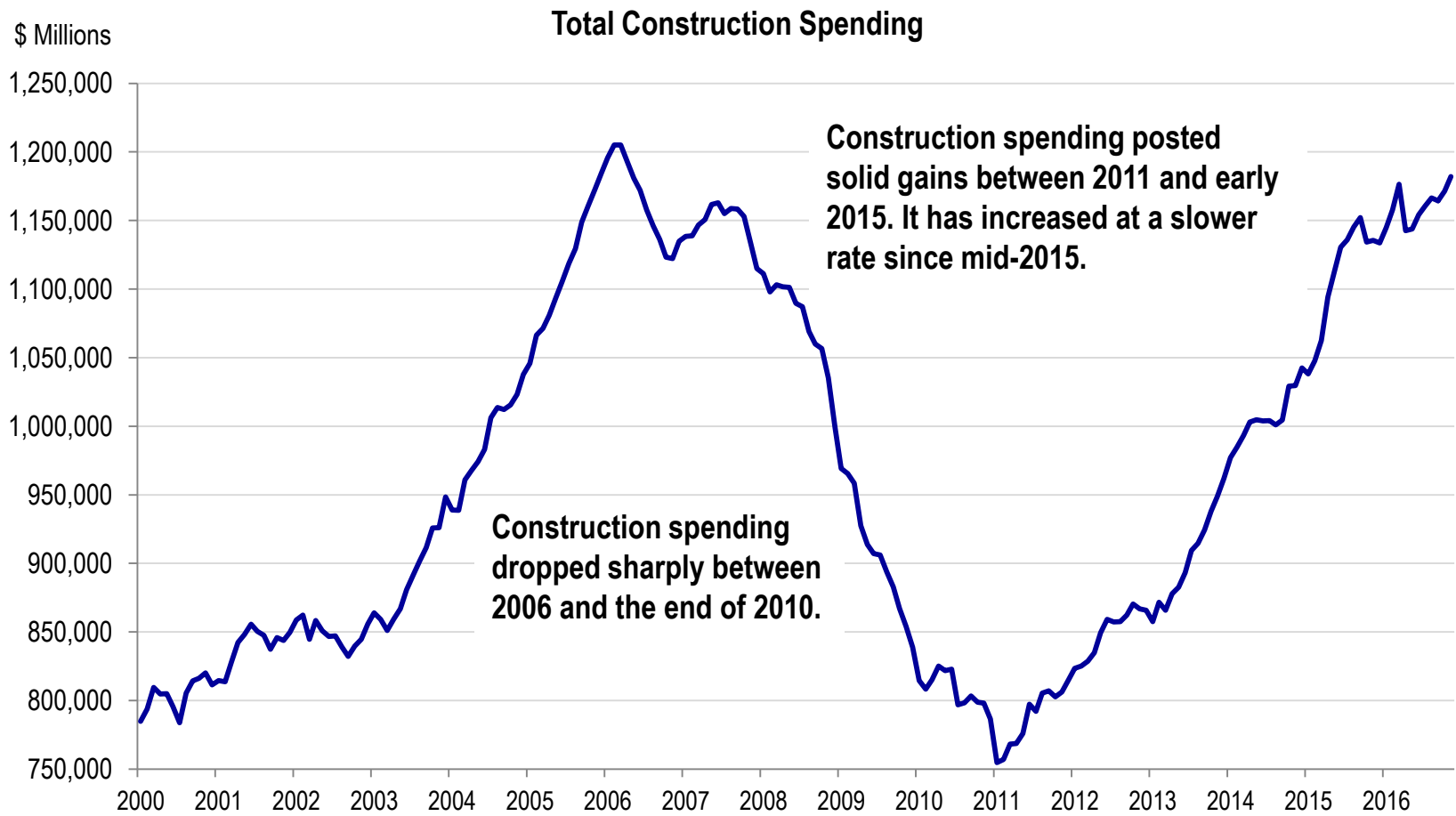
United States



Source: FRED, U.S. Census Bureau, cber.co.



# Total U.S. Construction Spending



Source: FRED, Census Bureau, not adjusted for inflation, cber.co.



# The U.S. Economy

## Services, Retail, and Manufacturing



# Services and Manufacturing

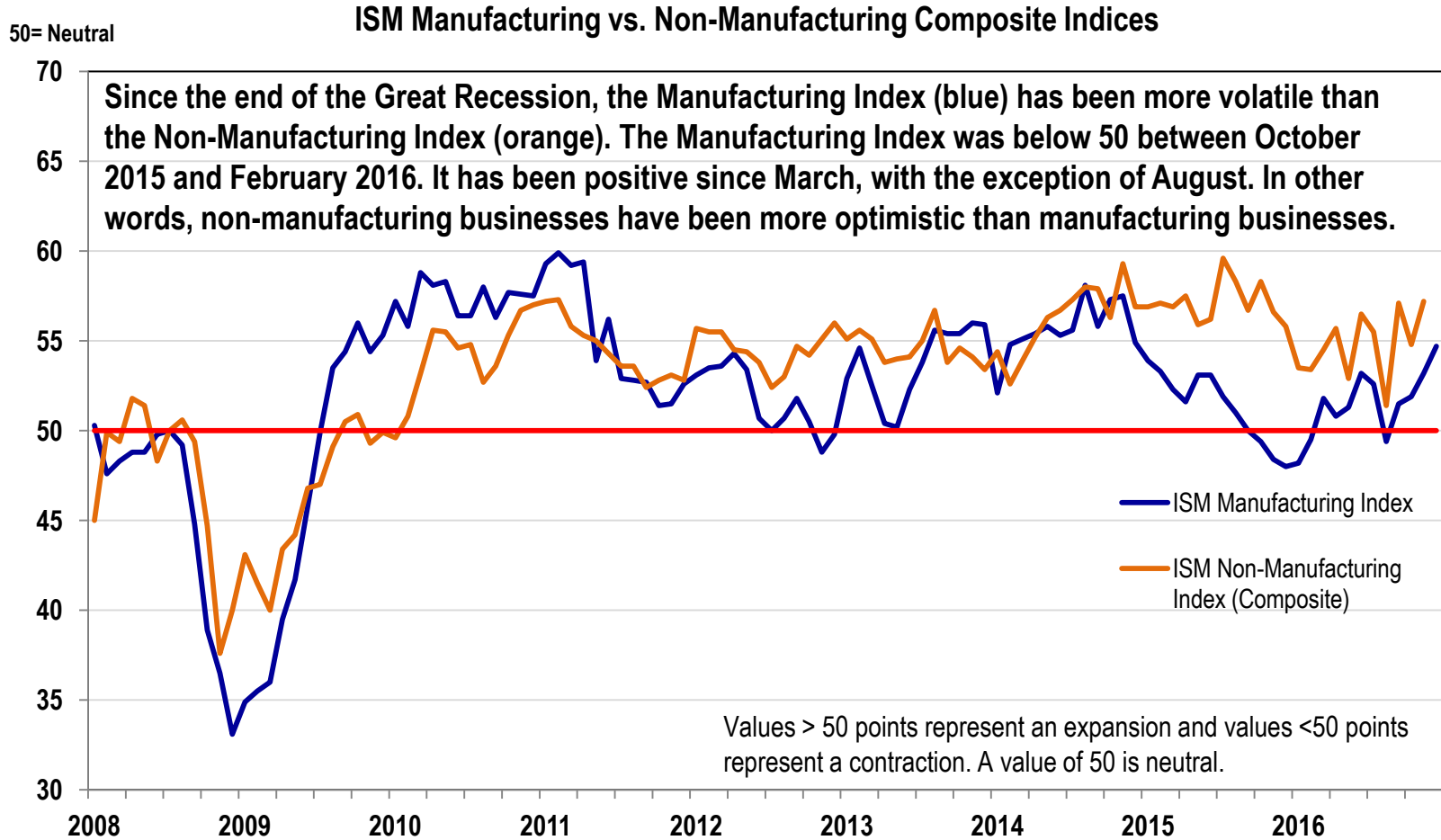
## Key Points

### Key Points

- Since the end of the Great Recession, service sector purchasing managers have consistently had more favorable expectations about the economy than their peers in manufacturing.
- The strong dollar has negatively affected the trade balance and manufacturing shipments; shipments have trended downwards since mid-2014. As a result, manufacturing employment has declined during a period of solid job growth.
- Auto and light truck sales returned to pre-recession levels and posted record sales in 2015. Sales were at a similar level in 2016 and are expected to be in the neighborhood of 18 million units in 2017.
- Retail sales posted a modest gain in 2016, with stronger than expected sales during the holiday season.

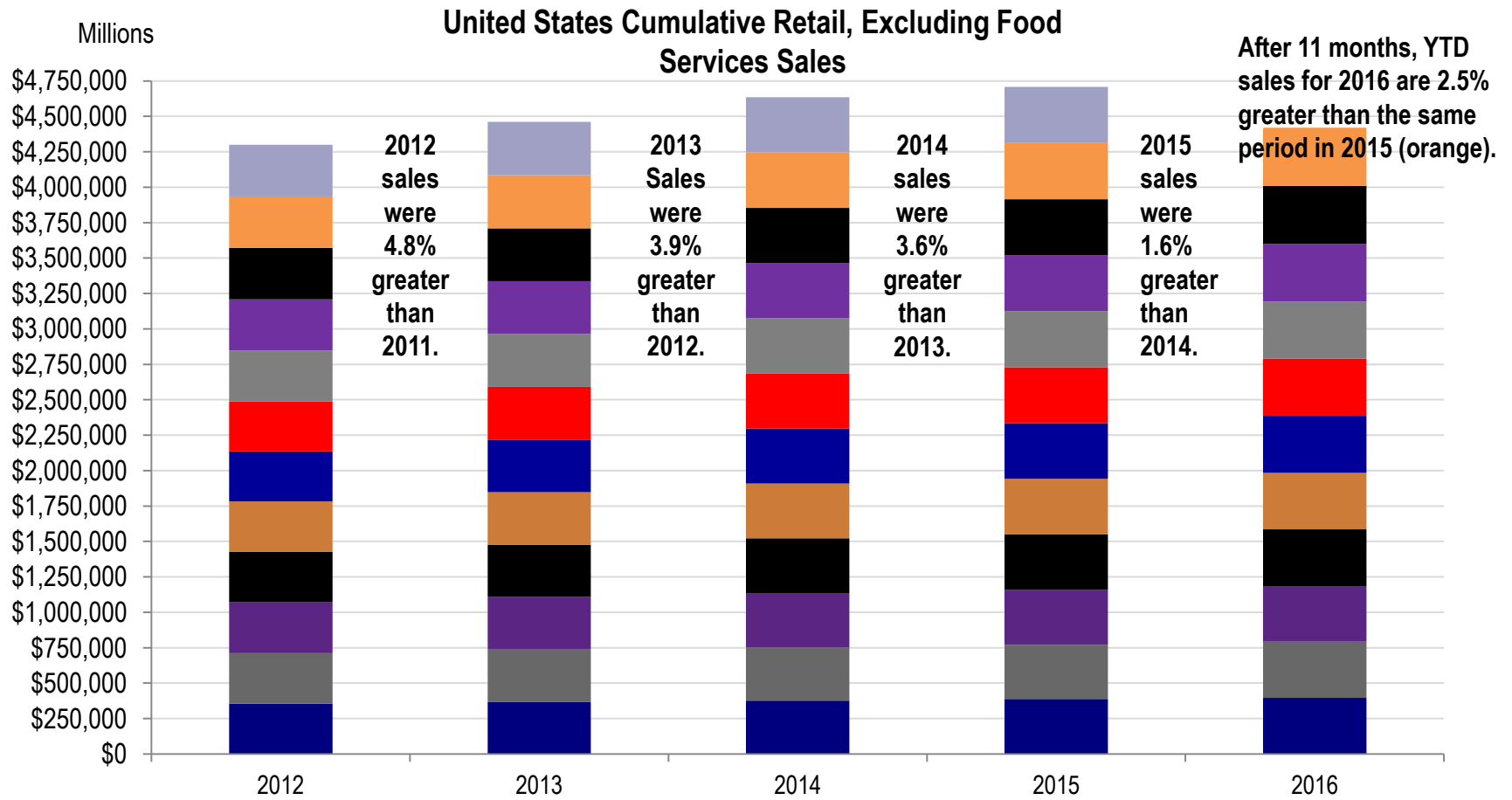
# ISM PMI Composite Indices

## Manufacturing vs. Non-manufacturing



Sources: Institute for Supply Management (ISM), FRED, cber.co.

# Cumulative Retail, Excluding Food Services Sales



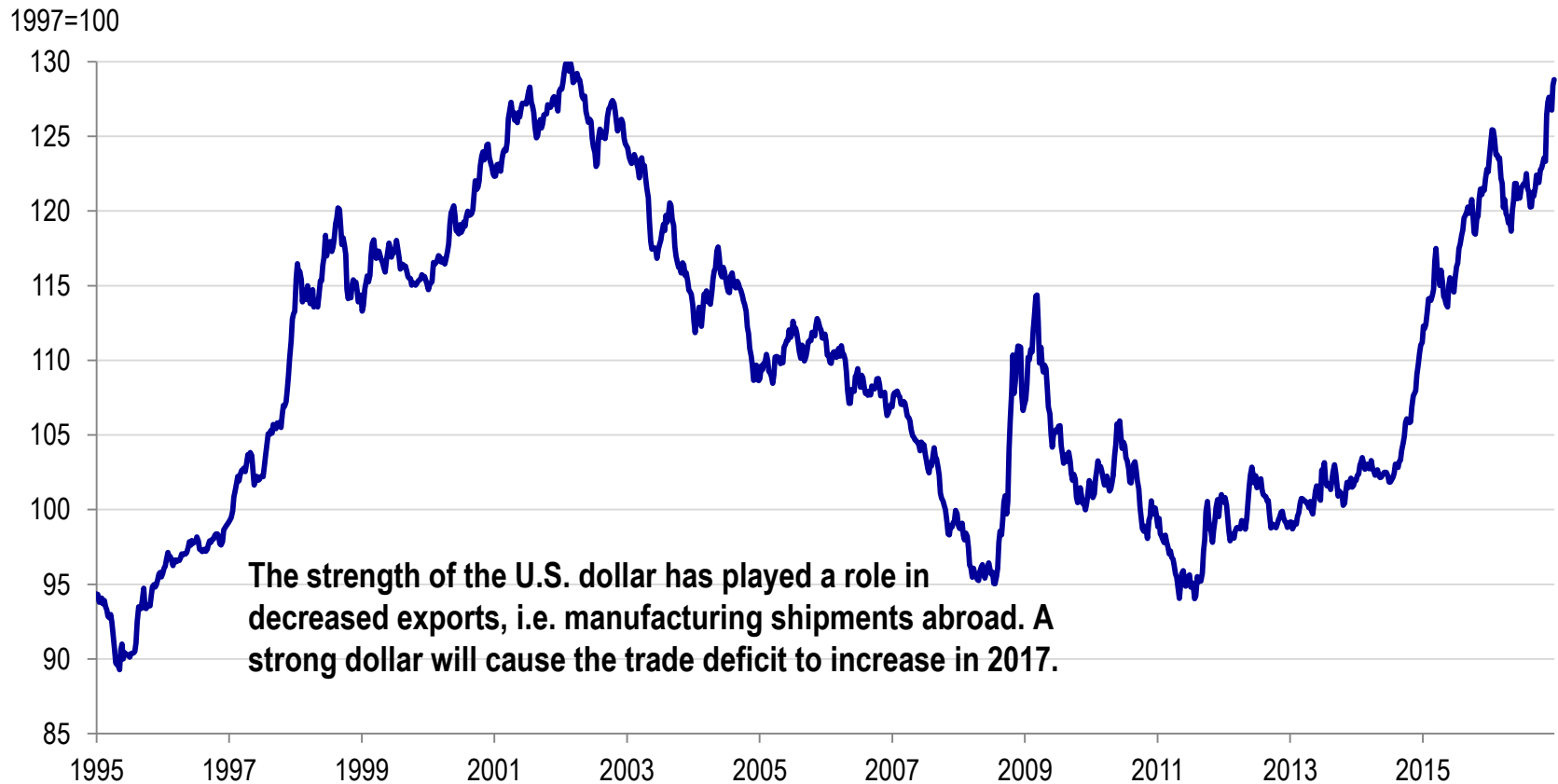
Source: U.S. Census Bureau, FRED, cber.co.

Note: Data is in descending order with December at the top and January at the bottom, not adjusted for inflation.

# Trade Weighted U.S. Dollar Index: Broad



Trade Weighted U.S. Dollar Index: Broad

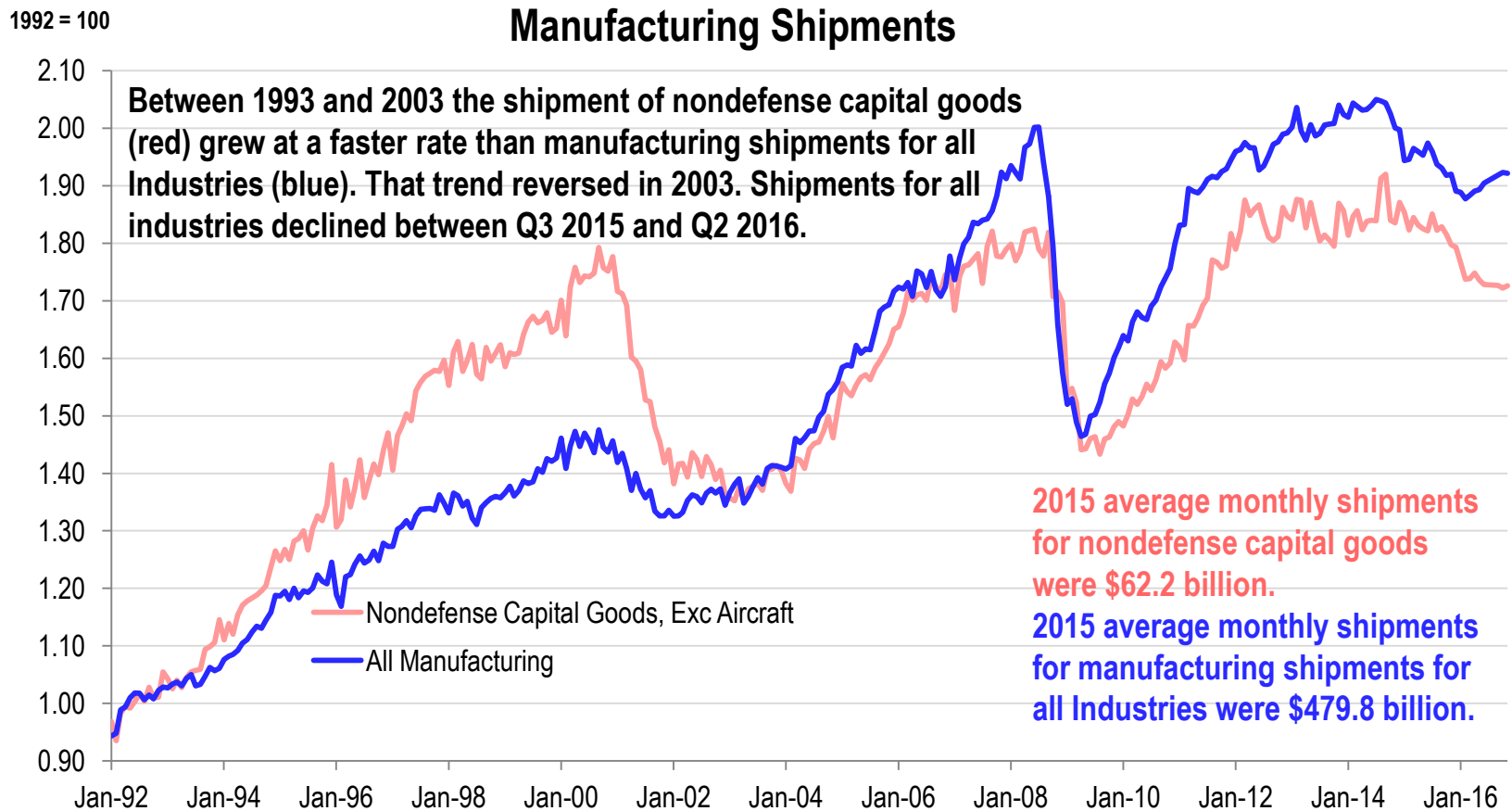


Source: FRED, The Federal Reserve, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

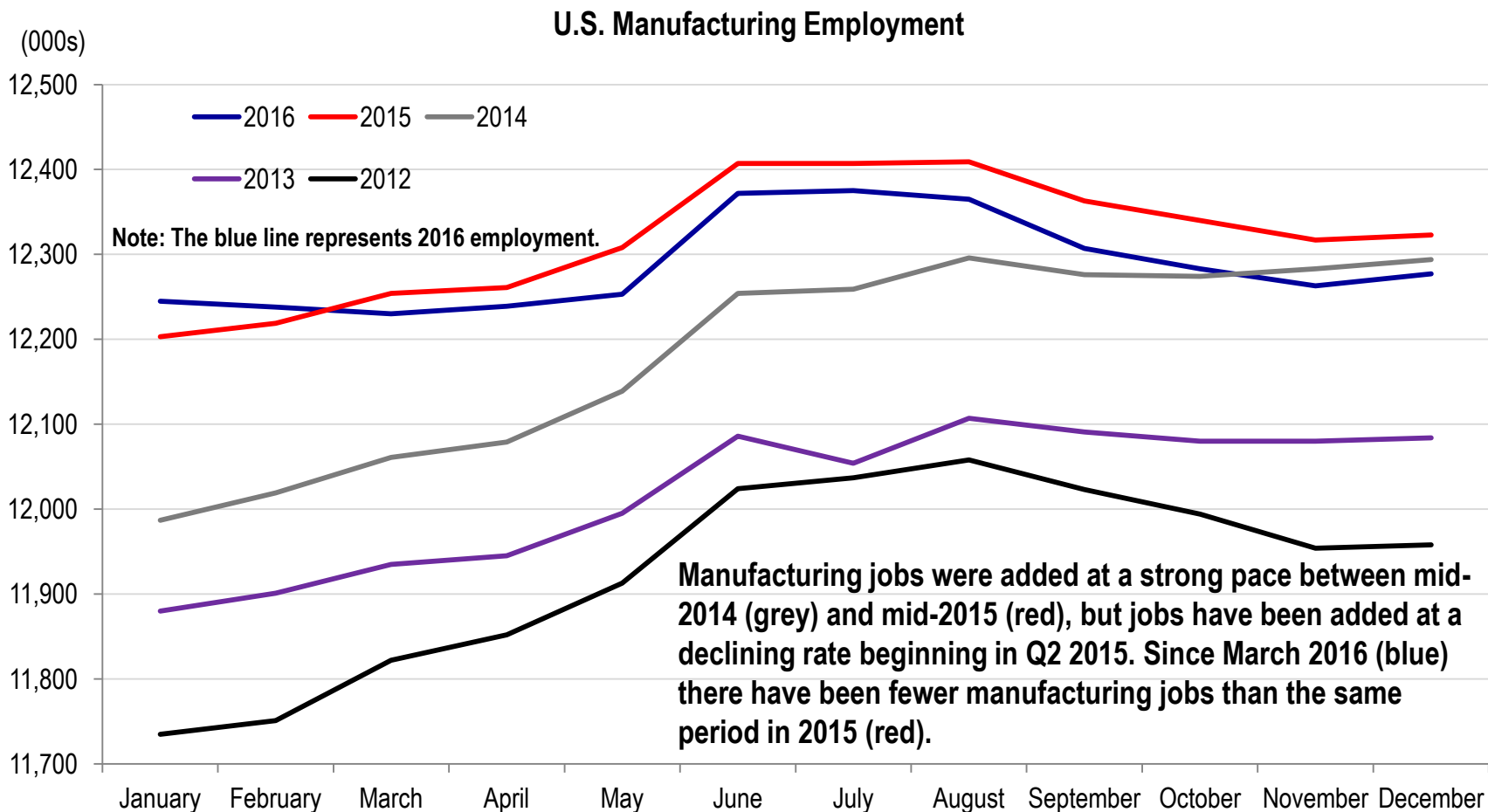
# United States Manufacturing Shipments

## All Industries vs. Nondefense Capital, Excluding Aircraft



Source: FRED, SA. U.S. Bureau of the Census, cber.co. Note: Not adjusted for inflation.

