cber.co
Colorado Economy and Employment Data Through March 2017

Colorado-based Business and Economic Research
Prepared
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Overview of Economic Review

This chartbook provides a series of charts, graphs, and discussions that review the Colorado wage and salary employment data published by the Bureau of Labor Statistics for the first 3 months of 2017. On average, Colorado employment through March indicates the state is on track to add 50,000 jobs this year. This month the review touches briefly on the national economy, looks at trends in the state's major employment categories, and touches on the prospects of a recession. This information is divided into the sections listed below.

U.S. Economy

- The United States Economy
  - Recession/Slowdown/No Recession
  - GDP, Employment, Employment Costs
  - Equities, Equity Volatility, Corporate Profits
  - Manufacturing, Non-manufacturing, Retail, Auto Sales
  - Summary

The Colorado Economy

- Population, Unemployment, Employment
- Employment in Strong Growth, Solid Growth, Volatile Categories
- Questions About the Economy
- Summary
- Appendix

This chartbook contains a summary of the 2017 forecast. The complete 2017 forecast can be found at http://cber.co/economic-forecasts/

The U.S. Economy
No Recession/Slowdown/Recession

Where is the Economy Headed?
No Recession, Slowdown, Recession?
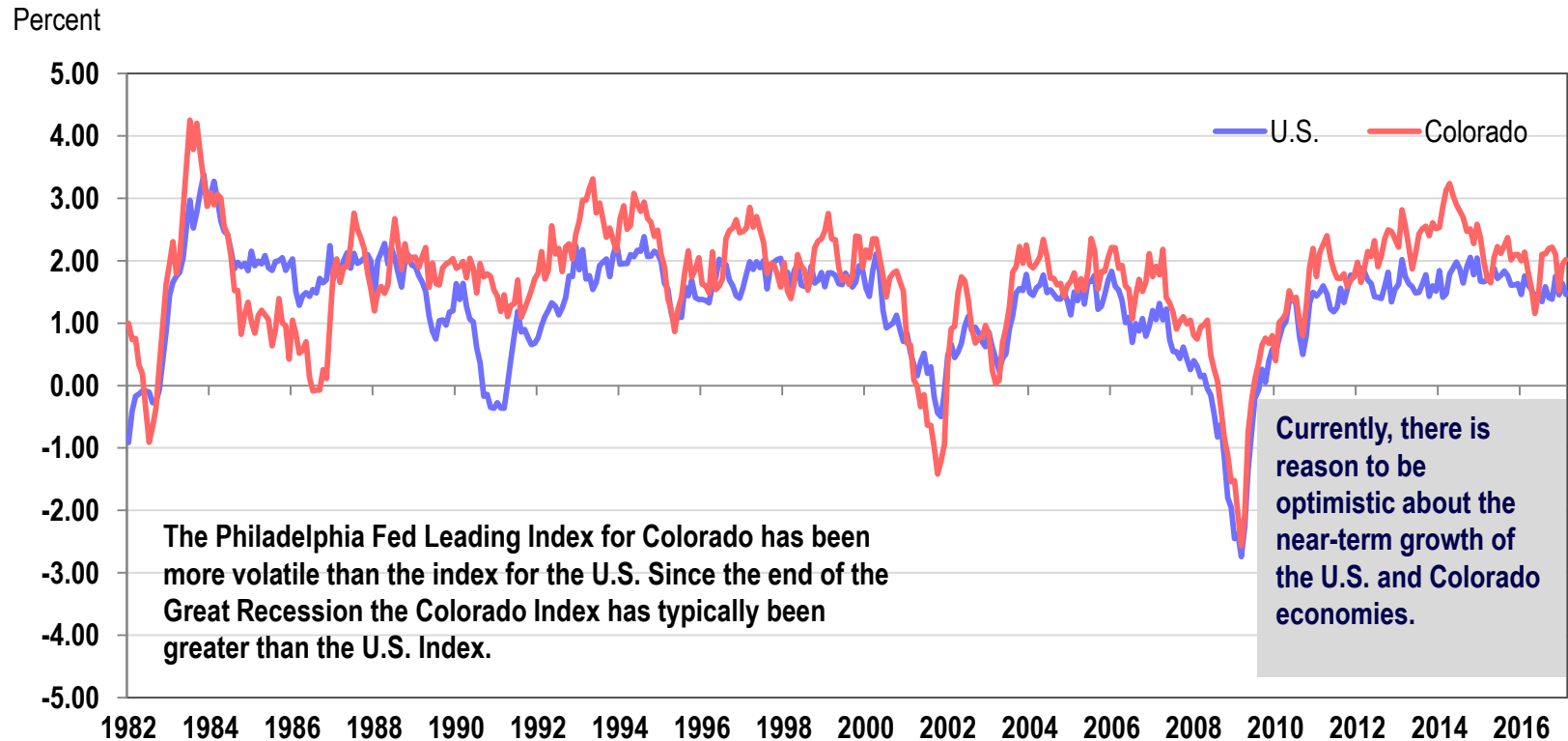
No Recession? – Not this year