# United States Manufacturing Employment



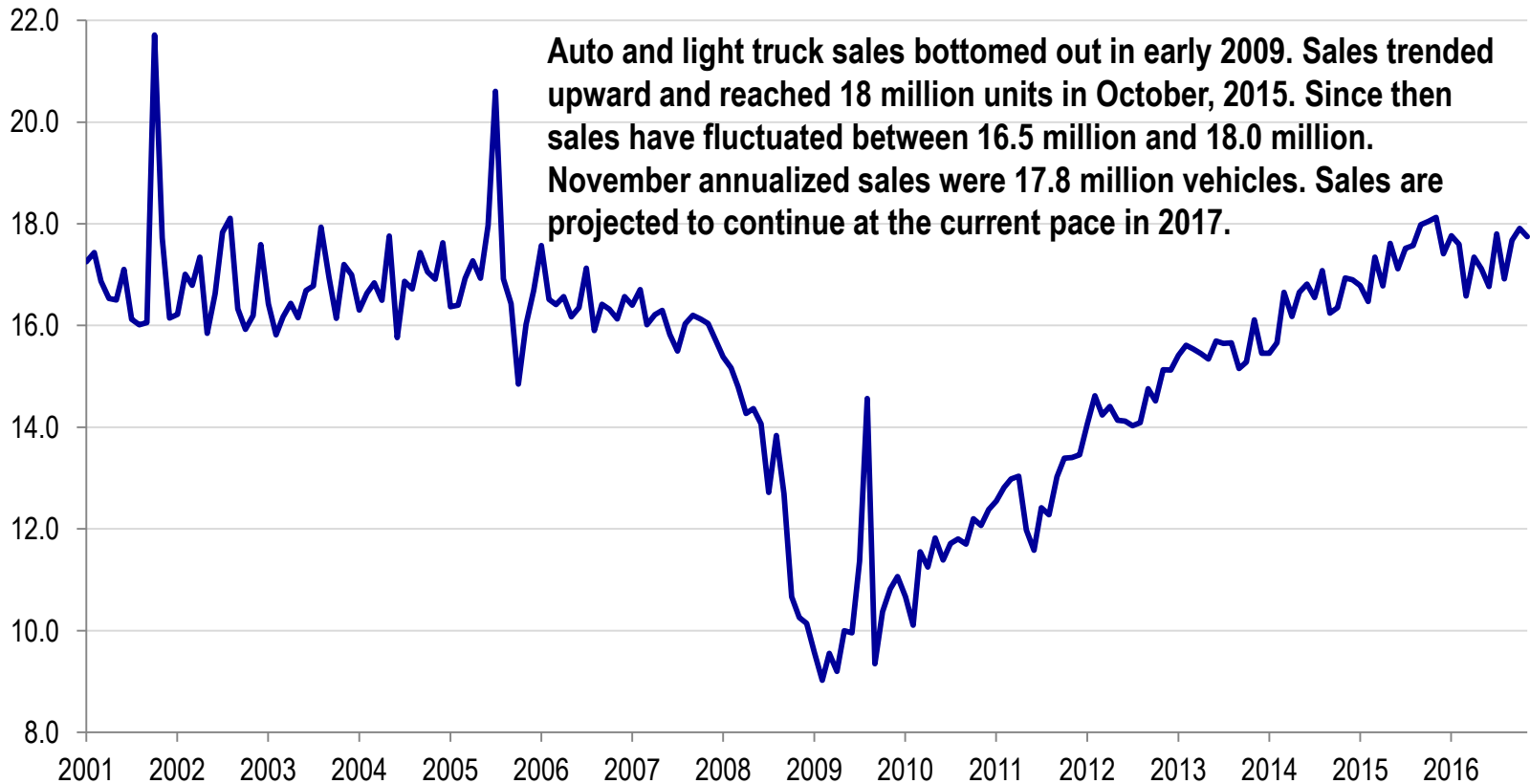
Source: Bureau of Labor Statistics, NSA, cber.co.



# U.S. Weekly Auto and Light Truck Sales

Annualized  
Rate Millions

## United States Number of Auto and Light Trucks Sold



Source: FRED, BEA, cber.co.

Note: Seasonally Adjusted Annualized Rate.

Colorado-based Business and Economic Research <http://cber.co>

# Summary of the U.S. Economy

The U.S. economy is on solid footing, although there are reasons to feel encouraged and reasons to feel concerned. The first year of the Trump administration will be a time of extremes – both good and bad.

Reasons to Feel Good About the U.S. and Global Economies	Reasons to be Concerned About the U.S. and Global Economies
<b>Global and U.S. Real GDP</b> – Global and U.S. real GDP growth will be stronger in 2017.	<b>Global Geopolitical Tensions</b> – Which country is next?
<b>Consumption and Investment</b> – In 2017 consumers will continue to spend; business investment will increase.	<b>Brexit</b> – Will we begin to see fallout from Brexit? If so, when?
<b>Jobs</b> - The U.S. will add 1.9 to 2.1 million jobs in 2017.	<b>Labor Shortages</b> – There are critical labor shortages in key occupations and industries.
<b>Service Industries</b> – The service sectors have been strong since 2010. Continued growth is on tap in 2017.	<b>Manufacturing</b> – When will we see a weaker dollar, stronger exports, and increased manufacturing shipments?
<b>Housing Prices</b> - U.S. housing prices continue to rise, which increases consumer confidence and “wealth”.	<b>Productivity</b> – Will business investment improve and the downward trend in labor productivity be reversed?
<b>Home Sales</b> – Despite high prices, home sales continue to be solid.	<b>Debt</b> – Will the level of personal and government debt become an issue in 2017?
<b>Auto Sales</b> – Auto sales are expected to continue at a rate similar to last year.	<b>Interest Rates</b> – Will rising interest rates cause a slowdown in auto sales, construction, and housing?
<b>Equity Markets</b> – We are in a bull market.	<b>A Divided Country</b> – The country was divided before the election. Will that change in the months ahead?



# The Colorado Economy

# Summary of Key Data

## United States and Colorado

### Colorado

**Population** - Colorado's population will increase by 99,654 in 2017 to a total of 5,655,405.

**Colorado GDP** – After a dismal 2016, the state real GDP will expand at a rate similar to the U.S. rate, 2.1% to 2.5%, in 2017.

**Wage and Salary Employment** – Colorado will add 57,000 jobs in 2016 and 57,000 to 63,000 jobs in 2017.

**Unemployment Rate** – State unemployment will range from 3.4% to 3.8% in 2017. Rates will be lowest in Boulder and Ft. Collins.

**Consumer Price Index** – The Denver-Boulder Greeley CPI is expected to be 2.8% in 2016 with an increase to 3.0% in 2017.

**Retail Trade Sales (Including Food Services)** – Annual retail trade sales will increase by 4.3% to \$103.8 billion in 2017.

**Construction** – About 22,400 single-family permits will be issued in 2017 – if the industry can find enough qualified workers.

**Case Shiller Housing Prices** – Y-O-Y state home prices for October 2016 were up 8.2%. Appreciation will be slower in 2017.

**The Colorado economy will have a solid year in 2017. The rate of job and real GDP growth will outpace the U.S.**

### United States

**Real GDP** – In 2017, annual real GDP growth will be stronger than 2016. It will be in the 2.1% to 2.5% range.

**Real Personal Consumption** – Annual personal consumption will be in the 2.4% to 2.8% range for 2017.

**U.S. Employment** – The U.S. will add between 160,000 to 180,000 jobs per month, or 1.9 to 2.1 million jobs in 2017.

**Unemployment Rate** – Average 2016 unemployment was 4.9%; look for 4.6% to 4.8% in 2017.

**Consumer Price Index** – The CPI is estimated to be 1.3% in 2016 and 2.5% in 2017.

**Real Median Household Income** – In 2015, real median household income was less than 1999 (\$56,516 vs. \$57,909).

**Price of a Barrel of Oil (WTI)** – Oil closed the year at \$53 per barrel. Look for higher prices in 2017.

**Case Shiller Housing Prices** – Y-O-Y U.S. home prices for October will be +5.6%. Appreciation will be slower in 2017.

**Standard and Poor's 500** – The S&P 500 posted a gain of 9.5% in 2016. For the near-term, we are in a bull market.

**The U.S. will post modest job and GDP growth in 2017.**



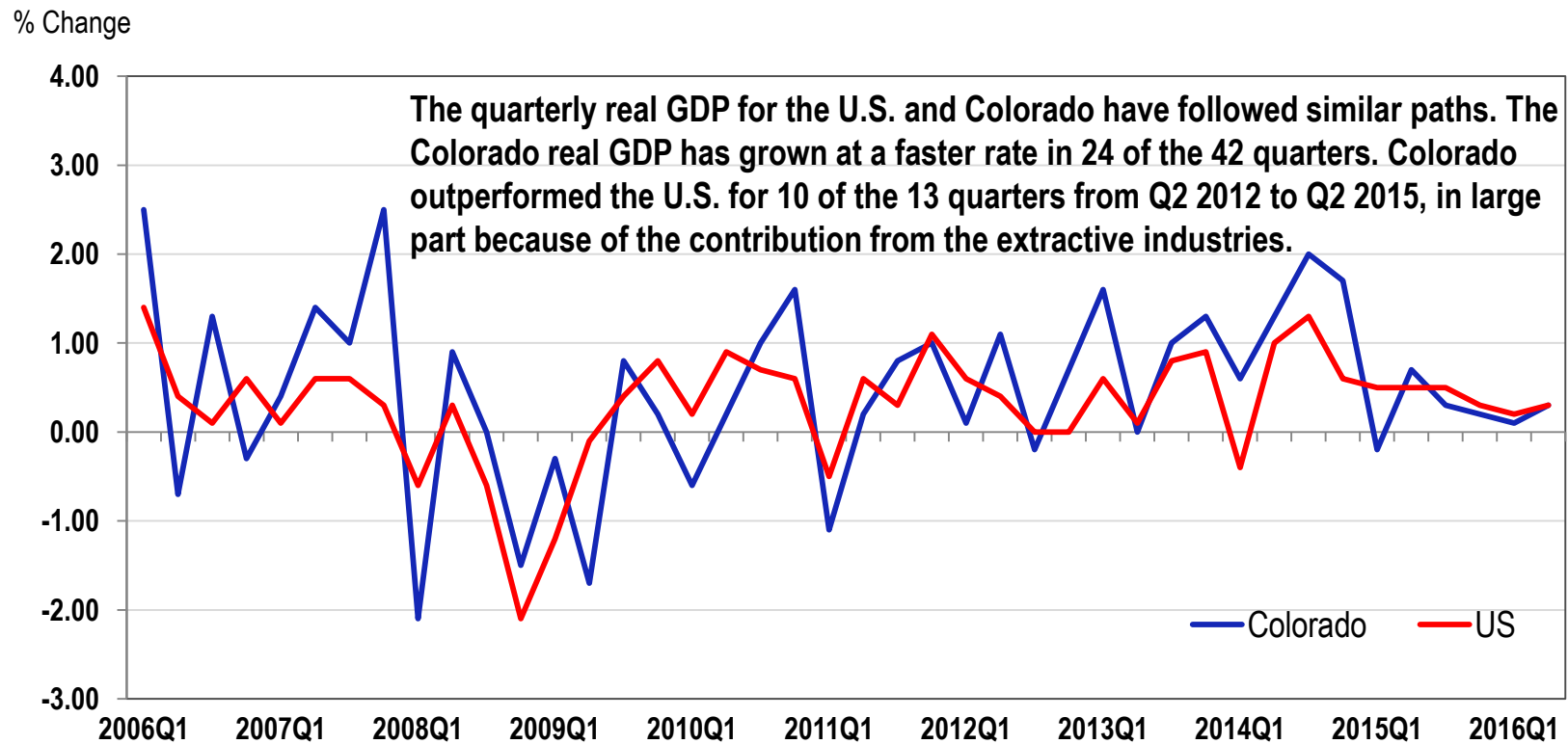
# The Colorado Economy

GDP, Real Median Household Income, and Inflation

# ● Change in Quarterly Real GDP (Prior Period)

## ● Colorado vs. U.S.

Percentage Change Over Previous Period in Real GDP Colorado vs. U.S.



Source: Bureau of Economic Analysis. Note: U.S. real GDP is summary of states GDP.



# Colorado MSA Real Per Capita GDP

Real per capita GDP for a region is defined as the GDP for that region divided by it's population.

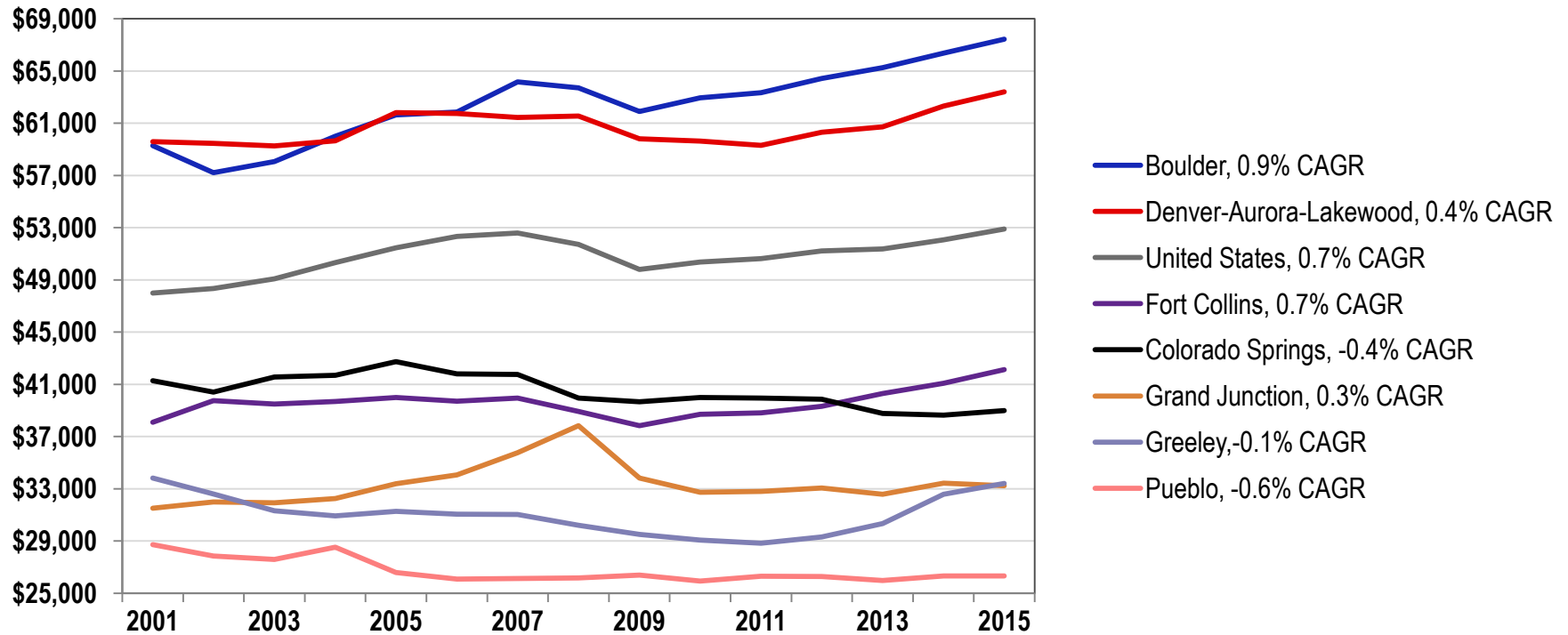
The following comments (and chart on the next page) are based on the Colorado MSA real per capita GDP for the period 2001 to 2015 (most current data).

- In 2015, Boulder and Denver had real per capita GDP that was above the level of the U.S. metro per capita GDP.
- In 2015, only Boulder had an annualized growth rate (0.9%) that was above the U.S. (0.7%). The rate for Fort Collins was the same as the U.S.
- Greeley, Pueblo, and Colorado Springs showed negative growth rates for their real per capita GDP between 2001 and 2015.

# ● Real Per Capita GDP by MSA and Annualized Growth Rates

## ● Growth Rates

Per Capita GDP and Annualized Growth Rates (2001-2015)



Source: Bureau of Economic Analysis, cber.co.



● **Real Median Household  
Income 2015** (CPI-U-RS  
Adjusted Dollars,  
● Not Seasonally Adjusted)

In 2015, the most current data, real median household income was:

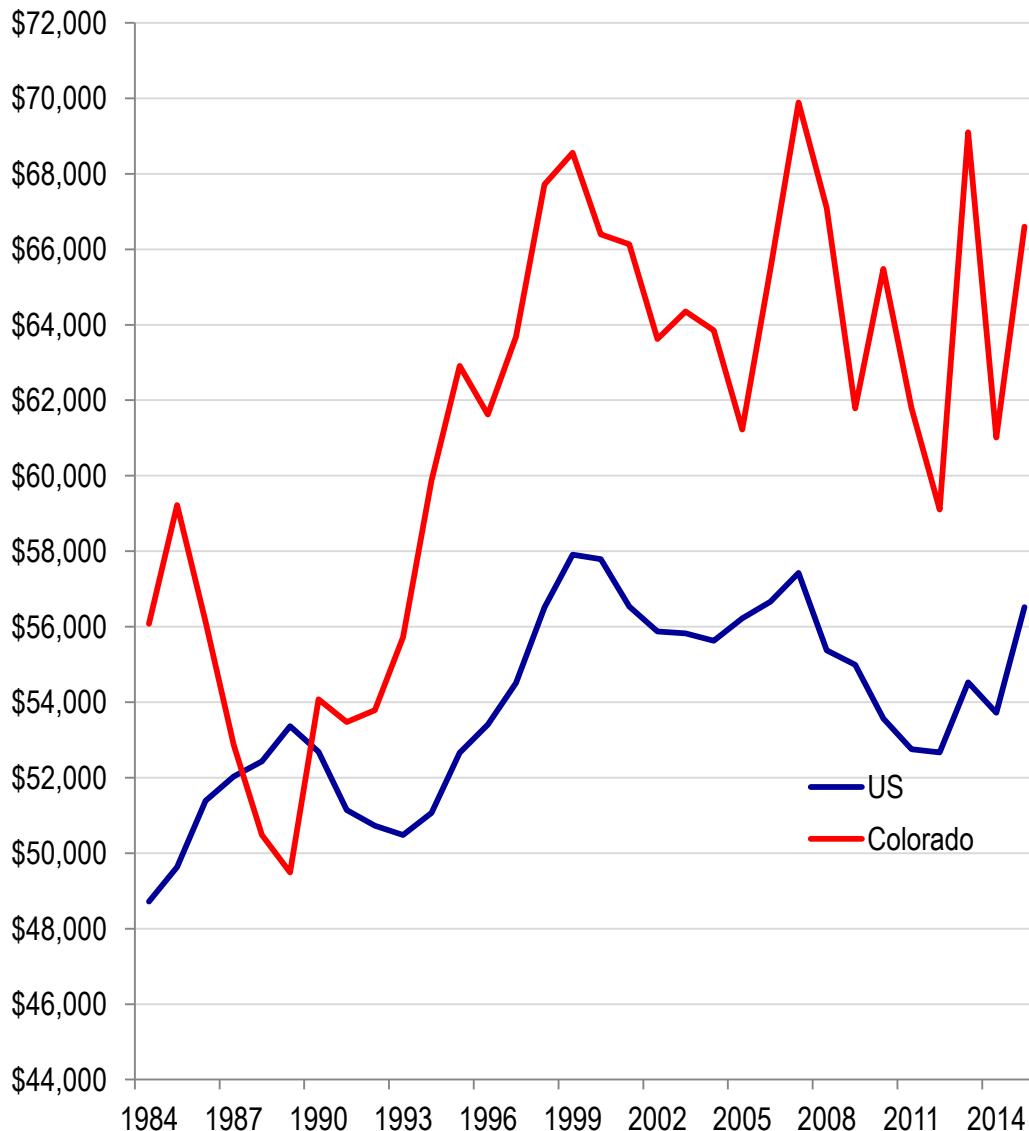
- Less than the 1999 value for the U.S. (\$56,516 vs. \$57,909).
- Less than the 1999 value for Colorado (\$66,596 vs. \$68,554)

In the 31 years between 1984 and 2015, the value of the real median household income for:

- The U.S. increased at an annualized rate of 0.48%
- Colorado increased at an annualized rate of 0.56%.

In 29 of the 31 years, the value for Colorado was greater than the U.S.

**Real Median Household Income U.S. vs. Colorado**



Source: Federal Reserve, cber.co

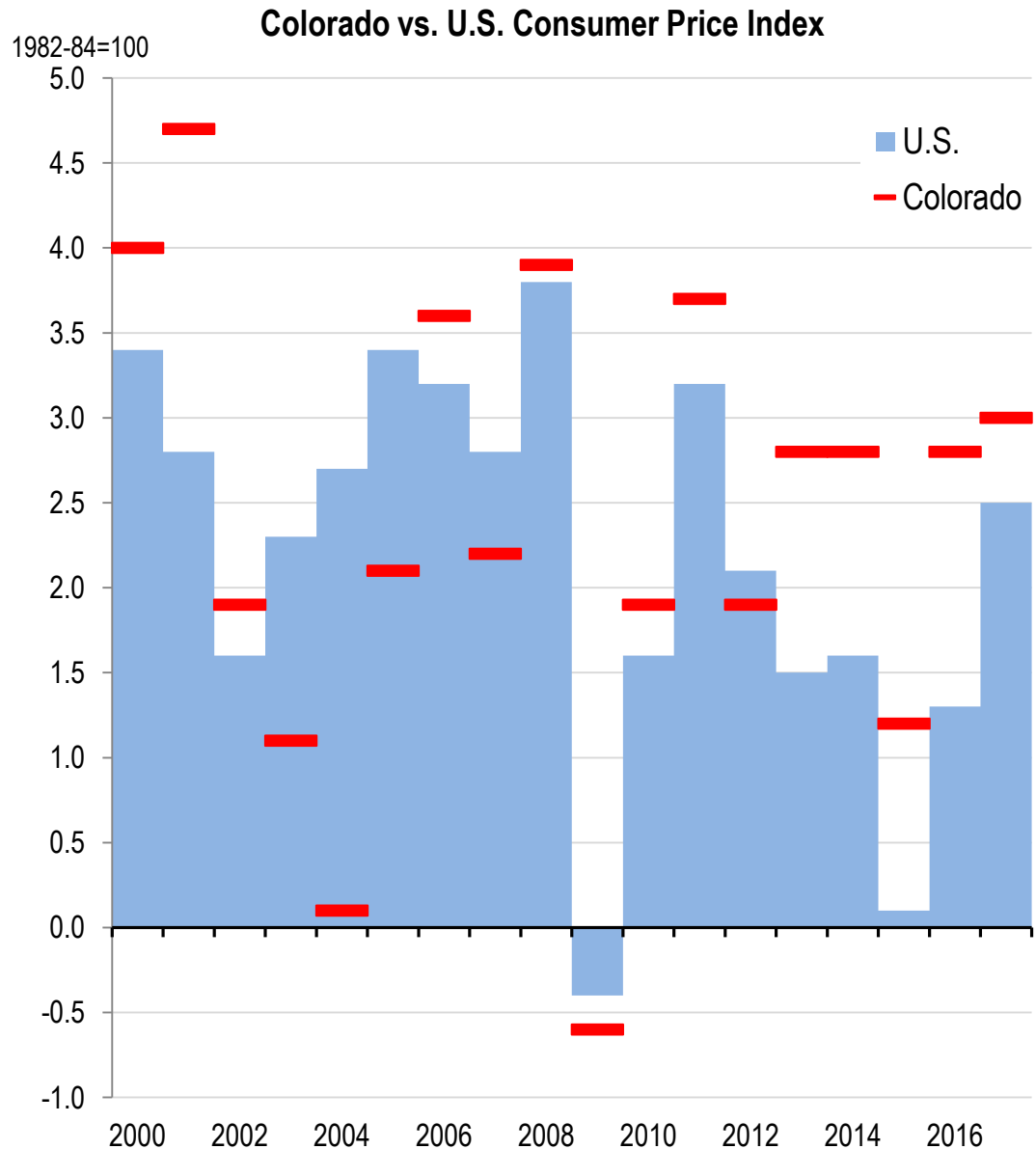
# Consumer Price Index (CPI)

The Denver-Boulder-Greeley CPI (red bars) is sometimes used as a proxy for Colorado inflation.

It has been greater than the U.S. CPI 12 of 18 times between 2000 and 2017. Five of the six years that Colorado inflation was lower were between 2003 and 2009.

Recently, higher housing prices and medical costs have caused Colorado to be a more expensive place to live.

The Denver-Boulder-Greeley CPI is expected to rise by 2.8% in 2016 and 3.0% in 2017.



Source: Bureau of Labor Statistics, [cber.co](http://cber.co).

Colorado-based Business and Economic Research <http://cber.co>



# The Colorado Economy

## Population and Components of Change

# Colorado Population

## Components of Change

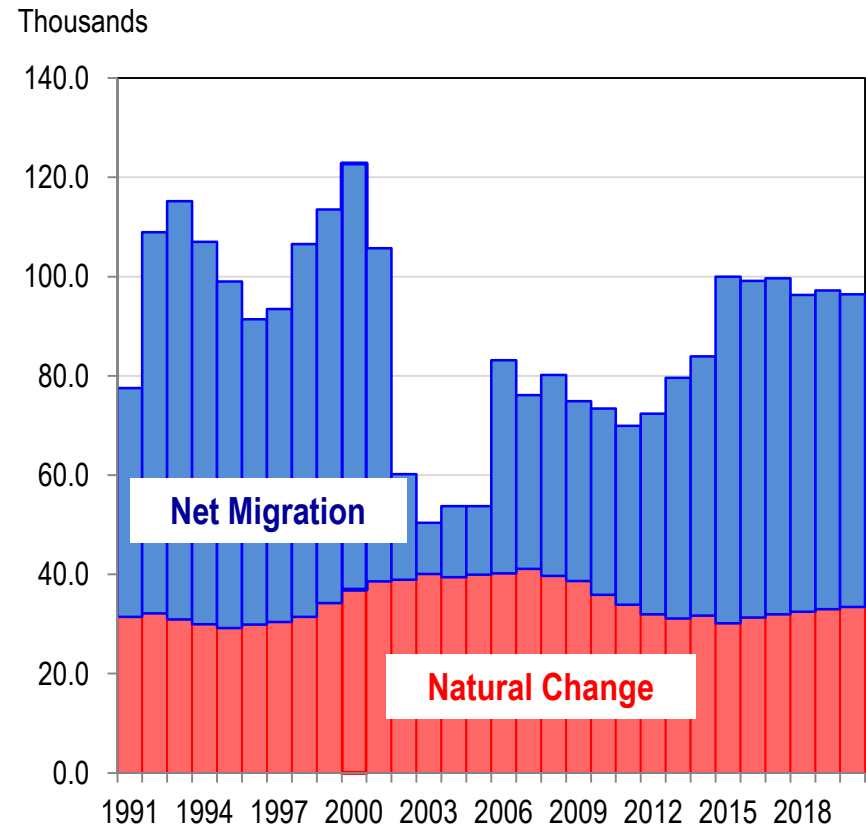
The population increases and decreases are a result of the natural rate of change (births minus deaths) and the change in net migration (people moving into the state minus people moving out of the state).

Over the past 2½ decades the natural rate of change (red bars) varied from a low of 29,145 in 1995 to a peak of 41,124 in 2007. For the past 10 years it has been slightly above 30,000.

Changes resulting from net migration (blue bars) are closely tied to the strength of the economy and the change in state employment. For example, there were five years, from 1986 to 1990, when net migration was negative (not shown on this chart). More people moved out of state than moved into the state to escape a regional recession. During the past two recessions, net migration declined, but did not turn negative. It was difficult for people to move anywhere to escape the downturn.

The Colorado population will increase by about 100,000 in 2015, 2016, and 2017. In 2017 the state's population will increase by 1.8% to 5.655,405.

Change in Colorado Population 1991 - 2016





# The Colorado Economy

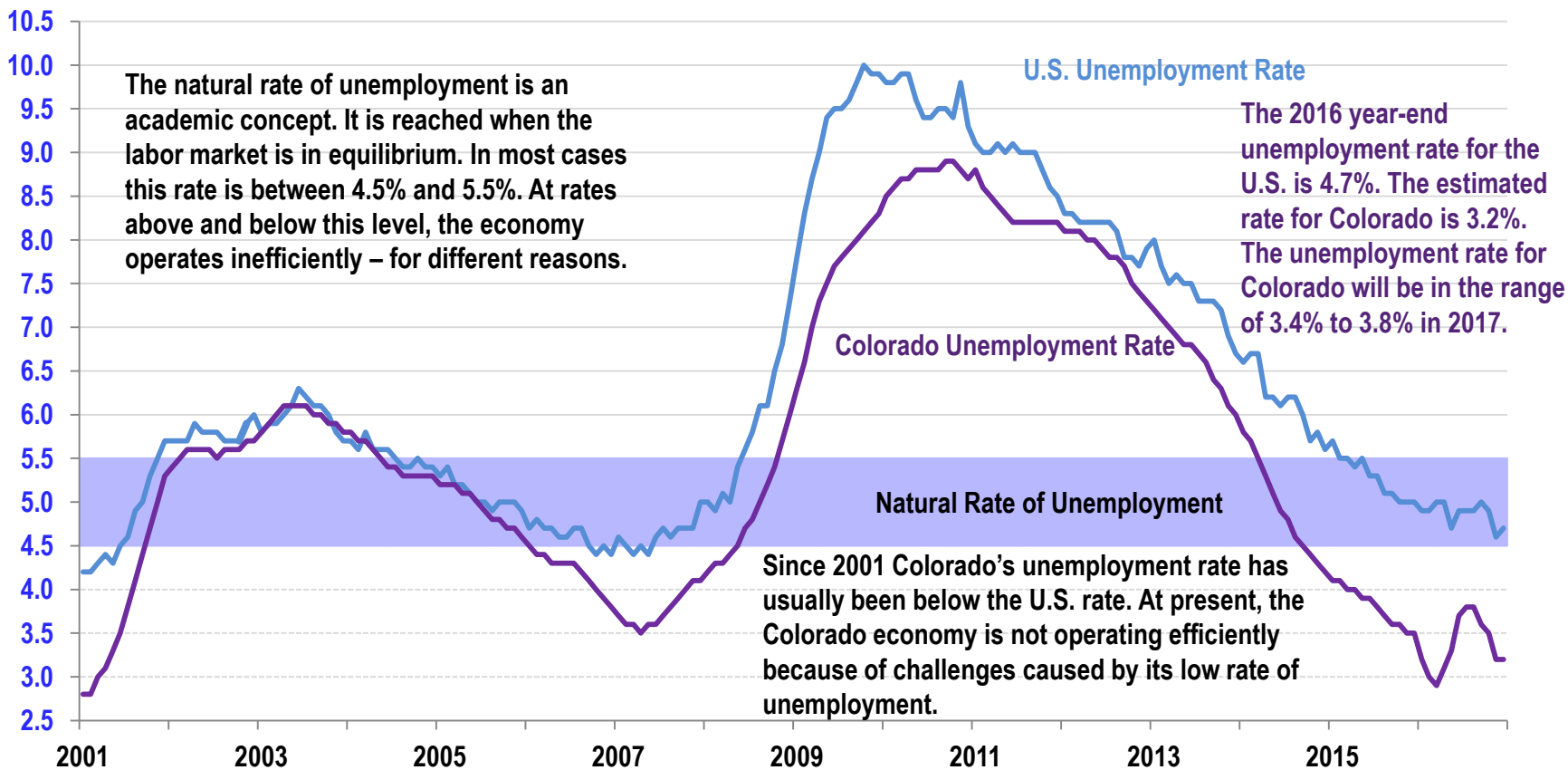
## Unemployment

# Unemployment Rate

## United States vs. Colorado

Percent

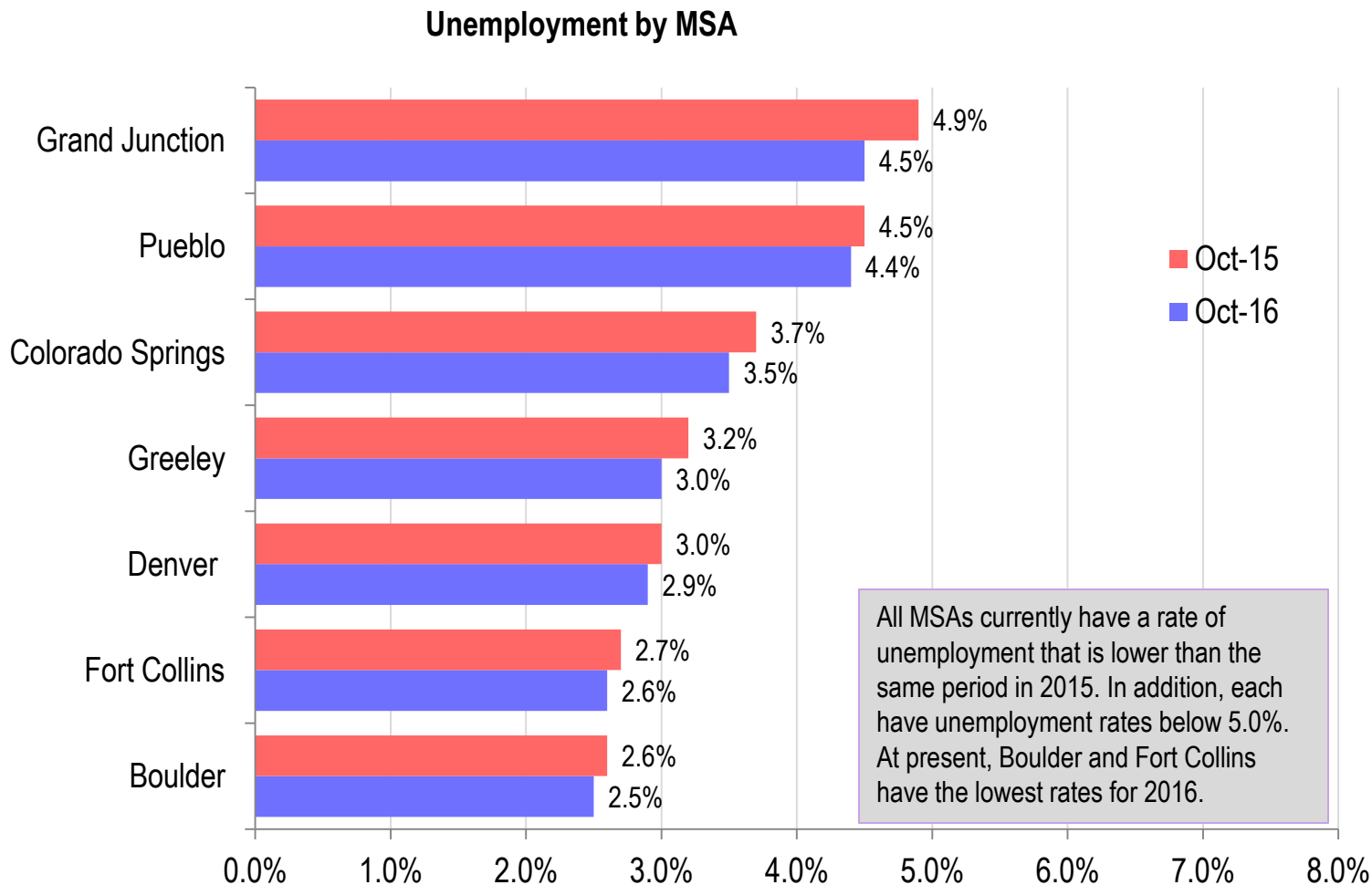
### United States vs. Colorado Unemployment Rate



Source: Bureau of Labor Statistics, SA, cber.co.

# Unemployment by MSA

## 2015 vs. 2016



Source: Bureau of Labor Statistics, NSA, cber.co. Note: MSA unemployment lags by two months and is reported only on a non-seasonally adjusted basis.



# The Colorado Economy

Establishments, Housing, Construction, Consumers, DIA



## Number of Colorado Private Establishments

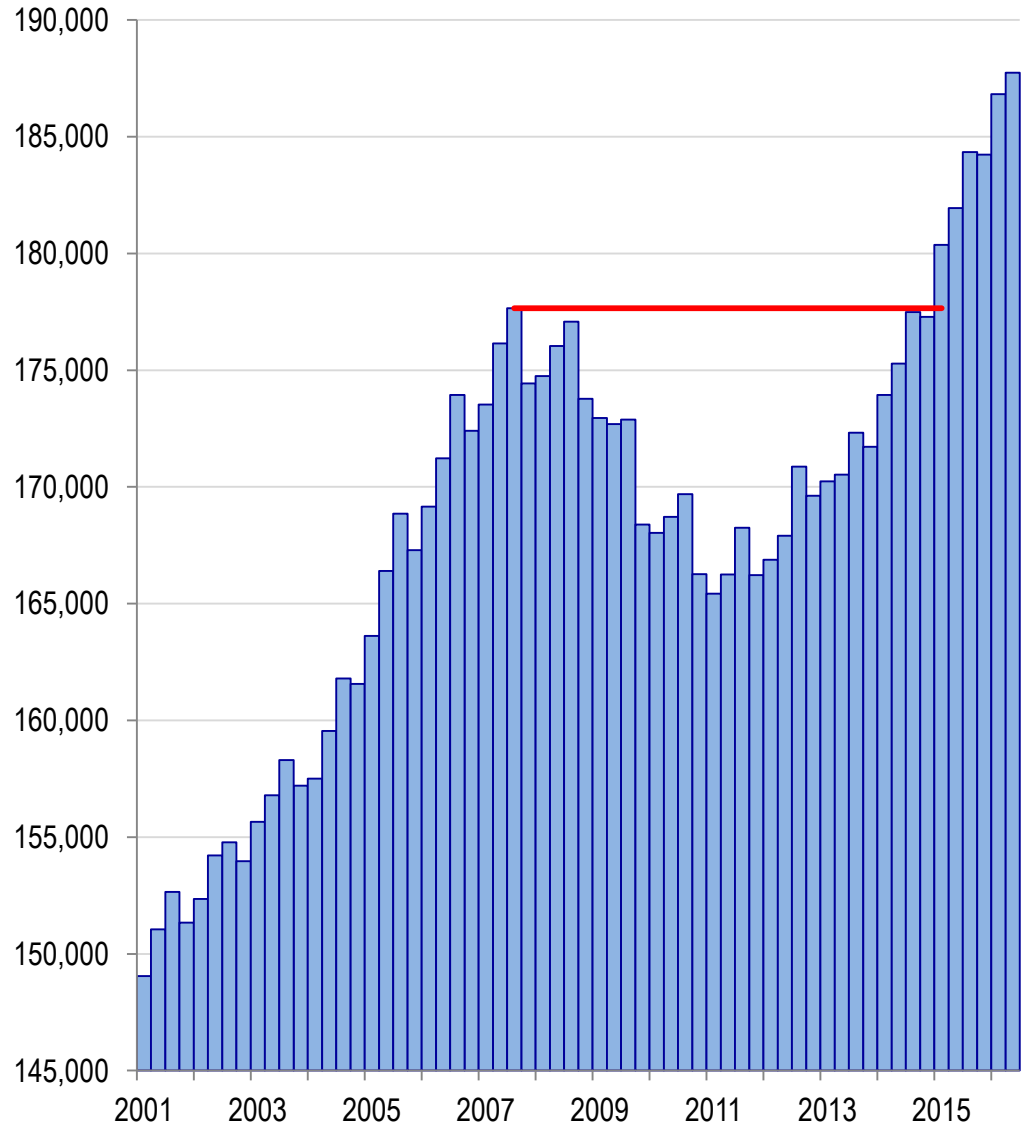
The number of Colorado private sector establishments peaked at 177,657 in Q3 2007.

The number of Colorado business establishments declined to 165,249 in Q1 2011 as a result of the Great Recession.

After that, there was steady growth in the number of establishments. In Q1 2015 the state returned to the previous 2007 peak. The total number of establishments in Q2 2016 is 187,744.

The creation of new establishments will be a source of job growth in 2017 and beyond.

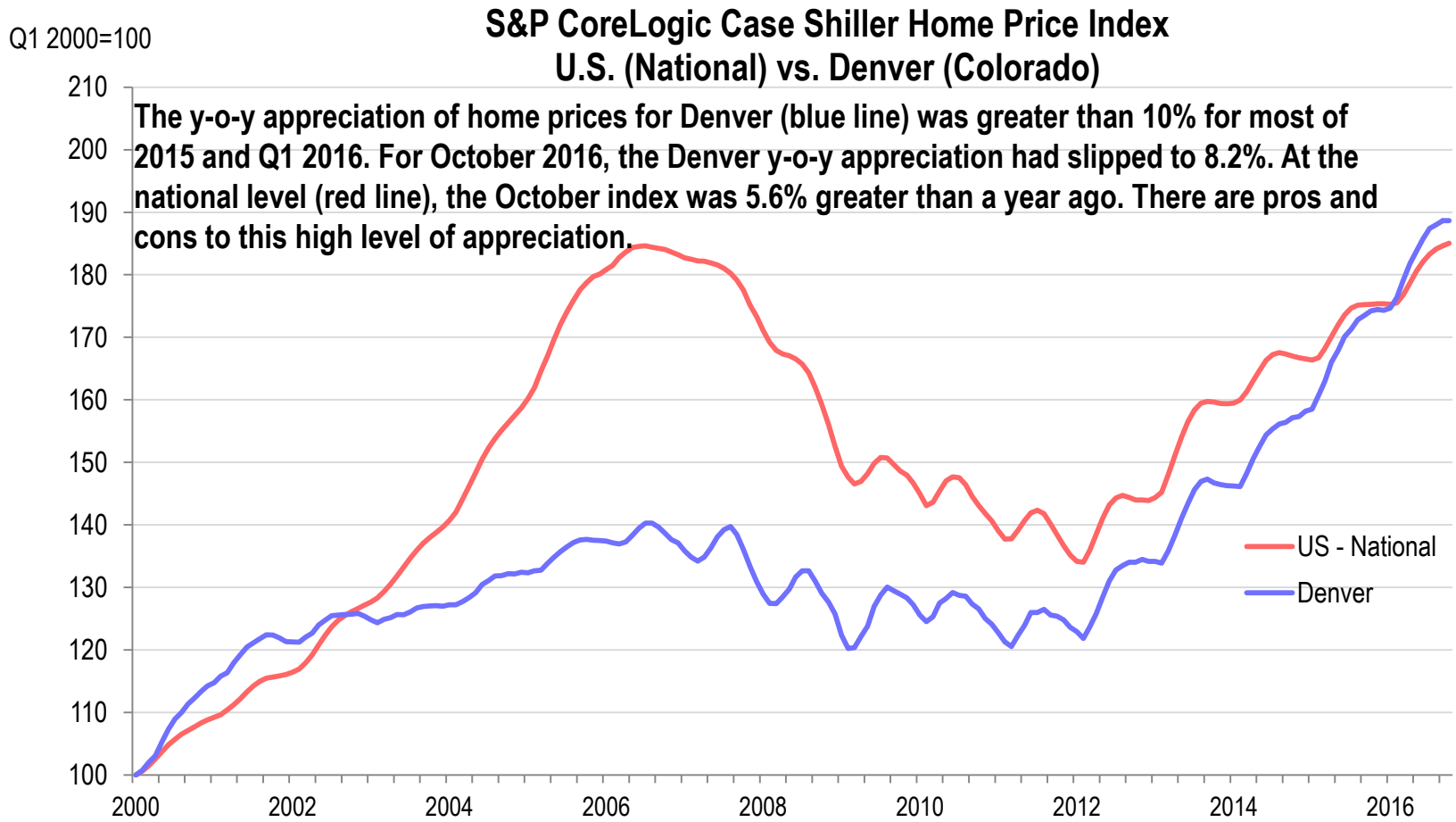
### Number of Private Establishments



Source: Bureau of Labor Statistics, cber.co.

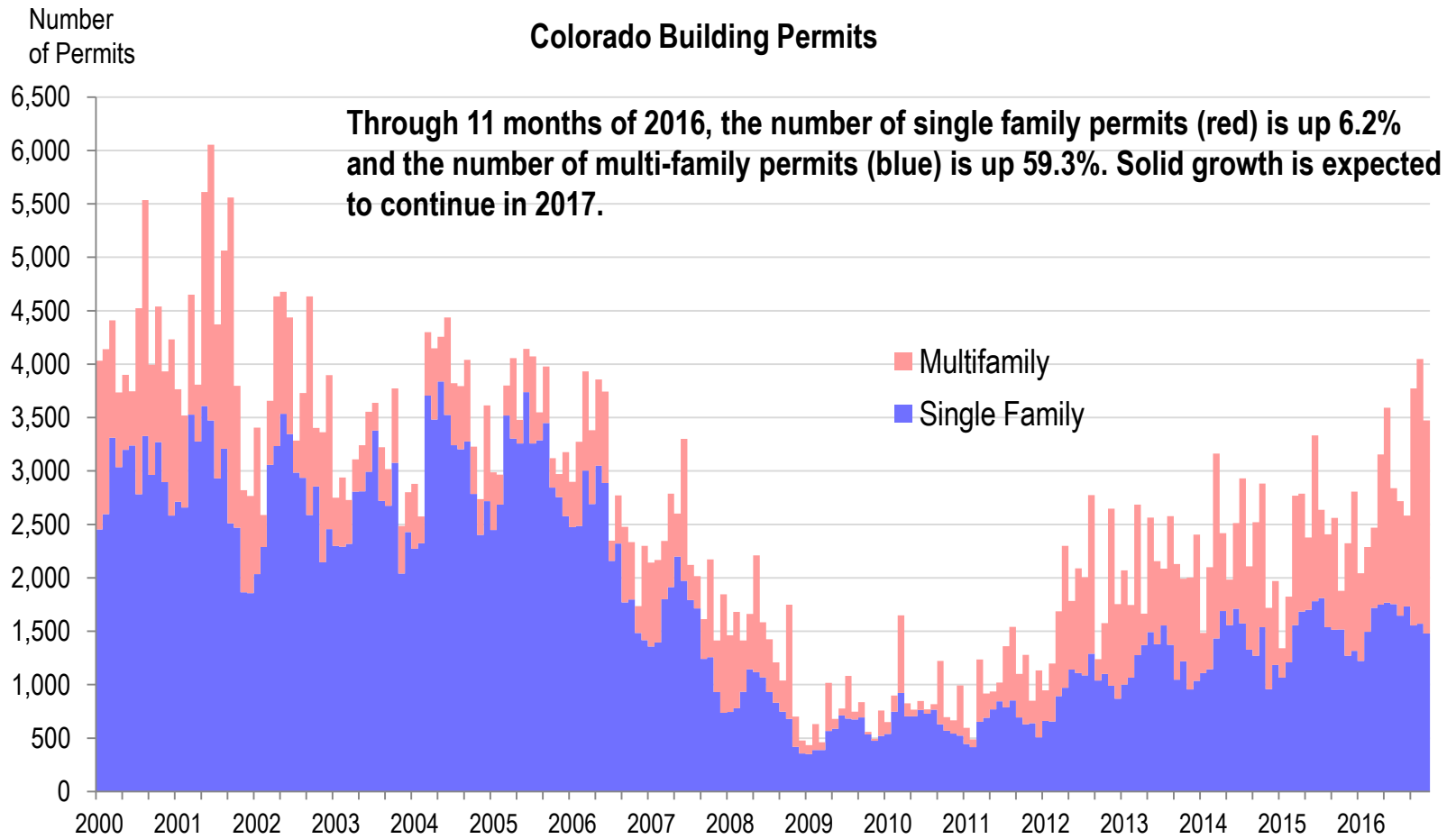
# Case Shiller Home Price Index

## National vs. Denver (Colorado)



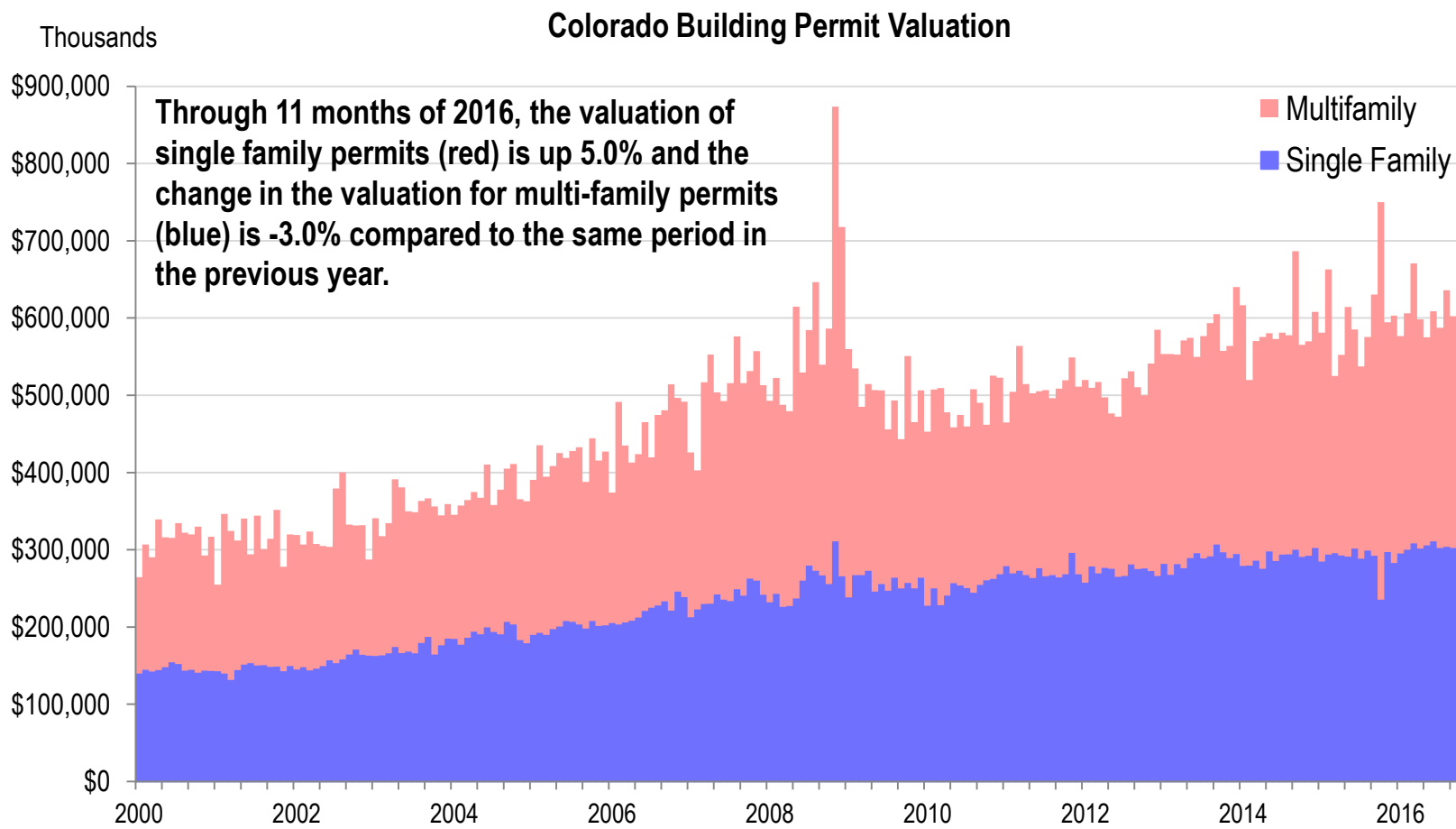
Source: S&P Core-Logic Case-Shiller, cber.co.