Slowdown? – Most likely we are coming out of a slowdown. Some economists think the data shows a recession is on the horizon; however, activity on the street and the preponderance of data shows that is not the case. If anything we are working our way through a slowdown and the economy will be solid for the remainder of the year.

Recession? - Mathematically we are due for a recession, but it will wait.

4

Leading Index
Colorado vs. United States

Philadelphia Federal Reserve Leading Index - Colorado vs. U.S.

The Philadelphia Fed Leading Index for Colorado has been more volatile than the index for the U.S. Since the end of the Great Recession the Colorado Index has typically been greater than the U.S. Index.

Currently, there is reason to be optimistic about the near-term growth of the U.S. and Colorado economies.

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

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GDP Based Recession Index

Recession Index

Legend:
- Recession Years
- Chance of Recession

Mathematically, we are due for a recession. At present, the chances of a recession are unlikely.
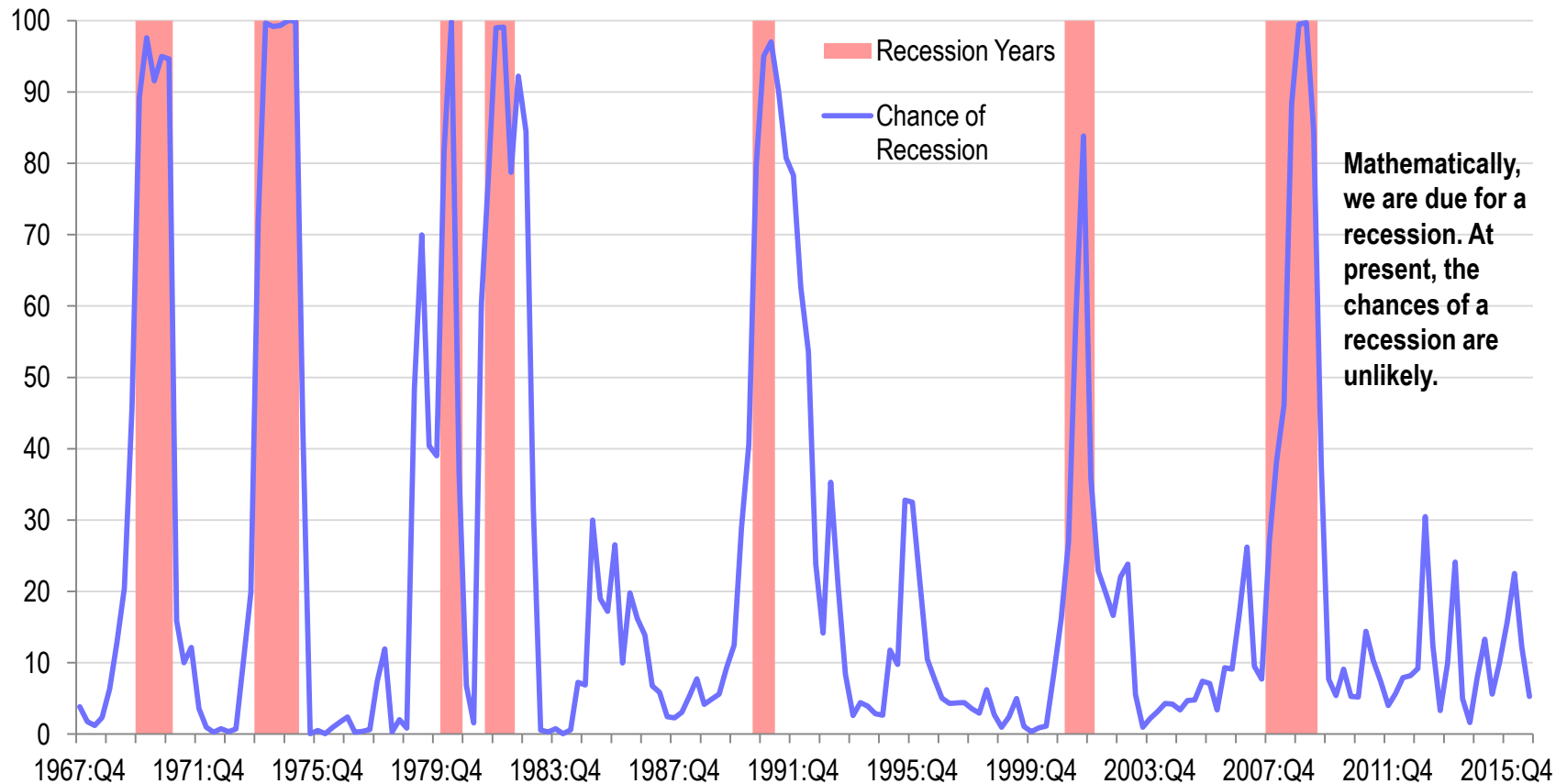
Source: Atlanta Federal Reserve, cber.co.