# Colorado Residential Building Permits - Units



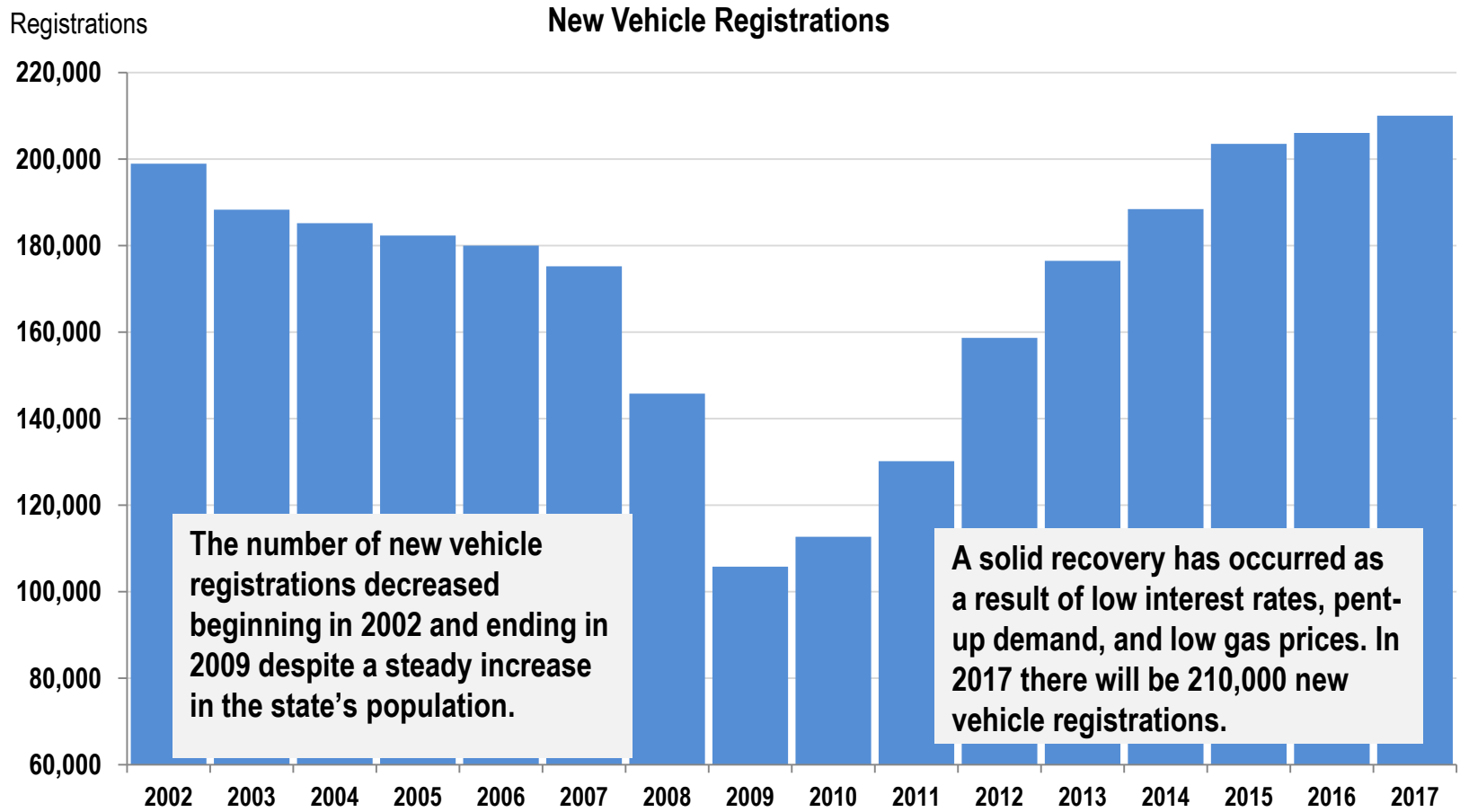
Source: TAMU Real Estate Center, U.S. Census Bureau, cber.co.

# Colorado Residential Building Permits - Valuation



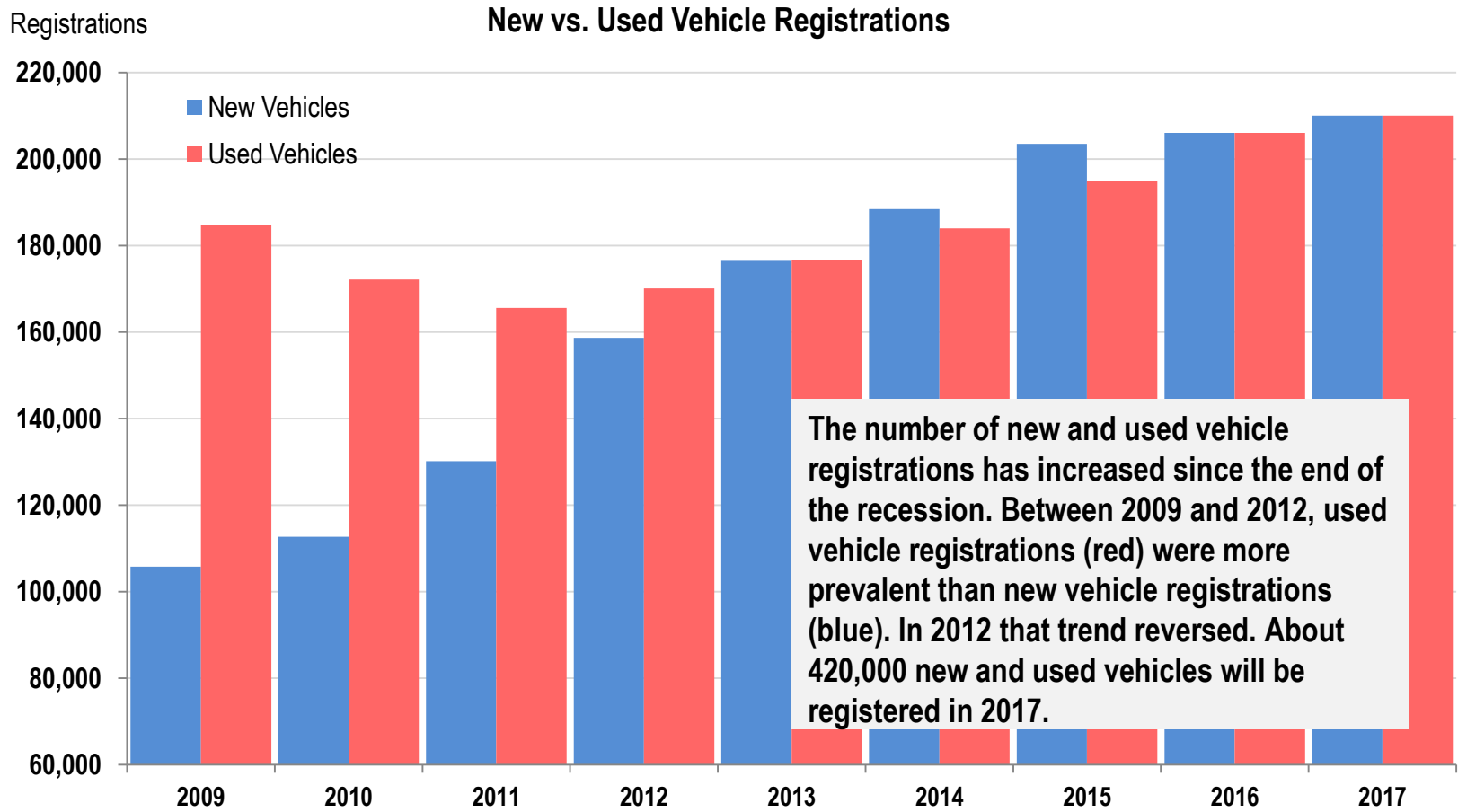
Source: TAMU Real Estate Center, U.S. Census Bureau, cber.co. Note: Not adjusted for inflation.

# Colorado New Vehicle Registrations



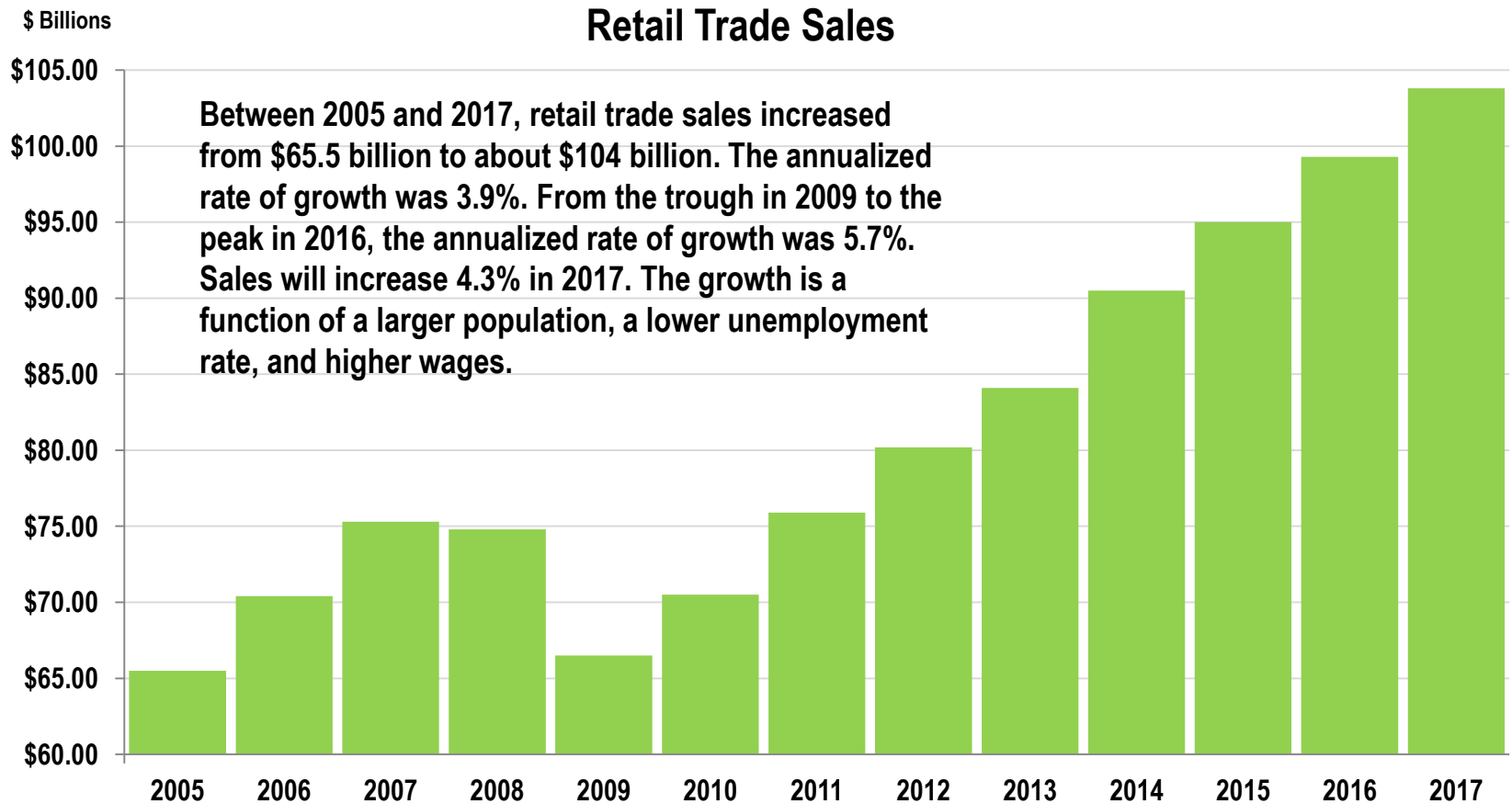
Source: Colorado Auto Dealers Association, cber.co.

# Colorado New and Used Vehicle Registrations



Source: Colorado Auto Dealers Association, cber.co.

# Colorado Retail Trade Sales (Including Food Services)



Source: Colorado Department of Revenue, CLC, OSPB, cber.co. Note: Not seasonally adjusted.

# DIA Passengers



Source: flydenver.com, cber.co.



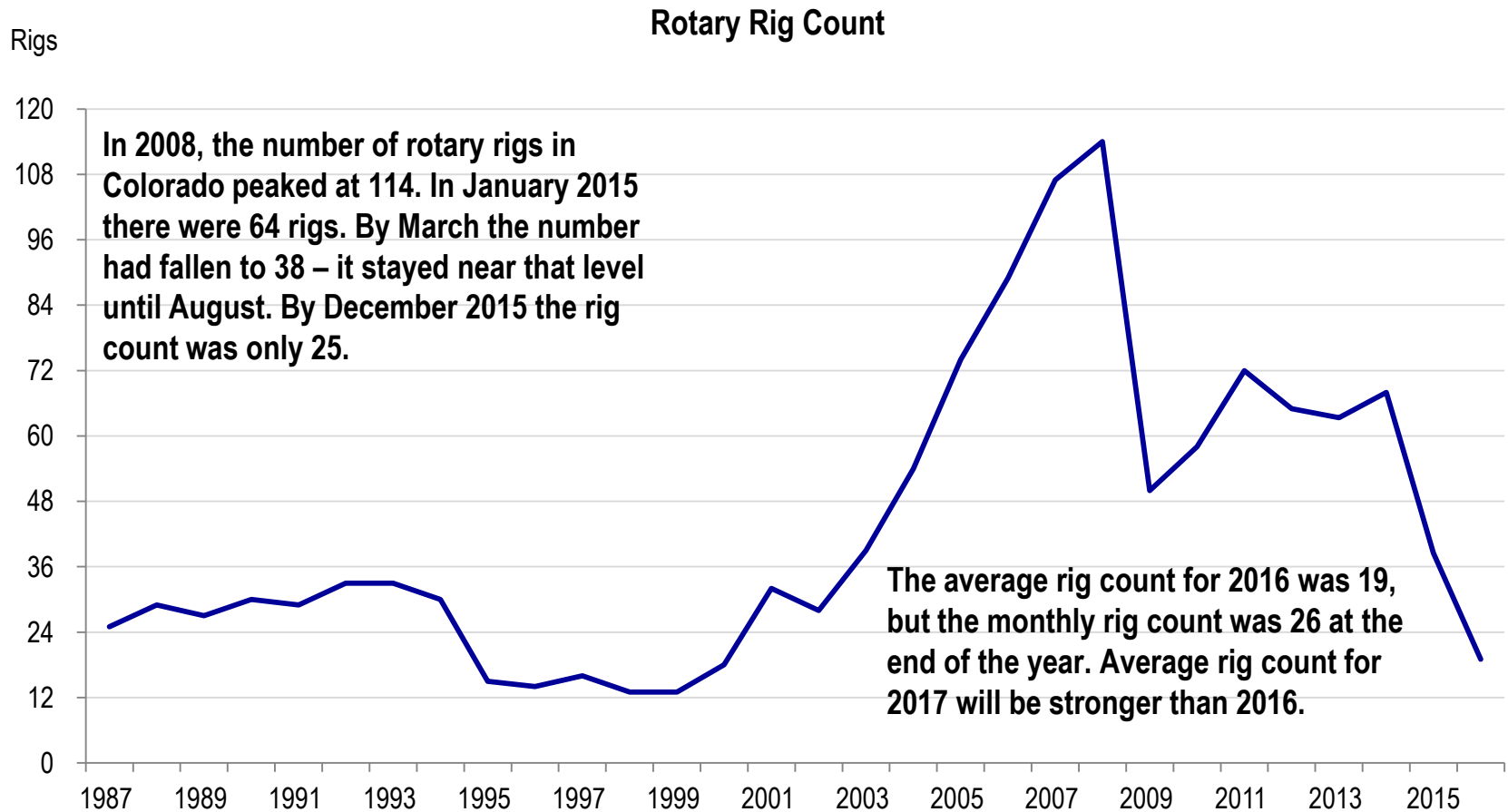


# The Colorado Economy

## Extractive Industries – Oil and Gas

# Colorado Annual Rotary Rig Count

## 1987 to 2016

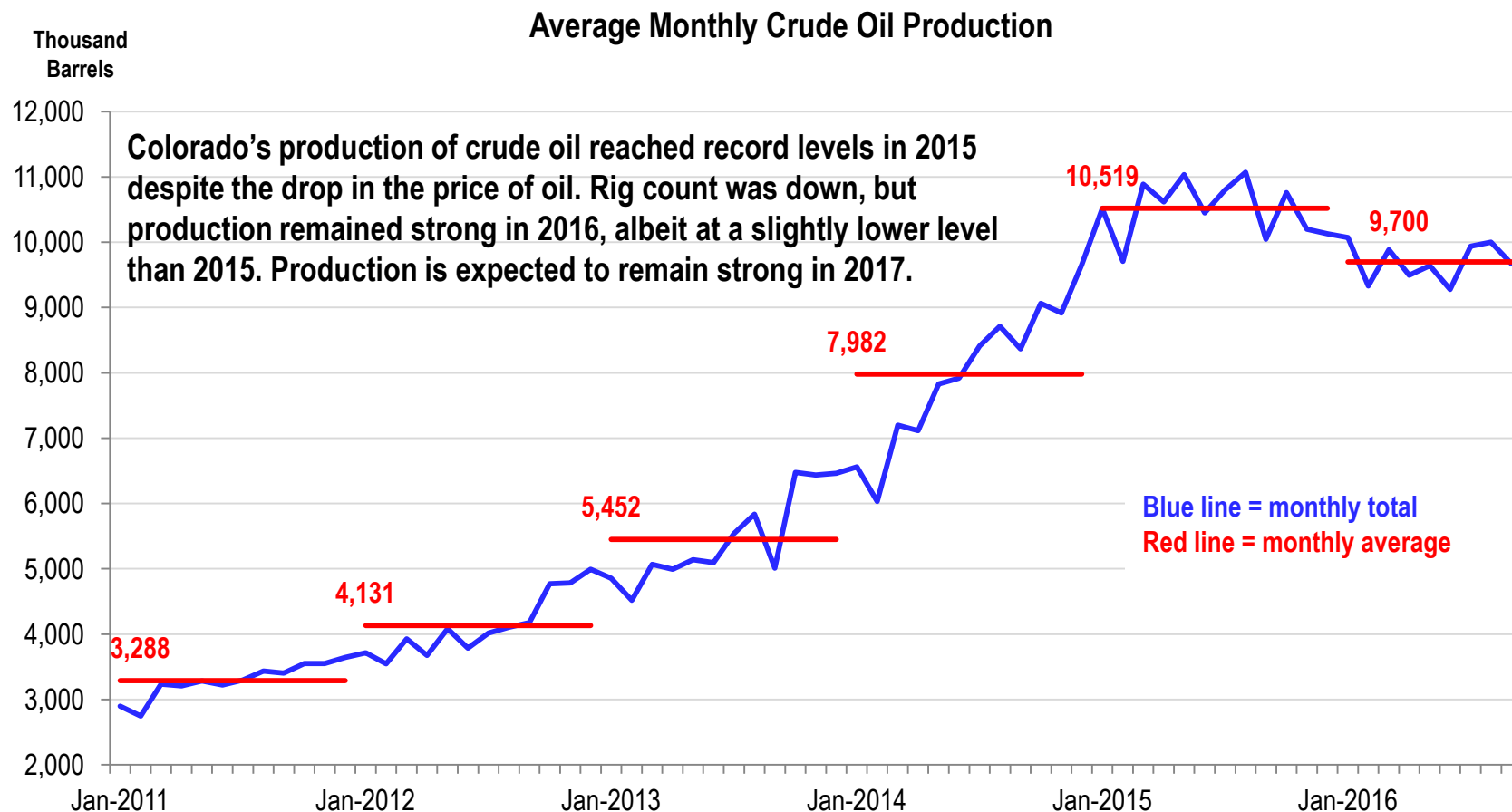


Source: Baker-Hughes, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

# Average Monthly Colorado Crude Oil Production

## 2011 to 2016 (Thousand Barrels)

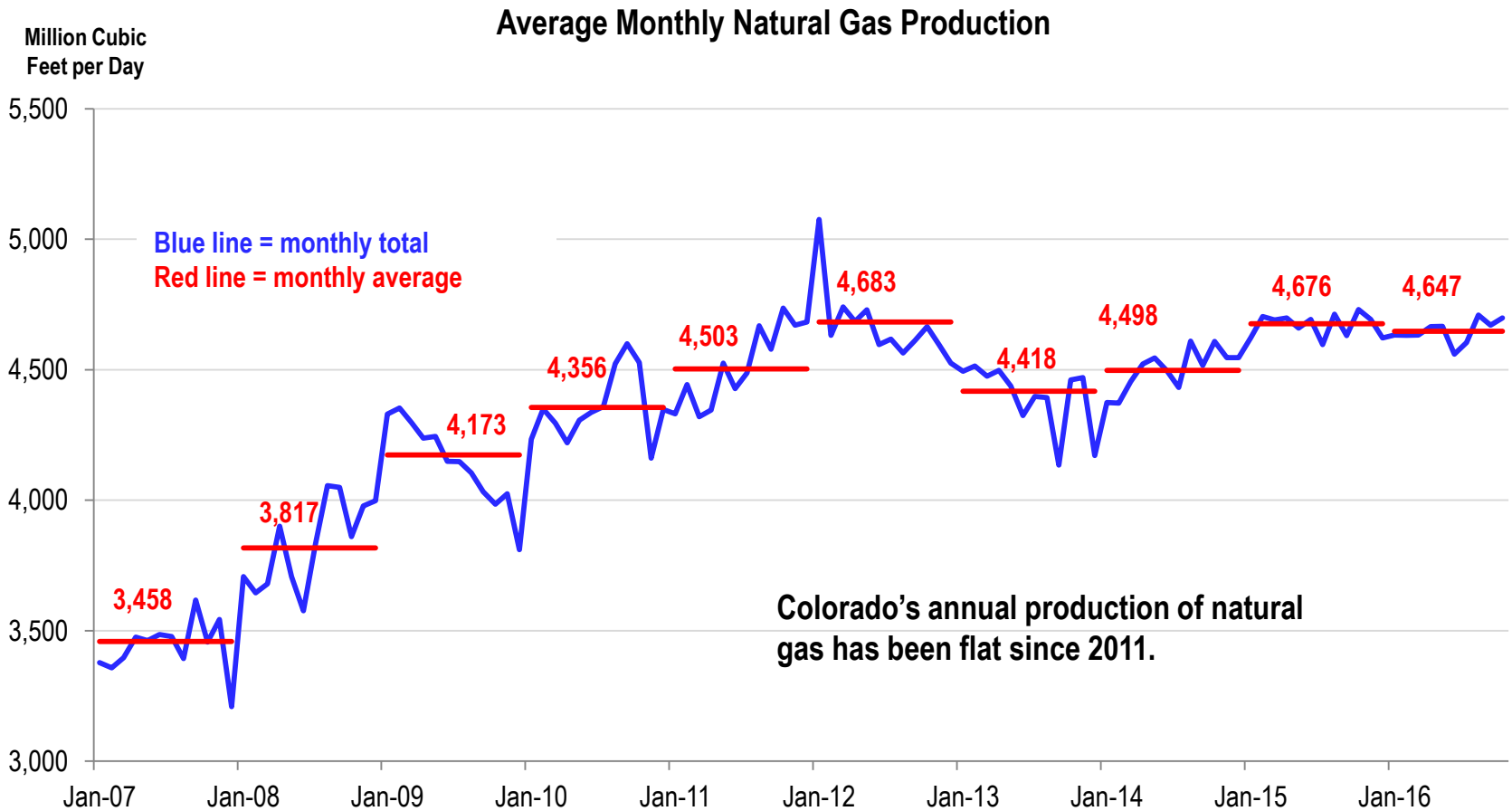


Source: EIA, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

# Average Monthly Colorado Natural Production

## 2007 to 2016 (Thousand Barrels)



Source: EIA, cber.co.

Colorado-based Business and Economic Research <http://cber.co>



# The Colorado Economy

## State Government

# The State of the State

## Revenue and Economics

The Great Recession played havoc with the budgets of state and local governments across the U.S. The good news is that revenue has improved, although many states are facing a gap between revenues and spending. Government is an important part of the economy because of the services it provides to businesses, residents, and visitors.

### **CLC and OSPB Projections**

Since 2001, the Colorado state government has felt the same pain in the pocketbook as many Colorado residents. On multiple occasions, wages and tax revenues have either declined, remained flat, or increased too slowly. At the same time, expenses have escalated every year.

The situation has improved for some residents, businesses, and government organizations.

The following charts show some of the revenue projections and economic updates provided by the Colorado Legislative Council (CLC) and the Governor's Office of State Planning and Budgeting (OSPB). The quarterly updates provided by both groups are recommended reading for those anxious to learn more about the Colorado economy.

### **Sales Tax, Individual Income Tax, and General Fund**

Net Income Tax accounts for about two-thirds of the Gross General Fund Revenue. Income Tax Revenue for FYE 2017 is projected to be about \$6.9 billion.

Excise and Sales Tax Revenue accounts for about one-fourth of the Gross General Fund. The Sales Tax Revenue for FYE 2017 is projected to be approximately \$3.2 billion.

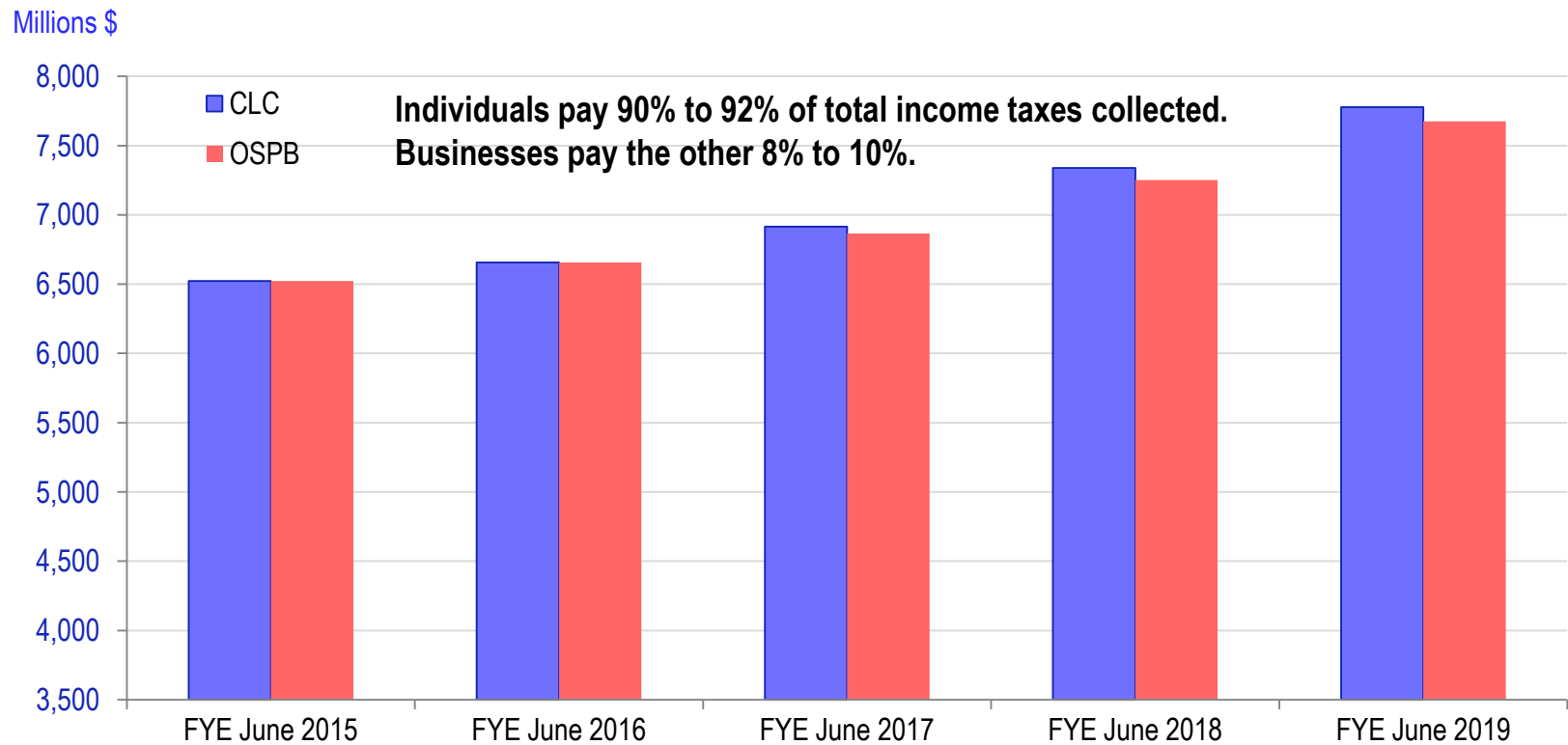
Miscellaneous Revenue accounts for the other \$.3 billion.

General Fund Revenue for FYE 2017 will increase to about \$10.4 billion.

Note: The State Fiscal Year is July 1st through June 30<sup>th</sup>.

# Colorado Net Income Tax

## Net Income Tax to General Fund

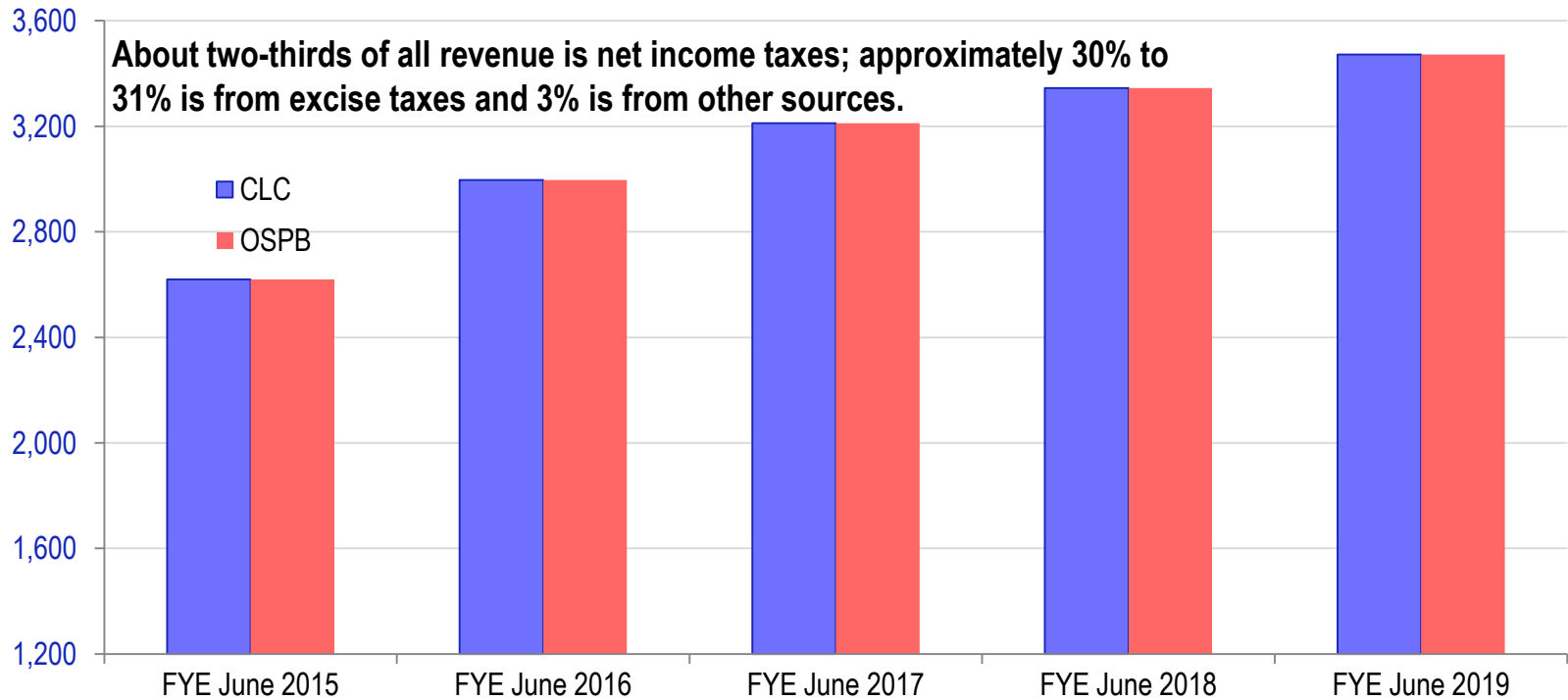


Source: Colorado Legislative Council, December 2016.

# Colorado Excise and Sales Tax Revenue

## Excise and Sales Tax Revenue

Millions \$

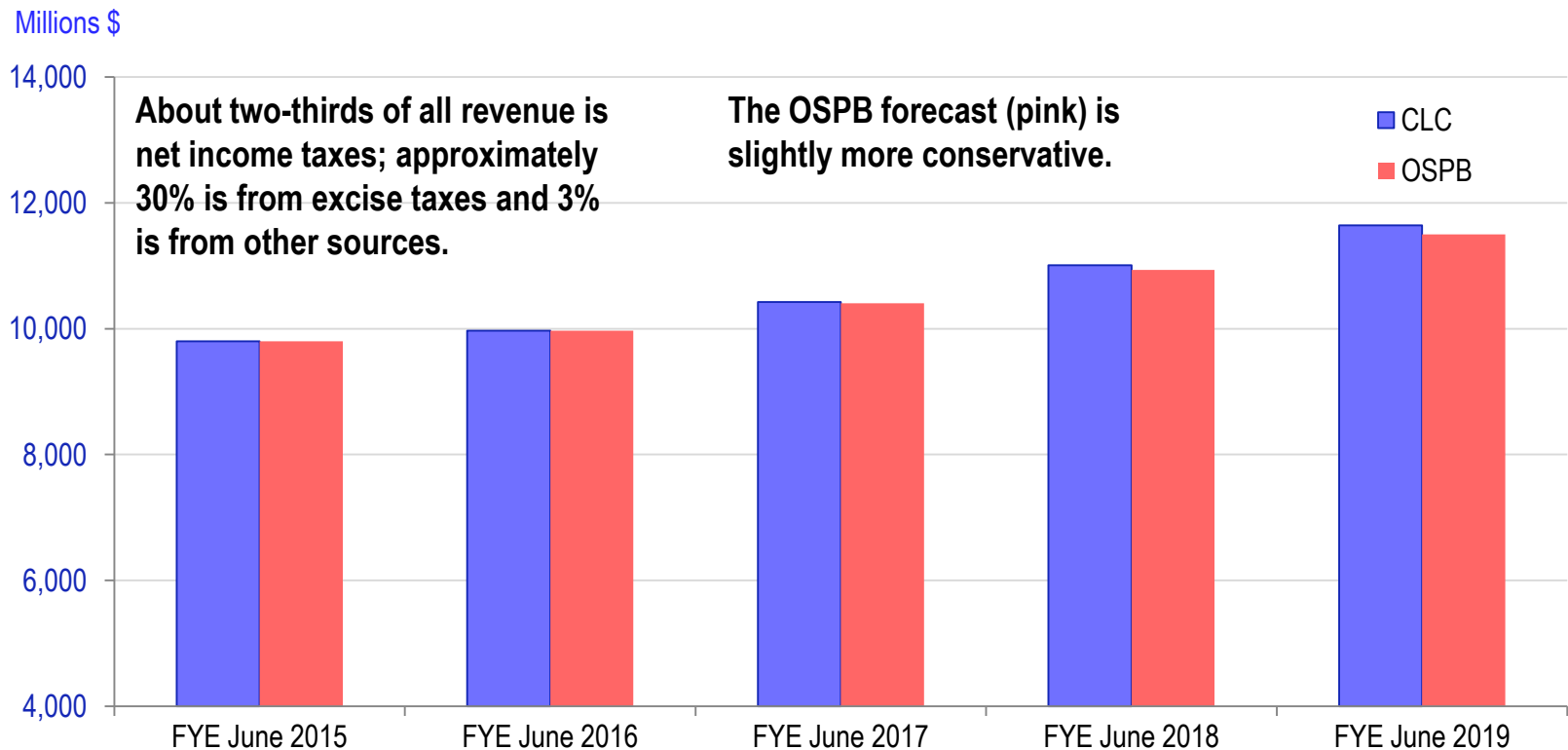


Source: Colorado Legislative Council and OSPB, December 2016.



# Colorado Gross General Fund Revenue

## Gross General Fund Revenue



Source: Colorado Legislative Council and OSPB, December 2016.

# CLC and OSPB December 21 Quarterly Forecasts

## 2016 Forecasts

The Colorado Legislative Council and the Governor's Office of State Planning and Budgeting recently released their quarterly updates. (<https://www.colorado.gov/cga-legislativecouncil> and <https://sites.google.com/a/state.co.us/ospb-live/>). The two reports provide slightly different forecasts, both of which are supported by rational explanations. A comparison of key indicators follows below.

**U.S. Economy December 2016 Forecast for 2016**

Category	CLC	OSPB
Real GDP % Change	1.6%	1.6%
Employment Change/%	2.6 million 1.8%	2.4 million 1.7%
Unemployment Rate	4.8%	4.9%
Inflation (CPI)	1.6%	1.3%

**Colorado Economy December 2016 Forecast for 2016**

Category	CLC	OSPB
Population Change /%	+92,700 1.7%	+91,600 1.7%
Employment Change/%	+53,300 2.1%	+56,700 2.2%
Unemployment Rate	3.4%	3.4%
Retail Trade Sales (Millions)/%	\$97,863 3.1%	\$99,100 2.2%
Home Permits (000s)	38.4	35.9
Denver-Boulder Inflation Rate	2.9%	2.7%

Source: CLC and OSPB.

# CLC and OSPB December 21 Quarterly Forecasts

## 2017 Estimates

The Colorado Legislative Council and the Governor's Office of State Planning and Budgeting recently released their quarterly updates. (<https://www.colorado.gov/cga-legislativecouncil> and <https://sites.google.com/a/state.co.us/ospb-live/>). The two reports provide slightly different forecasts, both of which are supported by rational explanations. A comparison of key indicators follows below.

**U.S. Economy December 2016 Estimate for 2017**

Category	CLC	OSPB
Real GDP % Change	2.4%	2.3%
Employment Change %	2.3 million 1.6%	1.8 million 1.2%
Unemployment Rate	5.0%	4.7%
Inflation (CPI)	2.3%	2.2%

**Colorado Economy December 2016 Estimate for 2017**

Category	CLC	OSPB
Population Change /%	+99,900 1.8%	+91,900 1.7%
Employment Change %	+46,700 1.8%	+62,600 2.4%
Unemployment Rate	3.4%	3.6%
Retail Trade Sales (Millions)/%	\$102,071 4.3%	\$104,200 2.4%
Home Permits (000s)	40.2	39.9
Denver-Boulder Inflation Rate	2.9%	2.7%

Source: CLC and OSPB.



# Colorado Employment Forecast

## Strong Growth, Solid Growth, Volatile Categories



# Colorado Economic Forecast

## Sector Portfolio Analysis

### Increased Forecast Accuracy

The primary focus of most state economic forecasts is to project total employment for the upcoming year. In addition forecasts of other data sets are produced to provide rationale for the employment forecast.

The most common approach is to produce a forecast for total employment. Another approach is to produce sector forecasts that are added together to get a total for the state. The latter approach introduces many variables for error.

cber.co feels the most accurate forecast is achieved by projecting total employment based on projections for three categories of sectors. This process identifies sectors with “predictable” job growth and puts them in two categories. Sectors with high volatility are placed in a third category.

The three categories are then summed for the employment total. Scenarios are produced and the most likely scenario is used as the final cber.co forecast. This final step helps create a better understanding of upside potential and downside risk.

### Strong Growth, Solid Growth, and Volatile Categories

This portfolio approach has made it easy to see that some sectors consistently have a higher rate of growth and some sectors has a consistent, but lower rate of growth. Others are more volatile. Ultimately, the volatile category tends to have a greater influence on the amount of change in total job growth than the sectors with steady growth.

Between 2012 and 2015 cber.co evaluated the performance of 23 sectors and refined the manner in which the sectors are grouped. Data was evaluated going back to 1990. The evaluation factors for grouping include the rate of growth, number of years with positive job growth, size of the sector, and volatility in job growth. The results of the analysis used for classifying the sectors is available in the Appendix. In the short period this process has been used, it has produced a high level of accuracy in the final forecast. More importantly, it has produced a better understanding of what is driving the economy.

# Annual Employment Situation for the Strong Growth Category

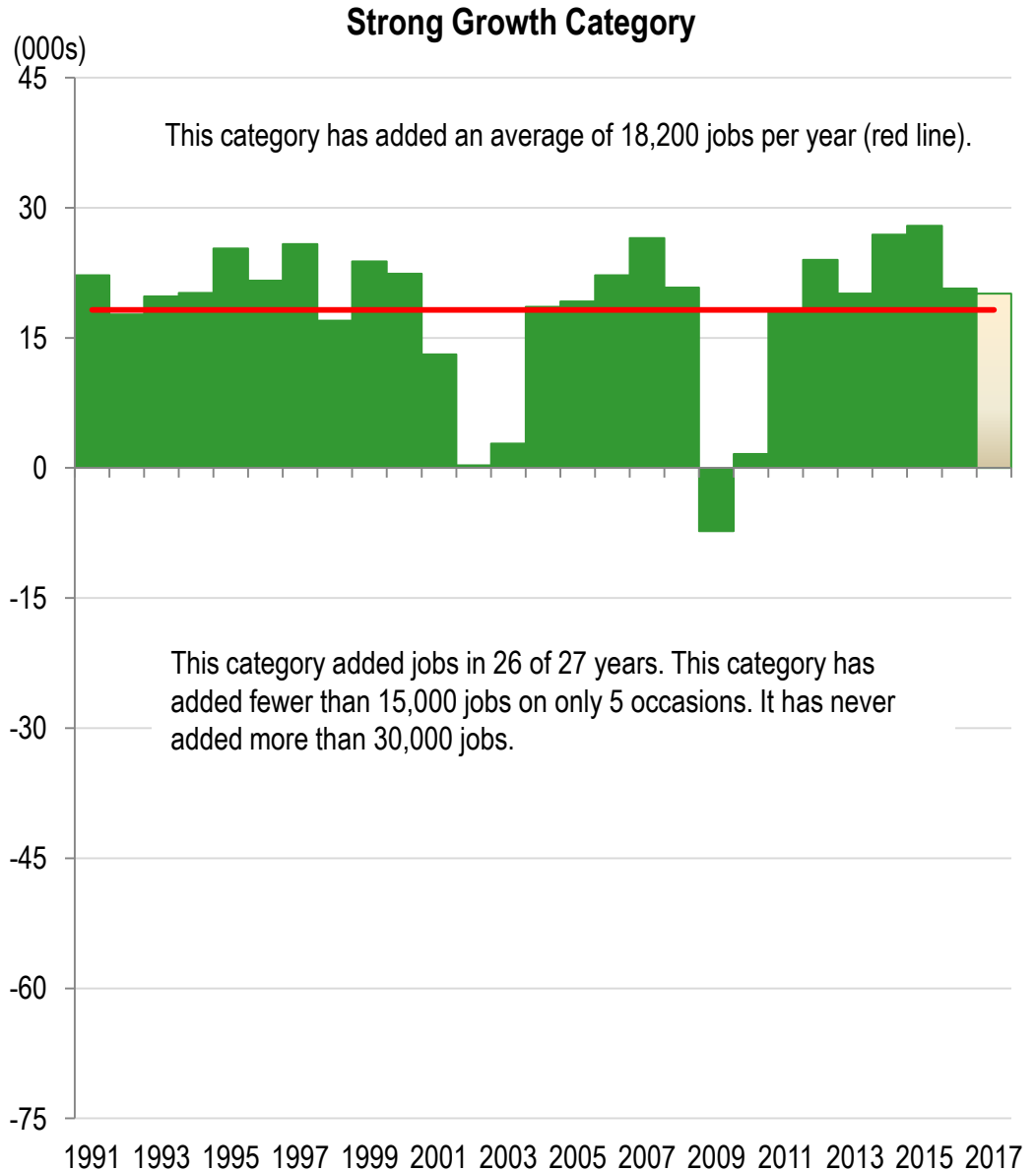
Over the past two decades the following sectors have been the foundation for consistent growth in Colorado employment.

- Professional, Scientific, and Technical Services
- Management of Companies and Enterprises
- Administrative - Business to Business (Not Employment Services)
- Private Education
- Health Care
- Arts, Entertainment, and Recreation
- Other Services.

Total employment for this category was:

1997 517,900 workers, 26.2% of total employment  
 2007 683,800 workers, 29.3% of total employment  
 2017 857,000 workers, 32.3% of total employment

In 2017, between 19,000 and 21,000 workers will be added at a rate of 2.3% to 2.5%. This rate of growth is similar to last year.



# Three Things to Look for in 2017

## Strong Growth Category

### Strong Growth Category (Business and Services)

- Professional, Scientific, and Technical Services (PST)
- Management of Companies and Enterprises
- Administrative - Business to Business (Not Employment Services)
- Private Education
- Health Care
- Arts, Entertainment, and Recreation
- Other Services

### Three Things to Look For

- In 2017, jobs will be added at a rate slightly above the long-term average for the category.
- The health care sector will lead job growth. It is likely the Affordable Care Act will be revised by Congress; however, it is unlikely the changes will have an impact on employment in 2017.
- The PST sector will continue to be a source of high wage jobs. Many of the jobs will be added in the advanced technology clusters with a small number of jobs being added in industries that support the extractive industries.

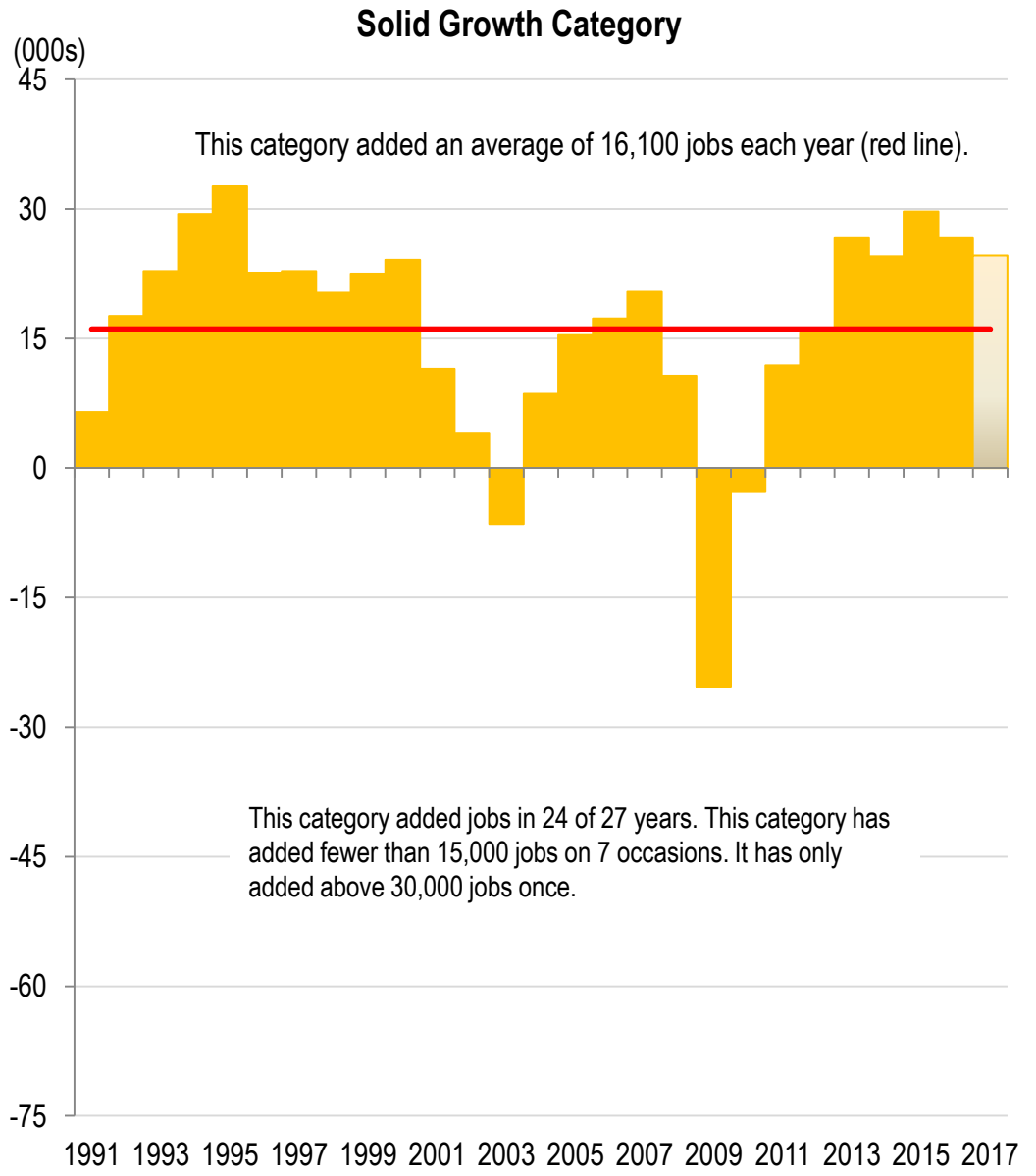
# Annual Employment Situation for the Solid Growth Category

Over the past two decades the following sectors generally posted gains. The category posted stronger jobs gains during the 1990s than the 2000s and 2010s.

- Wholesale Trade
- Retail Trade
- State (Not Higher Education)
- Higher Education
- Local (Not K-12 Education)
- K-12 Education
- Accommodations and Food Services

Total employment for this category was:  
 1997 763,400 workers, 38.6% of total employment  
 2007 901,100 workers, 38.6% of total employment  
 2017 1,045,200 workers, 39.3% of total employment

In 2017, between 24,000 and 26,000 jobs will be added, at a rate of 2.3% to 2.5%. This level of growth is similar to 2014.



Source: Bureau of Labor Statistics, cber.co.



# Three Things to Look for in 2017

## Solid Growth Category

### **Solid Growth Category (Consumption and Government)**

- Wholesale Trade
- Retail Trade
- State (Not Higher Education)
- Higher Education
- Local (Not K-12 Education)
- K-12 Education
- Accommodations and Food Services (AFS)

### **Three Things to Look For**

- Job growth in this category will be solid, but slightly less than 2016. It will be well above the long-term average for the category.
- State and local government coffers will benefit from increased sales and income taxes. This will occur because of increases in the population, employment, and wages.
- Demand for food service operations (AFS) will continue to increase because of the strong tourism industry and a larger population.