The U.S. Economy
GDP, Employment, Employment Costs
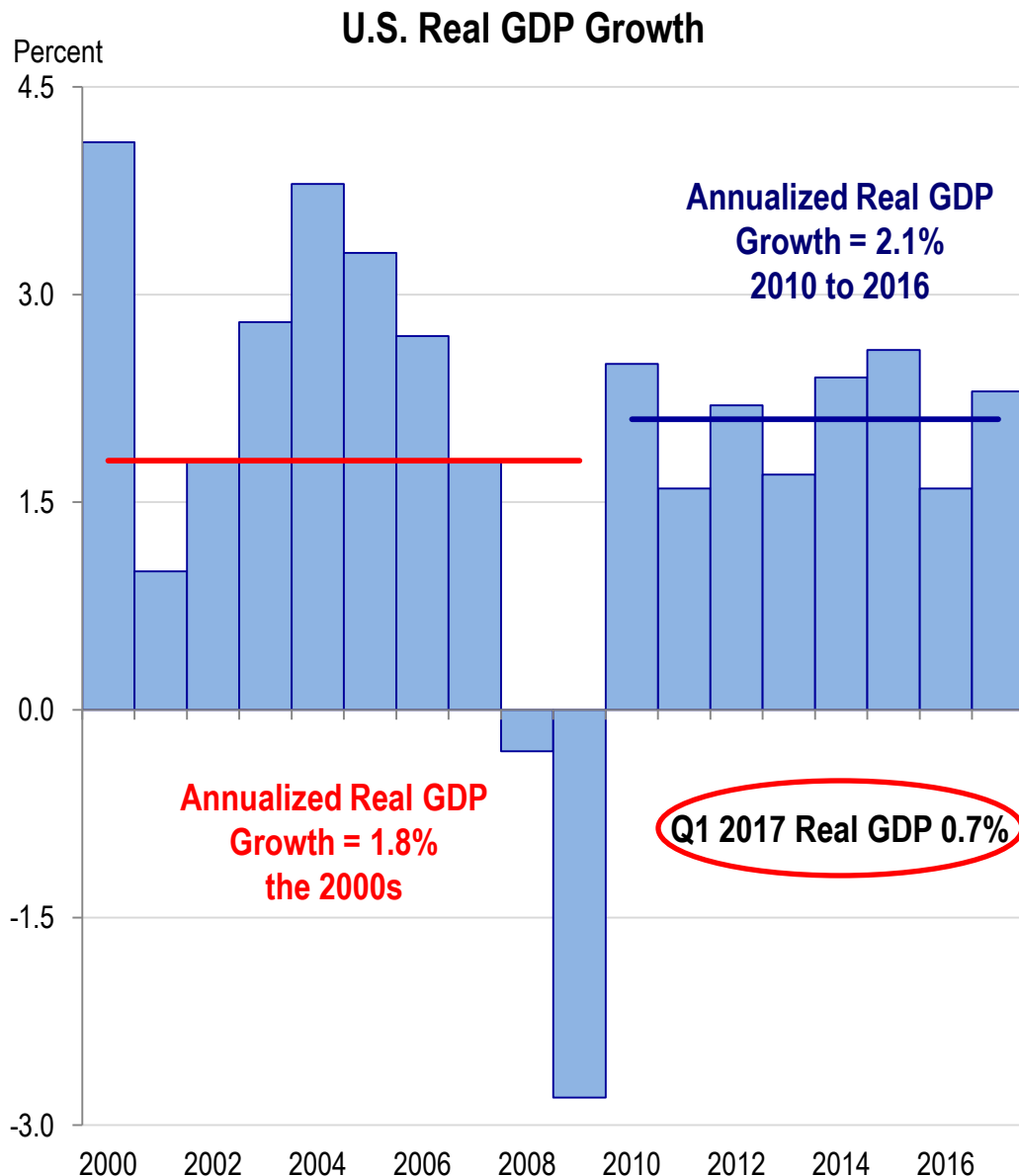
U.S. Real GDP Growth
C+I+G+NX

In 2017, real GDP is projected to grow at a rate between 2.1% to 2.5%.

- Personal consumption will drive real GDP growth, at a rate slightly greater than the rate of growth for real GDP.

- Business investment will increase if corporate tax rates are lowered. Stronger investment will benefit the economy in many different ways.

- Government spending will be stronger than in 2016.

- The trade deficit will increase as a result of the lack of demand caused by a strong dollar.

Real GDP for 2016

- Personal Consumption 69%
- Gross Private Domestic 17%
- Government Spending 17%
- Net Exports -3%

U.S. Real GDP Growth

Percent

Annualized Real GDP Growth = 2.1% 2010 to 2016

Annualized Real GDP Growth = 1.8% the 2000s

Q1 2017 Real GDP 0.7%

Q1 2017 Real GDP
Stronger Growth on the Horizon

Q1 2017 Real GDP Comes in a 0.7% Annualized Rate

Reasons to be Concerned

- Expectations were closer to 1.0%
- Consumer spending dropped from 3.5% in Q4 2016 to 0.3%.
- This was the lowest rate of consumer spending since 2009.
- Government spending fell significantly in Q1.
- Businesses pulled back on inventories.

Reasons Not to be Concerned

- The slower level of growth will be temporary.
- The reduced level of consumer spending is an anomaly, driven by a reduction in auto sales.
- Consumers, investors, and businesses are confident.
- Strong labor market.
- Stronger wage gains.
- Construction is a source of U.S. growth.
- Fixed business investment in Q1 was strong.

Change in United States Employment Year-Over-Year

Change in United States Employment

(000s)

Monthly data is shown with the blue line. Average annual data is shown with the red line.

+2.243 million

+2.206 million

+2.577 million

+2.907 million

+2.493 million

+2.227 million

+1.571 million

Since the end of the Great Recession, the strongest job growth occurred between October 2014 and July 2015. Monthly job growth has trended downward since early 2015. Average annual job growth for 2017 will be 1.9 to 2.1 million, or an average of 158,000 to 175,000 jobs per month. Employment has increased by 1.6% in Q1 2017, compared to the same time last year.

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

10

Employment Cost Index (ECI)

Total Compensation for All Civilian Workers in All Industries, 12-month Percent Change

ECI for Civilian Workers – 12 Month Percentage Change

Percent Change

In Q1 2016, the Y-O-Y ECI increased by 1.9%. It has since increased and was 2.4% in Q1 2017.