# Annual Employment Situation for the Volatile Category

Over the past two decades the sectors listed below were the primary source of volatility in total employment.

The sectors are:

- Natural Resources and Mining
- Construction
- Manufacturing
- Transportation, Warehousing, and Utilities
- Employment Services
- Financial Activities
- Information
- Federal Government

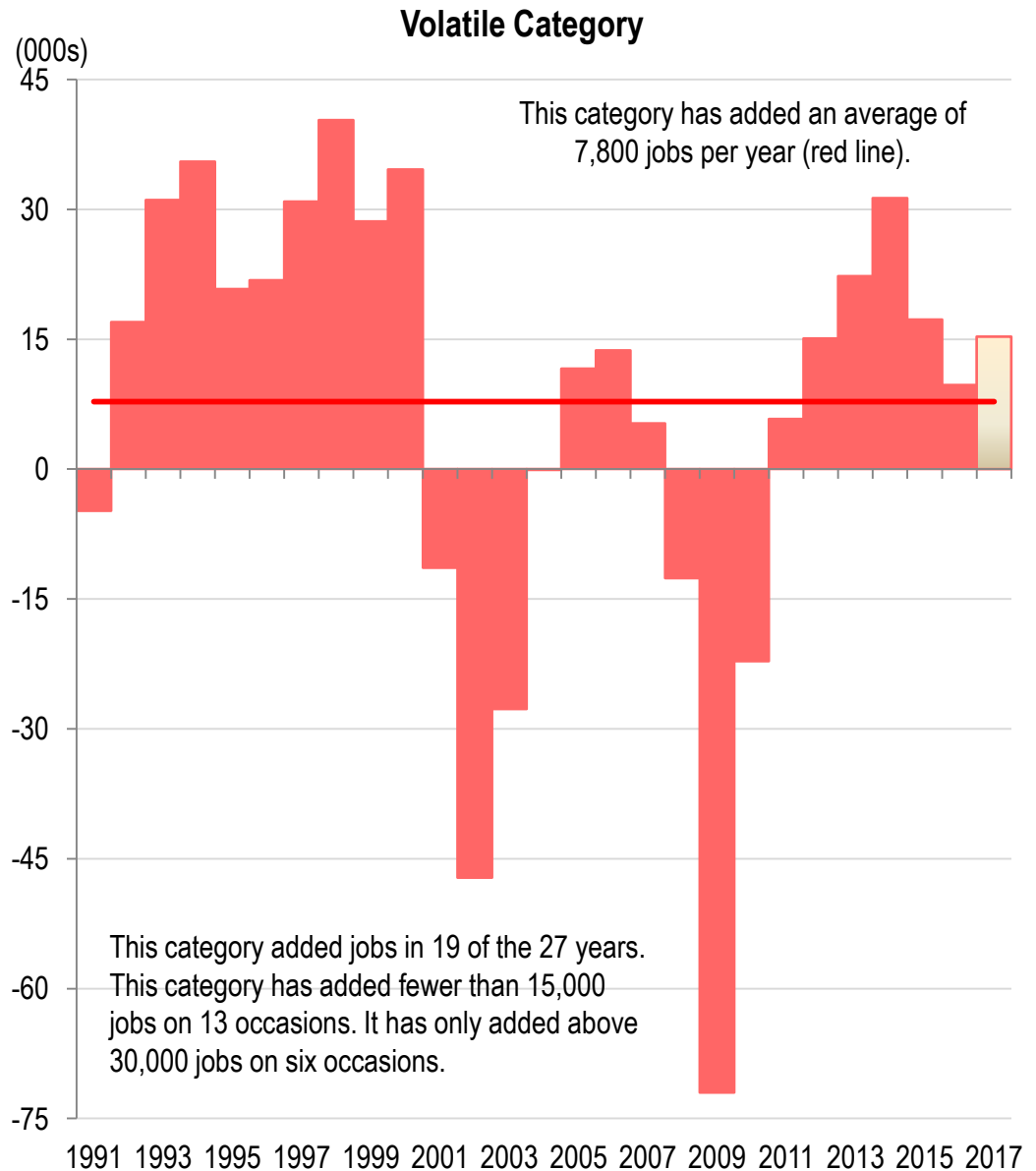
Total employment for this category was:

1997 698,900 workers, 35.3% of total employment

2007 746,600 workers, 32.0% of total employment

2017 756,600 workers, 28.5% of total employment

In 2017 between 14,000 and 16,000 jobs will be added, at a rate of 2.0% to 2.2%. This rate of growth is similar to 2012 and 2015.



Source: Bureau of Labor Statistics, cber.co.

# Three Things to Look for in 2017

## Volatile Category

### Volatile Category

- Natural Resources and Mining
- Construction
- Manufacturing
- Transportation, Warehousing, and Utilities
- Employment Services
- Financial Activities
- Information
- Federal Government

### Three Things to Look For

- Construction will have a solid to strong year in 2017. The greatest concern will be finding a sufficient number of qualified workers to fill job openings.
- The price for a barrel of oil is again in the \$45 to \$55 range and projected to move higher in 2017. The rig count is again trending upward and production will be similar to the last two years.
- The number of manufacturing jobs flattened out in 2016 and is expected to show minimal growth in 2017. The growth in financial activities will increase at a slower rate. Higher interest rates may cause reduced demand for financial industry workers.

# Impact of Industries in the Volatile Category

The Strong Growth and Solid Growth categories provide consistent job growth over time.

The Volatile category tends to have a greater influence on the amount of change in total job growth than the Strong Growth and Solid Growth categories. The industries in the Volatile category do not always have a standard business cycle that dictates when jobs are added or lost.

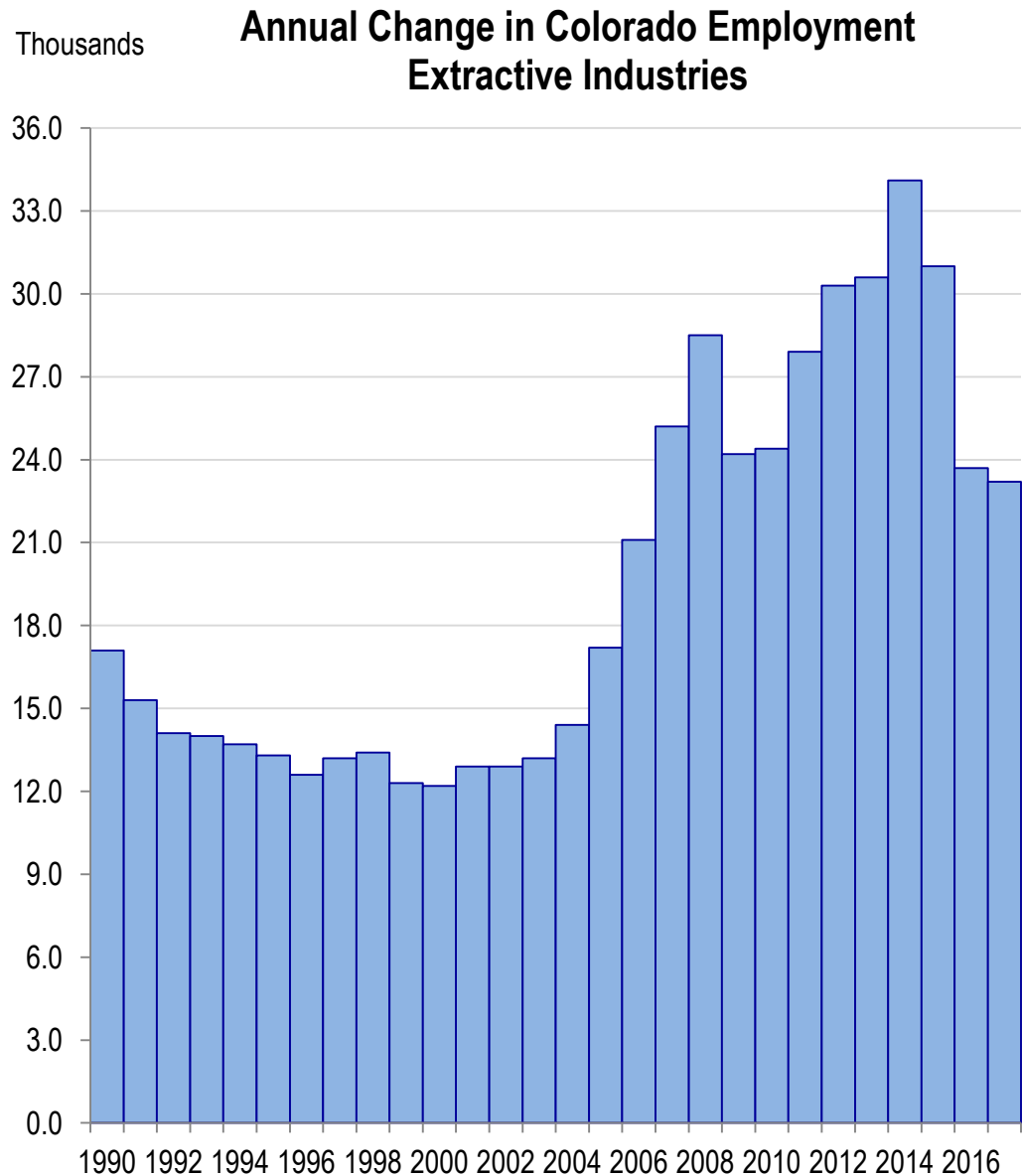
The following charts look at employment in three industries that are responsible for the “unpredictable changes” in the number of workers in the Volatile category.

## Colorado Employment – Extractive Industries

Colorado's extractive industries, which include mining and the oil and gas industries, have been extremely volatile. During the go-go 90s the extractive industries were either flat or they lost jobs. Between 2001 and 2014 the industry typically added workers.

The decrease in jobs during 2015 and 2016 was a function of the decline in the price for a barrel of oil. In addition, the coal industry has come under fire. Other mining industries have been impacted by low commodity prices.

Even with the reduction in employment, the location quotient is 1.30, based on the most current QCEW data.



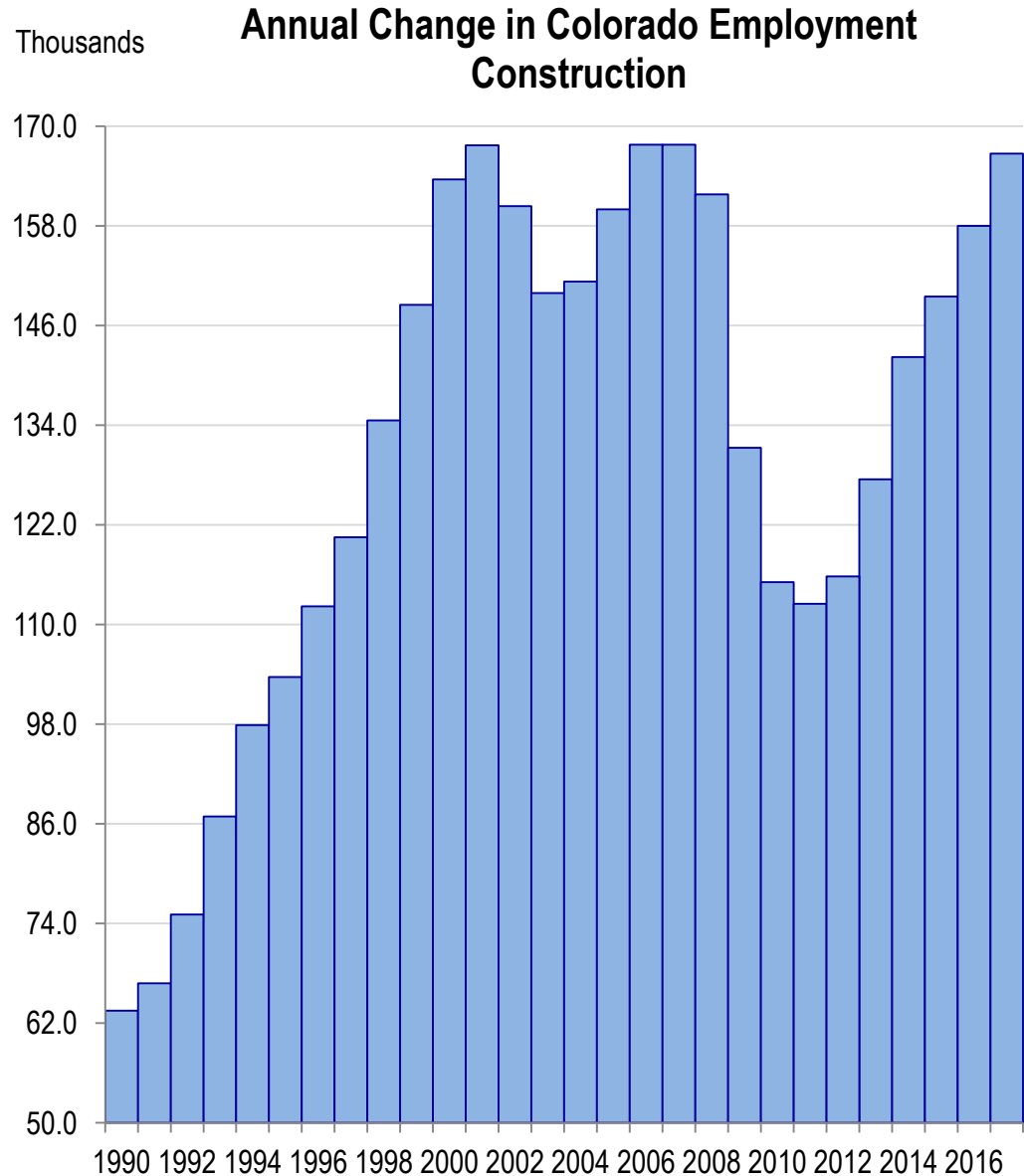
Source: Bureau of Labor Statistics, [cber.co](http://cber.co).

## Colorado Employment – Construction

Historically, Colorado construction employment has been volatile. There were steep gains during the 1990s and declines associated with the recessions during the 2000s. There has been solid growth since 2011.

Because the rate of growth for Colorado employment and population have outpaced the nation, the rate of growth for the construction industry has been greater than the rate for the U.S. As a result the construction industry has had a stronger than “normal” presence in the state.

The location quotient is 1.30, based on the most current QCEW.

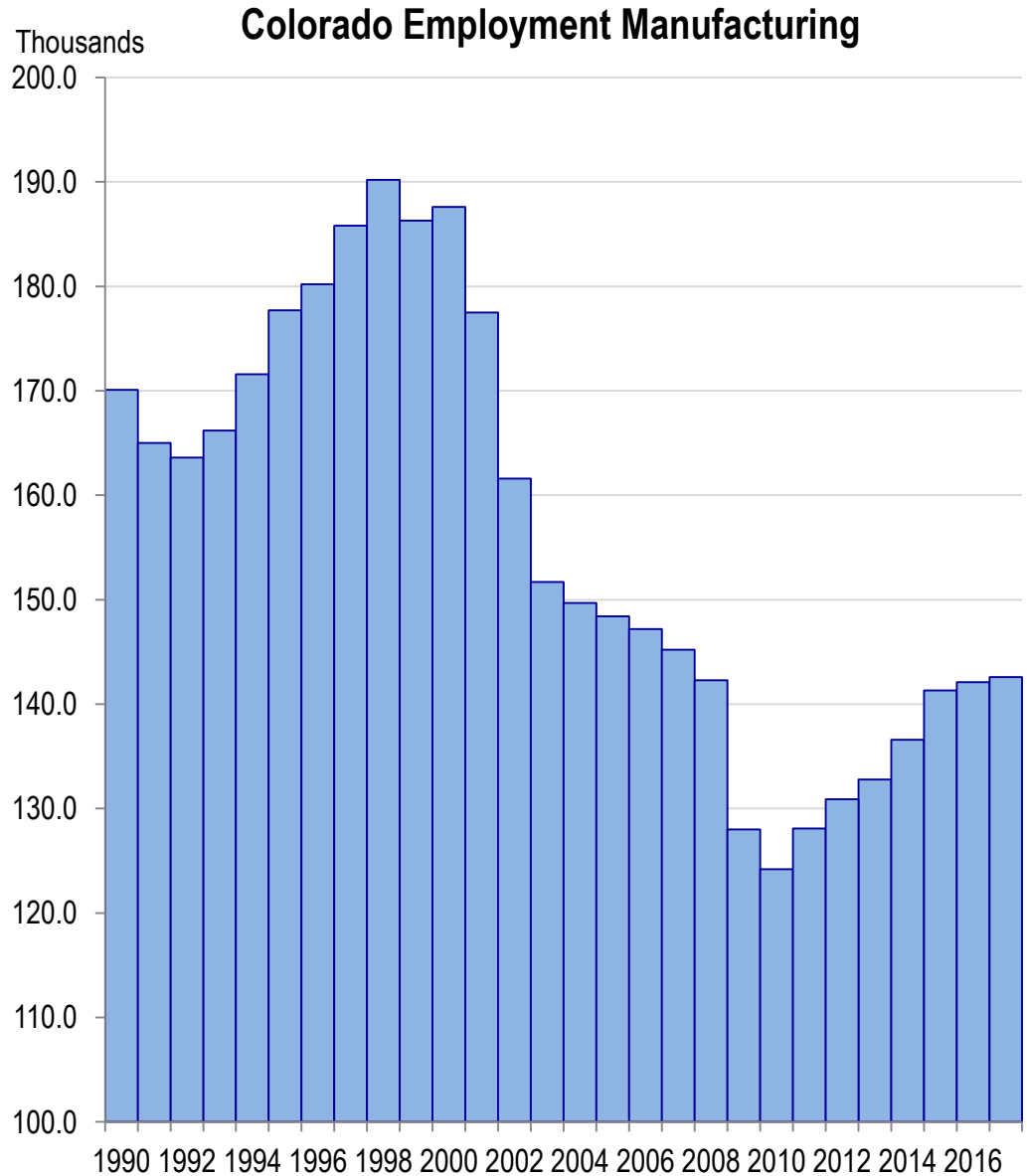


Source: Bureau of Labor Statistics, [cber.co](http://cber.co).

## Colorado Employment – Manufacturing

After posting declines for 11 of 12 years, from 1998 to 2010, manufacturing jobs have been added since 2011.

The location quotient is .64, based on the most current QCEW data. Overall, manufacturing is not a competency for the state; however, small sectors provide competencies, such as aerospace, photonics, renewable energy, advanced technologies, and brewing.



Source: Bureau of Labor Statistics, [cber.co](http://cber.co).

## Summary of Strong, Solid, and Volatile Growth Categories

In 2017, the growth of the Strong and Solid Growth categories will be similar to 2016 and the Volatile category will be more aggressive. Overall growth will be 2.2% in 2016 and 2.1% to 2.5% in 2017.

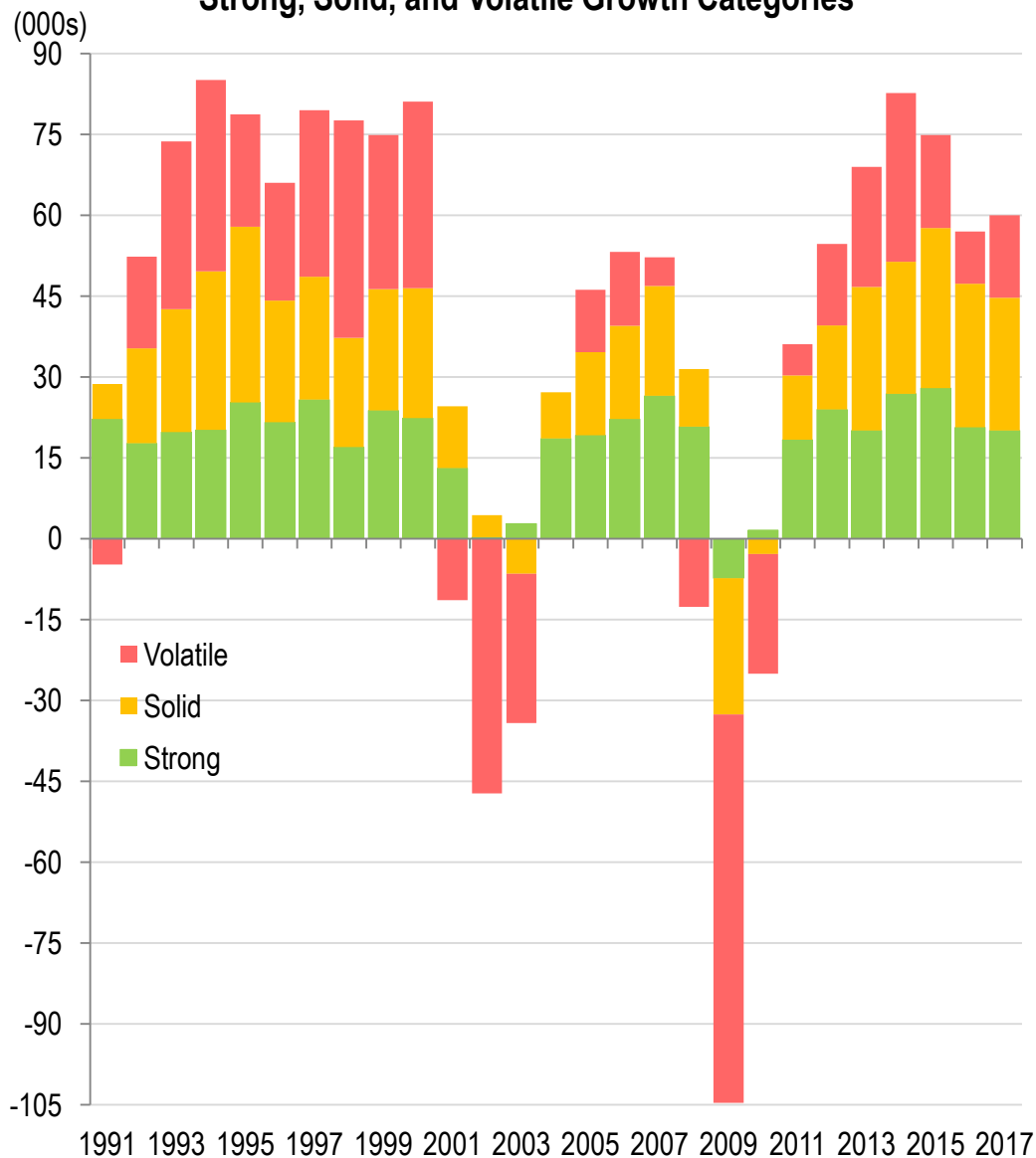
The Strong Growth category of sectors (green) has performed consistently over time. The category expanded at a rate of 2.5% in 2016 and will grow at a rate of 2.3% to 2.5% in 2017.

The Solid Growth category of sectors (yellow) will continue to post moderate growth. In 2016, this category grew at a rate of 2.7% and will add jobs at a rate of 2.3% to 2.5% in 2017.

Finally, the Volatile category of sectors (red) was a very disappointing source of job growth in 2016. The category added jobs at a rate of 1.3%. Jobs will be added at a rate of 2.0% to 2.2% in 2017.

Note: This data reflects projected changes to the 2015 and 2016 data when BLS makes its revisions in March 2017.

### Strong, Solid, and Volatile Growth Categories



Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research <http://cber.co>



# Scenarios for the 2017 Colorado Economic Outlook

The recovery from the Great Recession has been less than robust, but it has been **steady**. Job growth in the U.S. and Colorado will not reach its potential because of a number of factors that are causing the economy to operate inefficiently.

## Overall Job Growth

In 2017 Colorado employment will increase by 2.2% to 2.4%. Average employment for 2017 will be slightly less than 2.7 million workers.

## Strong Growth Category (About 32% of total employment)

In 2017, the rate of job growth for this category will be **2.3% to 2.5%**.

## Solid Growth Category (about 39% of total employment)

In 2017, the rate of job growth will be **2.3% to 2.5%**.

## Volatile Growth Category (29% of total employment)

In 2017, the rate of job growth will be **2.0% to 2.2%**.

The performance of the Volatile Growth Category will determine the accuracy of the cber.co 2017 forecast. There is more upside potential than downside risk to the forecast.

Source: cber.co.

Colorado-based Business and Economic Research <http://cber.co>

## 2017 Economic Outlook

### Optimistic Scenario

- U.S. Real GDP will be greater than 2.5%.
- The U.S. will add more than 2.2 million workers.
- Colorado will add more than 63,000 workers, job growth will be greater than 2.4%.

### Most Likely Scenario

- U.S. Real GDP will be 2.1% to 2.5%.
- The U.S. will add 1.9 to 2.1 million workers.
- Colorado will add 57,000 to 63,000 workers, job growth will be 2.2% to 2.4%.

### Pessimistic Scenario

- U.S. Real GDP less than 2.1%.
- The U.S. will add less than 1.9 million workers
- Colorado will add less than 57,000 workers, job growth will be less than 2.2%.

The probability of these scenarios follows:

- Most Likely 52%
- Optimistic 41%
- Pessimistic 7%.

There is more upside potential than downside risk.

# 2017 Employment Forecast

## Most Likely Scenario

### Strong Growth Category +19,000 to 21,000 Employees

- Professional and Scientific
- Management of Companies and Enterprises
- Business to Business (Not Employment Services)
- Private Education
- Health Care
- Arts, Entertainment, and Recreation
- Other Services.

### Solid Growth Category +24,000 to 26,000 Employees

- Wholesale Trade
- Retail Trade
- State (Not Higher Education)
- Higher Education
- Local (Not K-12 Education)
- K-12 Education
- Accommodations and Food Services

*In 2017 Colorado will add 57,000 to 63,000 jobs  
(2.2% to 2.4%).*

*Twenty-two sectors and subsectors have been placed into three categories based on their growth patterns over the past two decades. Projections for these categories are used in the development of the 2017 employment forecast.*

### Volatile Growth Category +14,000 to +16,000 Employees

- Natural Resources and Mining
- Construction
- Manufacturing
- Transportation, Warehousing, and Utilities
- Employment Services
- Financial Activities
- Information
- Federal Government

Source: [cber.co](http://cber.co).

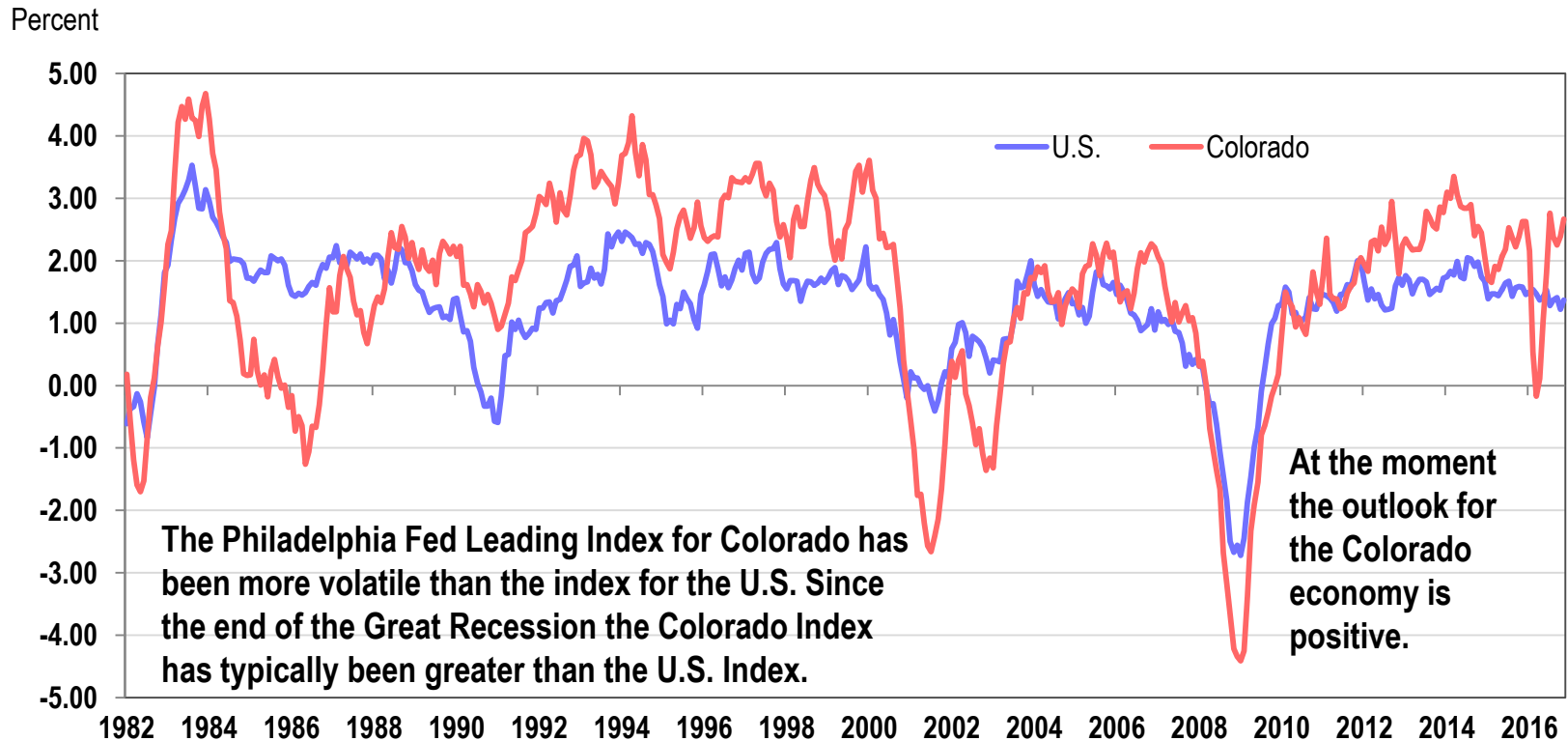


# Summary, Opportunities, and Challenges

# Leading Index

## Colorado vs. United States

Leading Index Colorado vs. U.S.

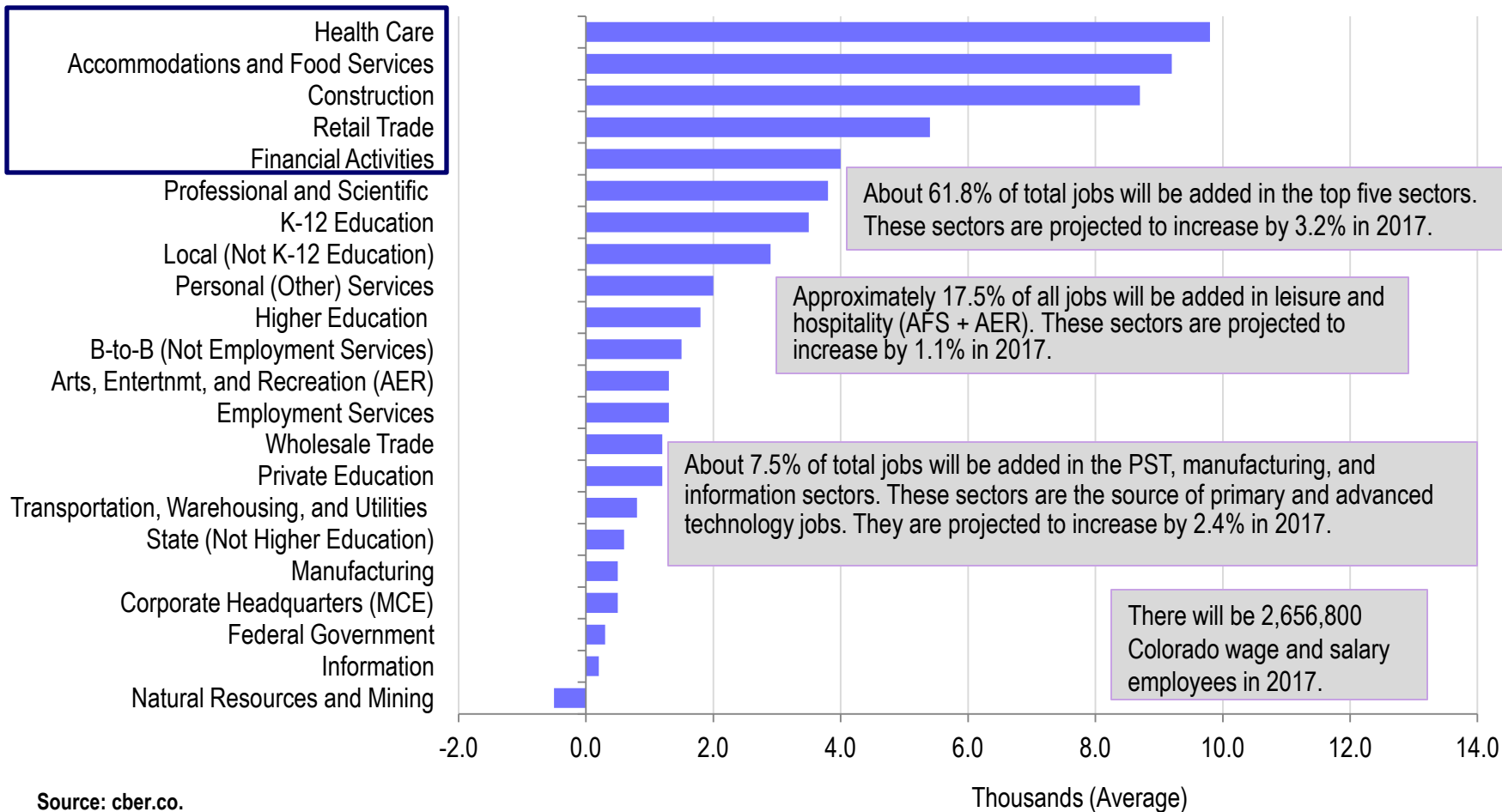


Source: Philadelphia Federal Reserve, [cber.co](http://cber.co). Note: The leading index predicts the six-month growth rate of the state's coincident index.

# Projected Job Changes

## 2017 Forecast

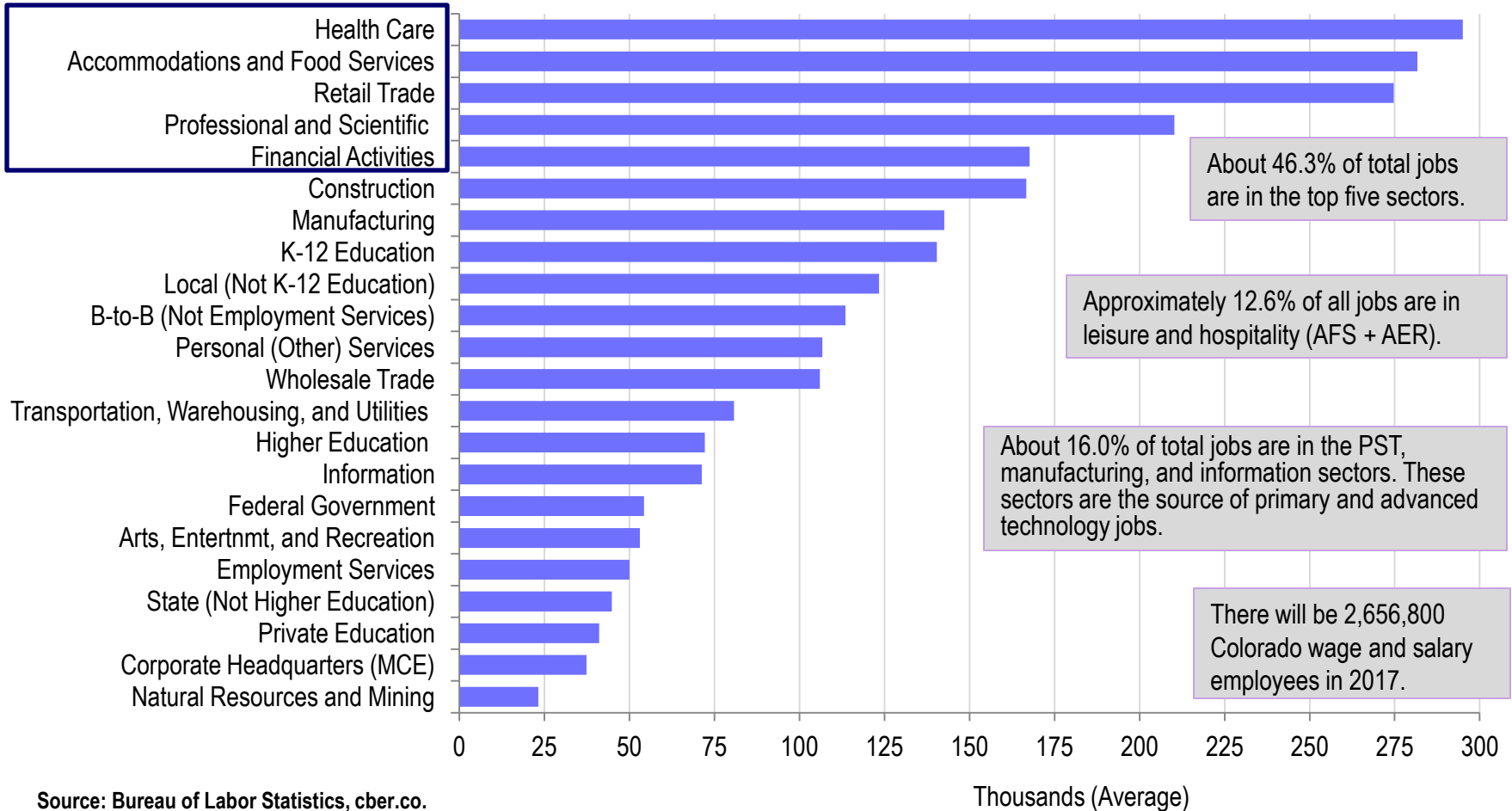
Job Change All Sectors



# Colorado Wage and Salary Employment

## 2017 Forecast

### Employment



About 46.3% of total jobs are in the top five sectors.

Approximately 12.6% of all jobs are in leisure and hospitality (AFS + AER).

About 16.0% of total jobs are in the PST, manufacturing, and information sectors. These sectors are the source of primary and advanced technology jobs.

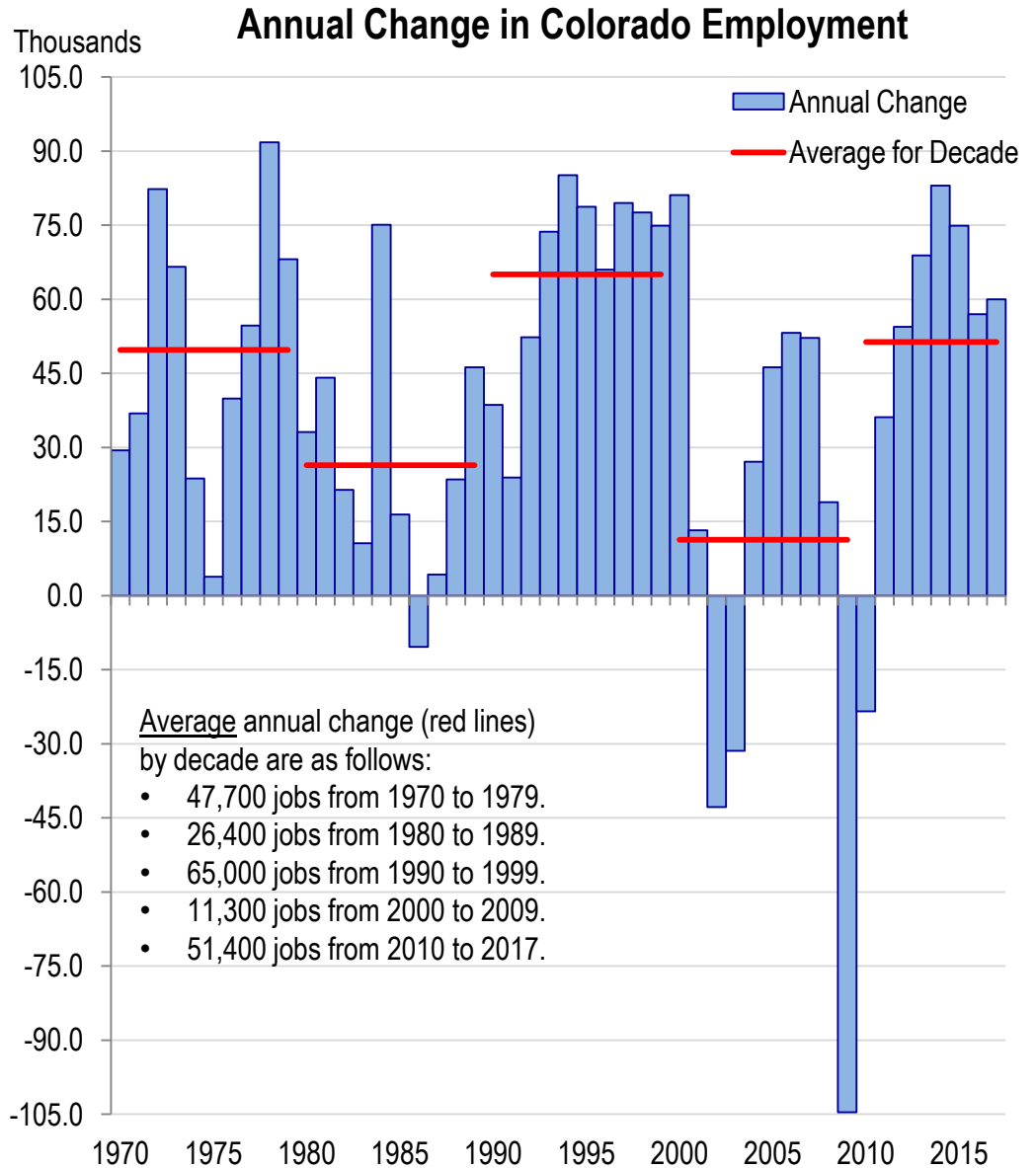
There will be 2,656,800 Colorado wage and salary employees in 2017.

# Annual Employment Change in Colorado

The 2017 forecast assumes that Colorado added 74,900 jobs in 2015 and 57,000 jobs in 2016.

For the first 8 years of this decade, Colorado has added an average of 51,400 jobs.

The state will add 57,000 to 63,000 jobs in 2017. Colorado employment will increase by 2.2% to 2.4%.



Source: Bureau of Labor Statistics, cber.co.

# Reasons to Feel Good About the Colorado Economy

Overall, 2017 will be a year of moderate job and economic growth for Colorado.

Reasons to Feel Good About the Colorado Economy	
<p><b>Population Growth</b> - Between 2015 and 2017 the Colorado population will increase by 100,000 people each year. These people will need housing, they will consume goods and services, and they will increase the congestion. Most residents view their presence as a good thing.</p>	<p><b>Price of Oil</b> – The price of oil has increased and may reach \$60 per barrel in 2017. The rig count has increased and the production of oil and natural gas will be steady in 2017.</p>
<p><b>Job Growth</b> – All three of the categories analyzed by cber.co will add jobs. In addition, each of the Super Sectors will add jobs with the exception of the extractive industries. The job losses in that sector are expected to be minimal. The performance of the state economy is a lot like the win-loss record of the Denver Broncos. As demonstrated this past season, you can't be a Super Bowl winner every year.</p>	<p><b>Moderate growth</b> - Moderate growth is boring, but boring is a good thing. Moderate growth is easier to manage than strong growth. The strength of Colorado's job growth is based in its diversity across all categories and sectors. As my grandmother used to say, "Many hands make light work." When many industries add jobs it is easy for Colorado to have a strong economy.</p>
<p><b>Establishment Growth</b> – The number of business establishments has increased. These businesses provide residents with more places to work.</p>	<p><b>Leading Index</b> – The Leading Index, produced by the Philadelphia Fed points to a positive future for both Colorado and the U.S.</p>



# Economic Risks and Concerns

The demand exists for Colorado to add jobs at a higher rate. There are a number of factors that are preventing stronger job and real GDP growth from happening.

<p><b>Low Unemployment Rate</b> – Industries such as construction, software, and advanced manufacturing have had difficulty finding qualified and clean workers because of low unemployment rates in key occupations. This will continue to be a challenge in 2017.</p>	<p><b>Two Economies</b> – Colorado is a state with two economies – rural vs. urban. Twenty-seven of the state’s 64 counties experienced declines in population between 2010 and 2014. Many are small rural counties. This is a tough problem to address because a high concentration of the population, workforce, and commerce is located in a small number of metro counties.</p>
<p><b>Inflation</b> – Colorado’s rate of inflation is expected to be 2.8% in 2016 and 3.0% in 2017. This will present a number of challenges for businesses.</p>	<p><b>Transportation</b> – The state’s transportation infrastructure (roads and bridges) needs a sugar daddy!</p>
<p><b>Affordable Housing</b> - It will be more difficult to find attainable and affordable housing as a result of the continued increases in housing prices. This has always been a problem in Colorado, but very few communities have found solutions.</p>	<p><b>Main Street Activity</b> – Unofficial measures of the economy (rising prices, lines in restaurants, shoppers carrying bags out of retail stores, cone zones, low gas prices) indicate the Colorado economy is solid, but not as strong as it has been the past couple of years.</p>



# Appendix



# Appendix

The cber.co Forecast

A Review of the 2016 Forecast and Related Issues

# The Purpose of the cber.co Forecast

The purpose of this forecast is to use reliable data sources to tell an unbiased story about the factors that are driving change in Colorado employment.

## Wage and Salary Employment Data

There are many purposes for forecasts such as sales (output), value added (GDP), tax revenue generated, or occupations.

Employment forecasts are most useful for the following reasons:

- Everyone understands jobs.
- Employment data is available in the public domain.
- Employment data is produced on a timely basis and its level of accuracy is usually reasonable.
- From an economic development standpoint, employment is the metric of choice because “it all starts with a job” – workers are hired because there is demand for goods and services, they are paid wages, they spend their wages on goods and services, and the cycle repeats.

## Forecast Accuracy

This forecast uses resources that produce reliable data, such as the Federal Reserve, BEA, and BLS. Every effort has been made to perform accurate and unbiased analysis to describe changes in the Colorado economy.

This and any other forecast cannot fully account for major shocks to the system, such as unexpected policy decisions, geopolitical unrest, acts of terrorism, and natural disasters.

The accuracy of all economic forecasts fall into one of two categories – wrong or lucky.

# What was Missed in 2016?

## BLS Data Error and Forecast Bias Errors

The first step in preparing or updating a forecast is to review the errors made for the prior year. This section touches on errors caused by the forecast process and errors caused by using preliminary BLS data.

### Forecast Process Bias

It is a common for forecasters to under estimate changes in job growth. This may occur for a variety of reasons:

- Many economic models understate growth during periods of expansion and overstate growth during periods of decline. This tendency is called regression to the mean.
- Some economists intentionally make conservative forecasts because they believe greater harm occurs from overstating rates of growth than from understating those rates.
- Some forecasts are understated so the economist can later make the claim that the economy performed better than expected.
- Some forecast are biased by their financial sponsors or the mission of their organization.

The moral of the story is to look at the track record of employment forecasts to determine their tendencies for errors.

### BLS Data Error

Short-term employment forecasts use the CES or Wage and Salary data produced by the Bureau of Labor Statistics.

There are “flaws” in the BLS survey and sampling methodology that causes errors in the monthly CES sector and geographic jobs data. A description of the process for revising preliminary data is provided elsewhere in the Appendix. A review of the various forecasts produced for Colorado suggests the inaccuracies in the BLS preliminary data were partially responsible for errors in all 2016 state employment forecasts.

# Review of cber.co 2016 Forecast Variances

## Review of 2016 Forecast

The major assumption of the cber.co forecast and all other forecasts was that job growth would be slower in 2016. All forecasts were correct in that assumption.

The key metrics in the cber.co forecast were too optimistic.

- Real GDP growth rate was 1.6%. This value was below the projected range of 2.3% to 2.7%.
- The U.S. added about 2.5 million wage and salary workers, This was below the forecast of 2.7 million.
- Colorado added 57,000 jobs in 2016. This is 10,000 jobs below the bottom of the projected range.

The actual performance of the Colorado economy met the key metrics of the pessimistic scenario rather than the most likely scenario. Bummer!

## 2016 Economic Outlook

### Optimistic Scenario

- U.S. Real GDP greater than 2.7%.
- Colorado will add more than 73,000 workers, growth greater than 2.9%.

### Most Likely Scenario

- U.S. Real GDP 2.3% to 2.7%.
- The U.S. will add at least 2.7 million workers.
- Colorado will add 67,000 to 73,000 workers, job growth will be 2.7% to 2.9%.

### Pessimistic Scenario

- U.S. Real GDP less than 2.3%.
- Less than 67,000 Colorado workers, growth less than 2.7%.

The probability of these scenarios follows:

- Most Likely 60%
- Optimistic 18%
- Pessimistic 22%.

There is slightly more downside risk than upside potential.

# Reasons for Variance from the 2016 Most Likely Scenario Forecast

## Reasons for Variance in 2016 U.S. Forecast

### Real U.S. GDP Growth

The year started on a horrible note and did not improve until Q3. Personal consumption was solid. Businesses remained skeptical. As a result, business investment was weak. Government spending was also weak, but that was expected. The strong U.S. dollar was a double whammy to the economy. The demand for goods abroad was weak, which in turn caused manufacturers to lay off workers. In addition, the passage of Brexit created uncertainty about the future of trade with Great Britain and countries in the EU.

### U.S. Employment

Average U.S. employment for 2016 was solid. Weak GDP growth, dismal productivity, and general inefficiencies in the economy caused job growth to deteriorate as the year progressed. Job growth at a slower rate will continue into 2017.

## Reasons for Variance in 2016 Colorado Forecast

### Colorado Employment

Throughout 2016 the data published by BLS showed the Colorado economy was on track to meet the cber.co forecast, about 70,000 jobs. Midway through the year, preliminary estimates of updates to the March 2017 benchmark revisions were released. The revisions showed that job growth had actually started slowing in Q4 2015.

As a result, the forecast for the Strong Category was too optimistic while the forecast for the Solid Category was slightly pessimistic. These two variances offset each other.

The culprit was the Volatile category. The forecast was much too optimistic. The timing and the depth of job cuts in the extractive industry was missed. The magnitude of the slowdown in manufacturing was not anticipated. Construction was not as strong as anticipated, most likely because there were not enough available workers to fill job openings.

# Summary of Performance to cber.co 2016

## Employment Forecast

This chart shows the accuracy of the 2016 cber.co forecast.

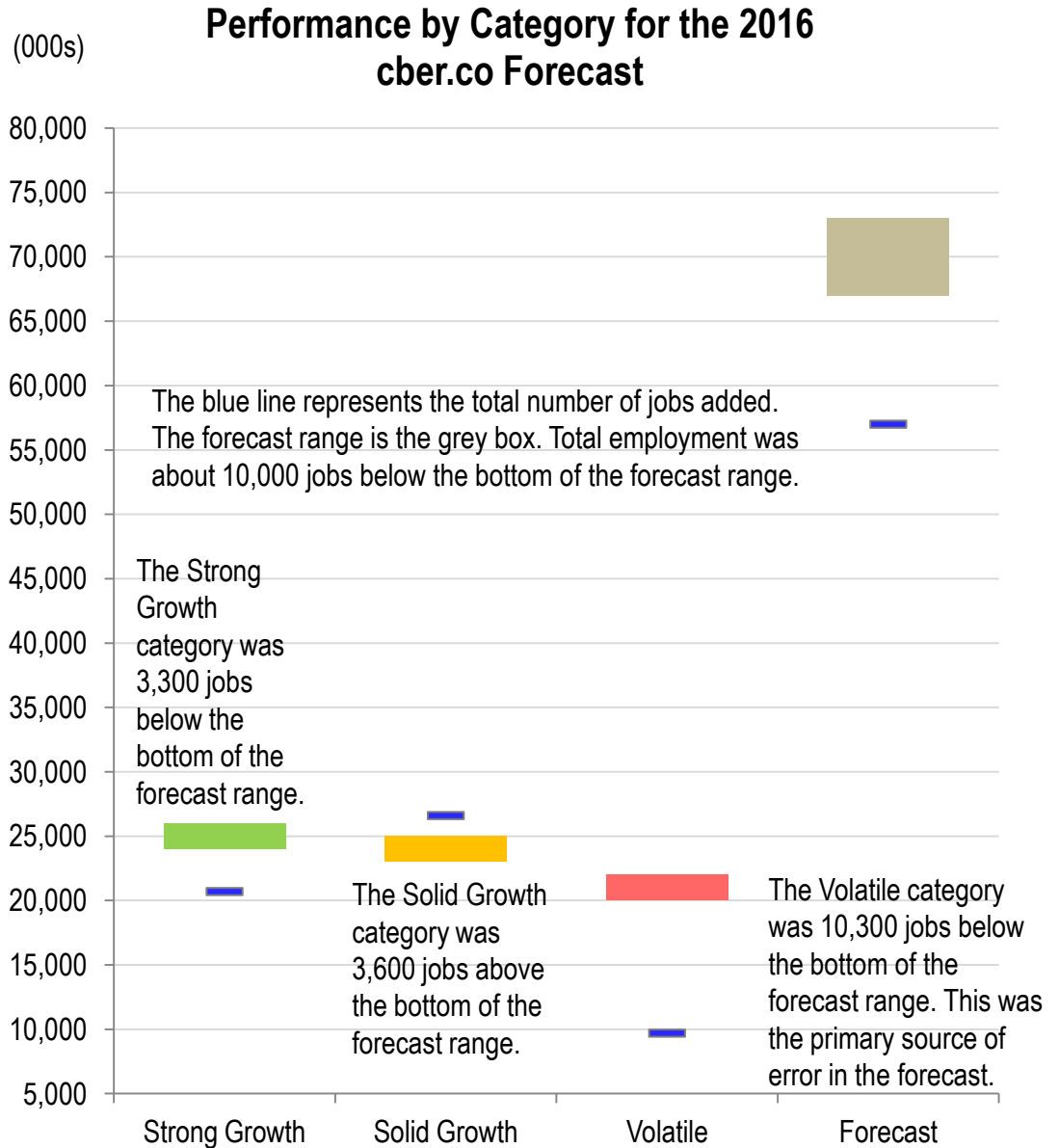
On this chart, the forecast ranges for the categories are:

- Strong Growth – green box.
- Solid Growth – yellow box.
- Volatile – red box.
- Total Employment – grey box.

The short blue lines indicate the level of change in employment for 2016.

The overall number of jobs added was below the projected forecast range (grey box).

**Average employment for 2016 was 57,000 greater than the same period in 2015. The forecast range was 67,000 to 73,000.**



Source: Bureau of Labor Statistics, cber.co.



# Other 2016 Economic Forecasts

## Forecast Accuracy

The assumptions and errors in other forecasts were reviewed as a means of understanding what activities caused expected and unexpected changes in the economy during 2016. All forecasts overestimated U.S. real GDP growth. Real GDP growth was 1.6% for 2016. All forecasts correctly identified that Colorado would add fewer jobs in 2016 compared to 2015. Through most of 2016, BLS reported that Colorado would add about 70,000 jobs. That will likely be revised downward to 57,000, with Q4 2015 also being revised downwards.

2016 Colorado Forecasts	Accuracy of 2016 Colorado Forecasts
cber.co Economic Forecast	Too pessimistic for solid growth categories, too optimistic for strong growth and volatile categories. Too optimistic about total job growth. Too optimistic with real GDP growth rate. The culprit was the Volatile Category forecast.
Colorado Legislative Council (CLC)	Too <u>pessimistic</u> about job growth. Too optimistic with real GDP growth rate.
Office of State Planning and Budgeting (OSPB)	Real GDP overstated. Employment too optimistic.
CU Leeds School Business Economic Outlook	Real GDP overstated. Employment too optimistic. Of the 11 sectors that were projected, 2 were reasonably accurate. Five were too optimistic. Three of these sectors were significantly overstated (extractive industries, manufacturing, and PBS). Four were too pessimistic. Only the government sector was understated.



# Appendix

## Putting the Forecast in Perspective

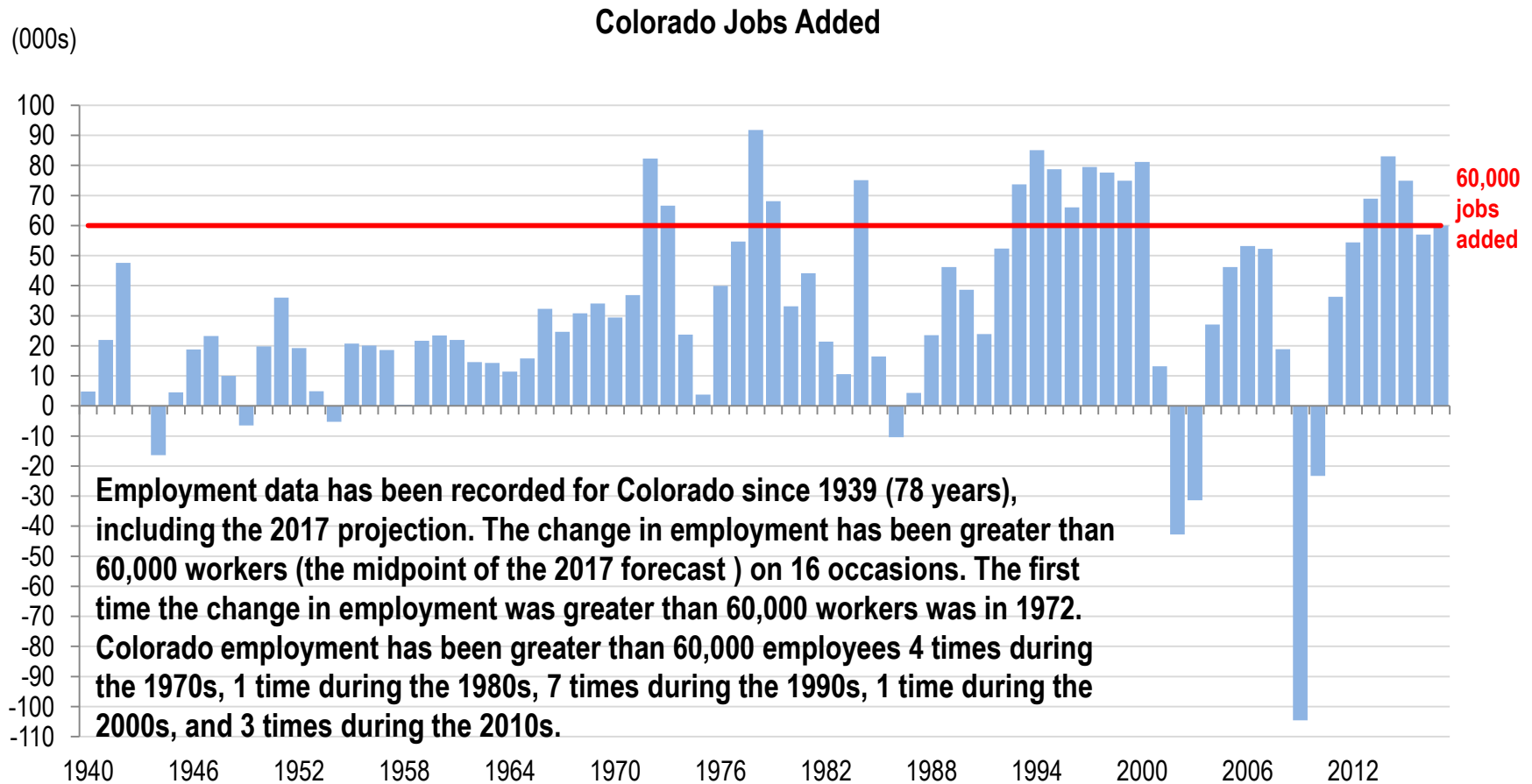
# Putting the Forecast in Perspective

In 1954, Darrell Huff wrote the classic book, *How to Lie with Statistics*, about analyzing data.

Using concepts from Huff, the following three charts put the 2017 forecast in perspective.

- The first two charts tell different stories about the rate of Colorado's job growth. If you look at absolute job growth since employment data was first collected, 2017 will be a reasonable year.
- On the other hand, if you look at relative growth for the same period, 2017 will be a weak year.
- Which is correct? They both are!
- Another way to look at Colorado's job growth is to compare it to the nation. This data illustrates that Colorado employment has increased at a faster rate than U.S. employment.

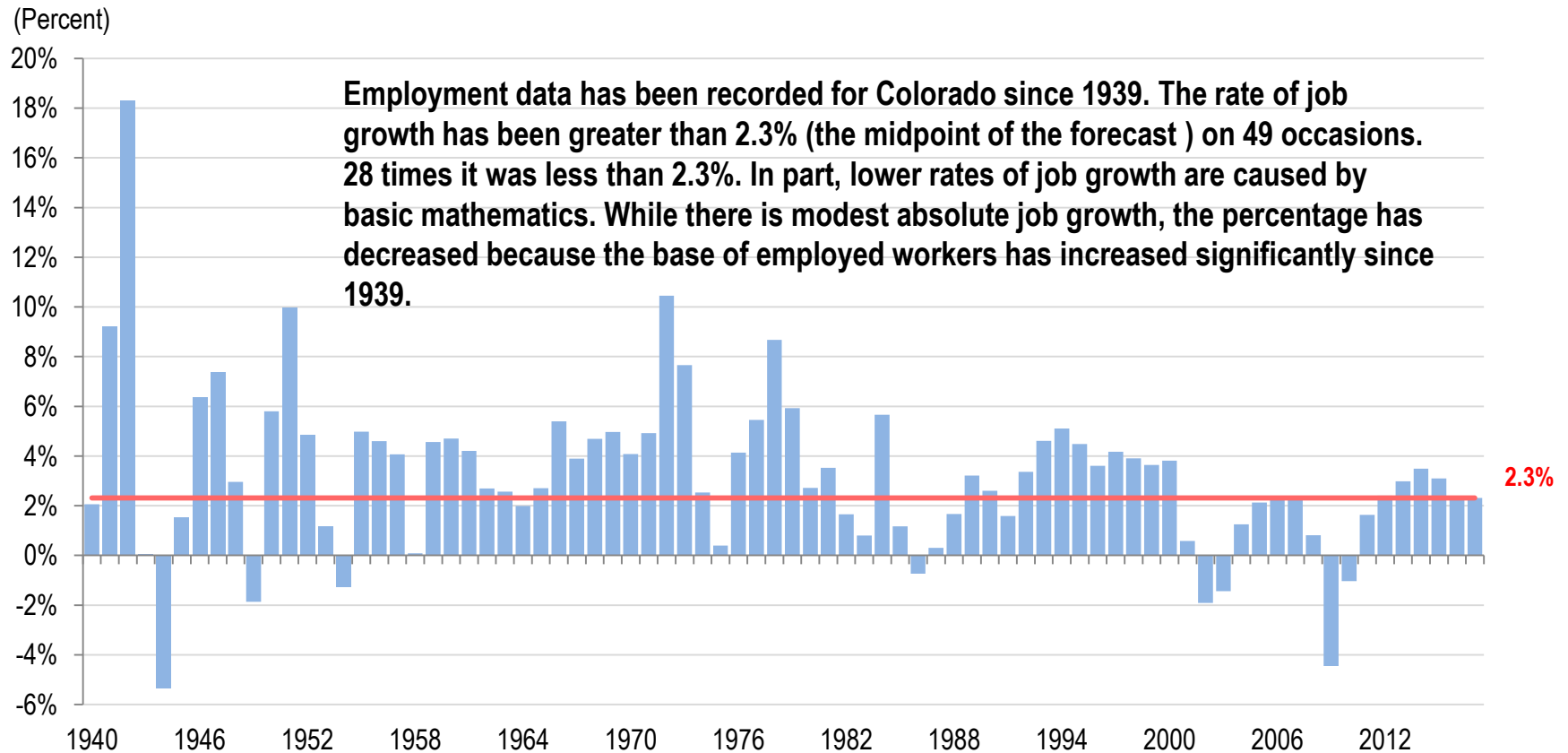
- The Projected Absolute Job Growth for 2017 (Total Jobs Added) will be the 17<sup>th</sup> Strongest since 1939.



Source: Bureau of Labor Statistics, cber.co.

- The Projected Rate of Colorado Job Growth for
- 2017 will be the 50<sup>th</sup> Strongest in 78 Years
- 

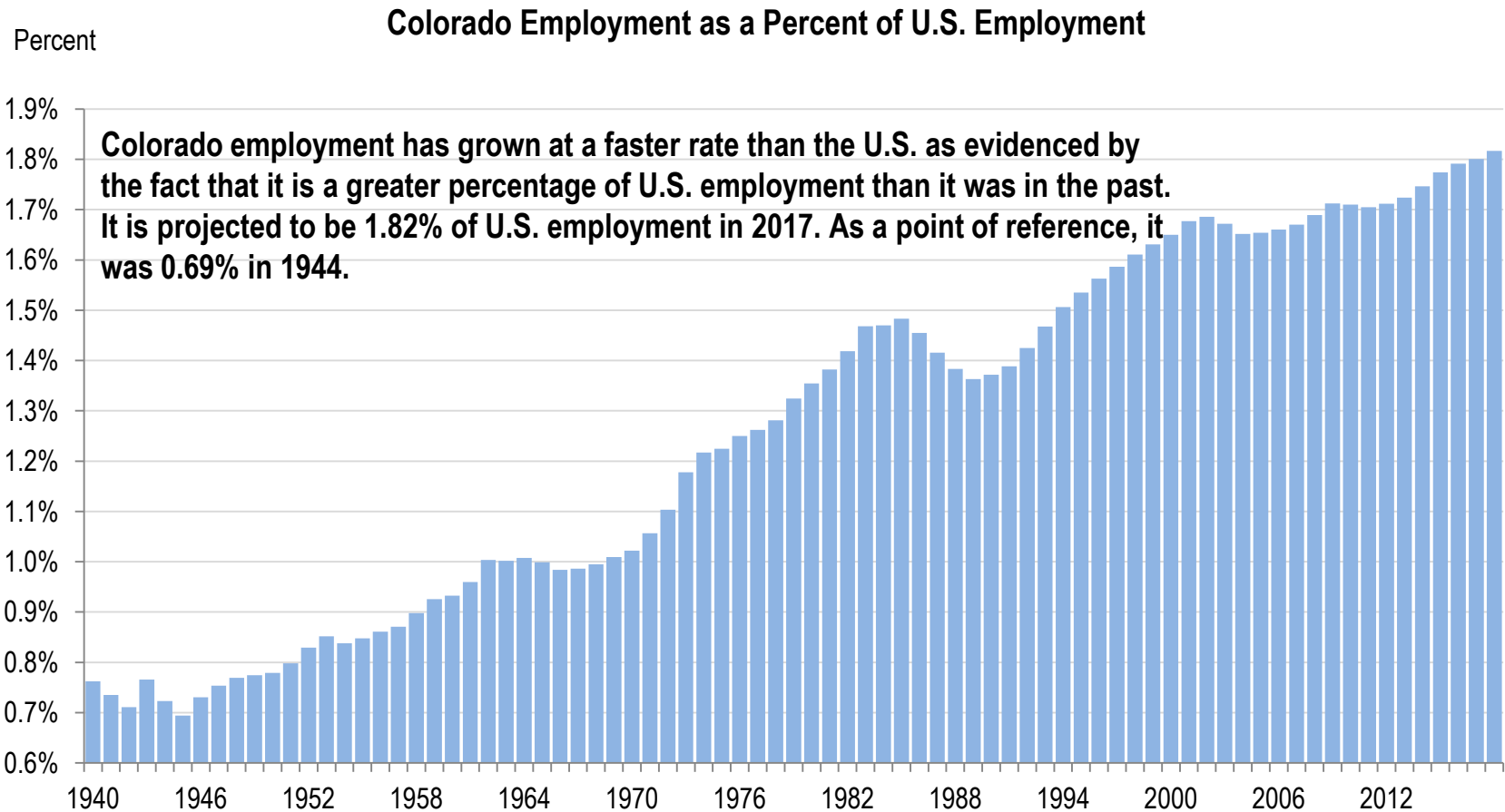
Percentage of Jobs Added



Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

# Colorado Employment as a Percent of U.S. Employment



Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research <http://cber.co>



# Appendix

BLS/LMI Data Revision Process and Analysis for Determining  
Forecast Categories



# BLS/LMI Data Revision Process

## BLS and LMI Data Projections

In recent years, data-producing federal agencies have been asked to deliver more accurate data, in a shorter time frame, using fewer staff, with lower research budgets. The data used for most short-term forecasts is the Current Employment Survey, also called Nonfarm or Wage and Salary data. It is possible for the CES data to be revised up to four times.

## BLS and LMI Data Revision Process

The CES projection process is outlined below:

1. Around the 20<sup>th</sup> of a month, preliminary data for the prior month will be published and the month prior to that will be updated (For example, around June 20<sup>th</sup> preliminary data for May will be produced and April will be updated.) These revisions are usually minor. Most short-term forecasts use this data.
2. In March of the following year, the previous two years will be revised. (For example, the 2014 employment data will be revised in March 2015 and finalized in March 2016).
3. The initial March update is usually the most significant revision, and the two-year update is often minor (In the case of 2014, some of the monthly totals will see significant upward revisions when revised in March 2015.)
4. Periodically, BLS updates the entire data series back to 1990. This usually occurs when they recalibrate their projection models or redefine NAICS codes.



# Analysis for Determining Forecast Categories

The tables in this section show tests that were used to categorize sectors into the Strong Growth, Solid Growth, and Volatile categories.

As it turns out, there is some logic to the different levels of volatility:

- The Strong Growth category includes sectors that are necessary and less susceptible to business cycles, for example, health care and other services. Combined, these sectors typically add jobs at a faster rate than the overall economy.
- The Solid Growth category is consumer based. It includes the trade sectors and sectors impacted by retail sales tax revenue, i.e. government agencies and education. Combined, these sectors typically add jobs at a rate similar to the overall rate of growth.
- The Volatile category includes sectors that are susceptible to business cycles and pressures from outside their industry. For example, the price of oil is driven by the amount of oil production around the world. This may cause booms and busts locally, which may directly impact the extractive Industries and indirectly alter growth in the construction, manufacturing, and retail industries.

# Analysis for Determining Forecast Categories

## Strong Growth Sectors

### STRONG CONSISTENT GROWTH SECTORS

Category	1990 Employment	2012 Employment	% of Jobs 1990	% of Jobs 2012	Yrs Jobs Added '91 to '12	Change in Jobs '91-'00	Change in Jobs '01-'10	Change in Jobs '11-'12	% Jobs Added '91 to '12	% Jobs Added '91 to '12	CAGR '91 to '12
Arts, Ent, Rec	23.4	47.0	1.5%	2.0%	18	19.1	2.2	2.3	23.6	3.0%	3.22%
Admin Not Em Sv	56.7	104.9	3.7%	4.5%	19	34.7	8.2	5.3	48.2	6.1%	2.84%
Health Care	115.8	247.1	7.6%	10.7%	22	54.3	62.3	14.7	131.3	16.6%	3.51%
Mgmt Corp Ent	13.1	31.8	0.9%	1.4%	19	6.0	9.9	2.8	18.7	2.4%	4.11%
Other Serv	56.0	95.5	3.7%	4.1%	20	24.2	12.2	3.1	39.5	5.0%	2.46%
Private Educ	14.0	35.2	0.9%	1.5%	22	8.7	9.6	2.9	21.2	2.7%	4.28%
Prof, Scien, Tech	86.3	177.8	5.7%	7.7%	18	67.5	13.4	10.6	91.5	11.6%	3.34%
Strong Growth	365.3	739.3	24.0%	32.0%	21	214.5	117.8	41.7	374.0	47.4%	3.26%
State	1,520.9	2,310.0			18	692.9	8.5	87.7	789.1	100.0%	1.92%

Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

# Analysis for Determining Forecast Categories

## Solid Growth Sectors

### SOLID GROWTH SECTORS

Category	1990 Employment	2012 Employment	% of Jobs 1990	% of Jobs 2012	Yrs Jobs Added '91 to '12	Change in Jobs '91-'00	Change in Jobs '01-'10	Change in Jobs '11-'12	% Jobs Added '91 to '12	% Jobs Added '91 to '12	CAGR '91 to '12
Acc Food Serv	143.9	233.3	9.5%	10.1%	20	59.6	14.8	15.0	89.4	11.3%	2.22%
St-Higher Ed	40.6	63.6	2.7%	2.8%	20	7.4	12.3	3.3	23.0	2.9%	2.06%
Local Ed	81.7	125.6	5.4%	5.4%	19	23.5	21.6	(1.2)	43.9	5.6%	1.97%
Local Not Ed	72.9	117.8	4.8%	5.1%	20	25.5	19.5	(0.1)	44.9	5.7%	2.21%
Retail Trade	172.7	243.5	11.4%	10.5%	16	72.5	(8.3)	6.6	70.8	9.0%	1.57%
St-Not Higher Ed	24.4	33.1	1.6%	1.4%	19	6.2	2.1	0.4	8.7	1.1%	1.40%
Whls Trade	72.9	94.1	4.8%	4.1%	16	26.5	(8.6)	3.3	21.2	2.7%	1.17%
Solid Growth	609.1	911.0	40.0%	39.4%	19	221.2	53.4	27.3	301.9	38.3%	1.85%
State	1,520.9	2,310.0			18	692.9	8.5	87.7	789.1	100.0%	1.92%

Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research <http://cber.co>

# Analysis for Determining Forecast Categories

## Volatile Sectors

### VOLATILE SECTORS

Category	1990 Employment	2012 Employment	% of Jobs 1990	% of Jobs 2012	Yrs Jobs Added '91 to '12	Change in Jobs '91-'00	Change in Jobs '01-'10	Change in Jobs '11-'12	% Jobs Added '91 to '12	% Jobs Added '91 to '12	CAGR '91 to '12
Construction	63.5	115.1	4.2%	5.0%	15	100.1	(48.5)	-	51.6	6.5%	2.74%
Empl Srvcs	22.8	40.7	1.5%	1.8%	16	31.7	(20.8)	7.0	17.9	2.3%	2.67%
Fed Govt	57.3	54.5	3.8%	2.4%	9	(2.5)	1.4	(1.7)	(2.8)	-0.4%	-0.23%
Fin Activities	104.6	146.1	6.9%	6.3%	15	42.4	(2.7)	1.8	41.5	5.3%	1.53%
Information	52.2	69.7	3.4%	3.0%	11	56.2	(36.4)	(2.3)	17.5	2.2%	1.32%
Manufacturing	170.2	132.1	11.2%	5.7%	9	18.7	(63.4)	6.6	(38.1)	-4.8%	-1.15%
Extractive Ind	17.1	15.3	1.1%	1.3%	12	(4.9)	12.2	5.9	13.2	1.7%	2.63%
Trans,Whs,Util	59.0	60.5	3.9%	3.1%	16	15.3	(4.4)	1.5	12.4	1.6%	0.87%
Volatile	546.7	542.0	35.9%	28.6%	14	257.0	(162.6)	18.8	113.2	14.3%	0.86%
State	1,520.9	1,545.0	100.0%	100.0%	18	692.9	8.5	87.7	789.1	100.0%	1.92%

Source: Bureau of Labor Statistics, cber.co.

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### ABOUT THE AUTHOR

Gary Horvath has produce annual employment forecasts of the state economy for over 25 years. They have been supplemented by monthly economic updates and indices that track economic performance over the short term. In addition he has directed three statewide analyses that included reviews of all 64 county economies.

In addition, Horvath was the principal investigator for a state and federally funded project to prepare a nanotechnology roadmap for Colorado. As well, he was a co-founder of the Colorado Photonics Industry Association, a trade group for Colorado’s Photonics cluster. Horvath has been an active board member of the group since its inception.

Horvath has also served on the Board of Directors for the Economic Development Council of Colorado, Northwest Denver Business Partnership, Adams County Economic Development, and Broomfield Economic Development Corporation. Horvath has also been the lead for the photonics/electronics cluster in OEDIT’s early stage and proof of concept grant programs.