Source: Bureau of Labor Statistics, cber.co.
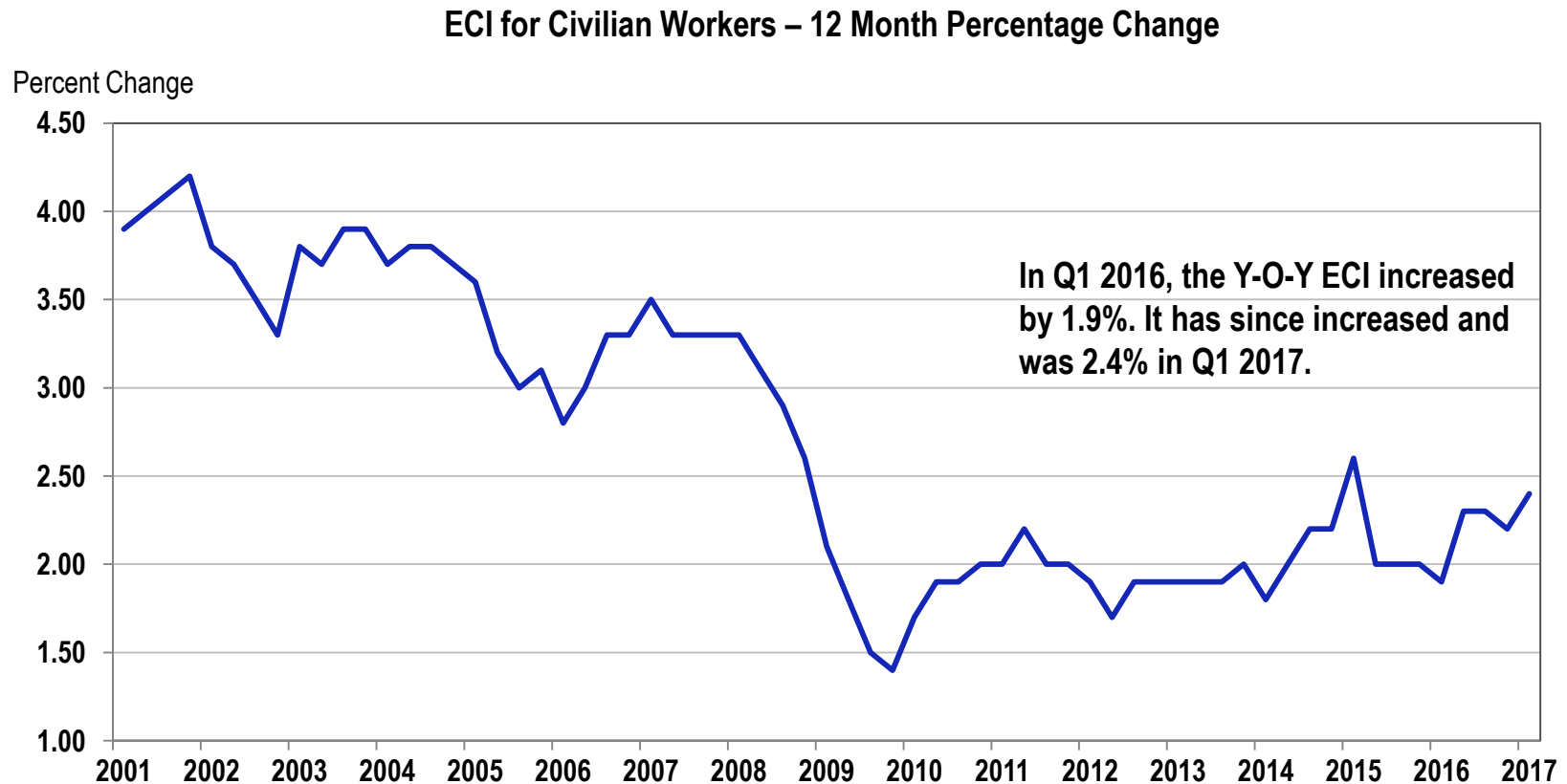
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The U.S. Economy
Equities, Equity Volatility, Corporate Profits

Standard and Poor's 500 Index

Standard and Poor's 500 Index

Daily
S&P 500

Recent S&P 500 Gains
30% in 2013
11% in 2014
-0.7% in 2015
9.5% gain for 2016.

In July 2016, the S&P 500 finally surpassed its 2015 peak.

The April 27th S&P value was 6.7% greater than the 2016 year-end value.
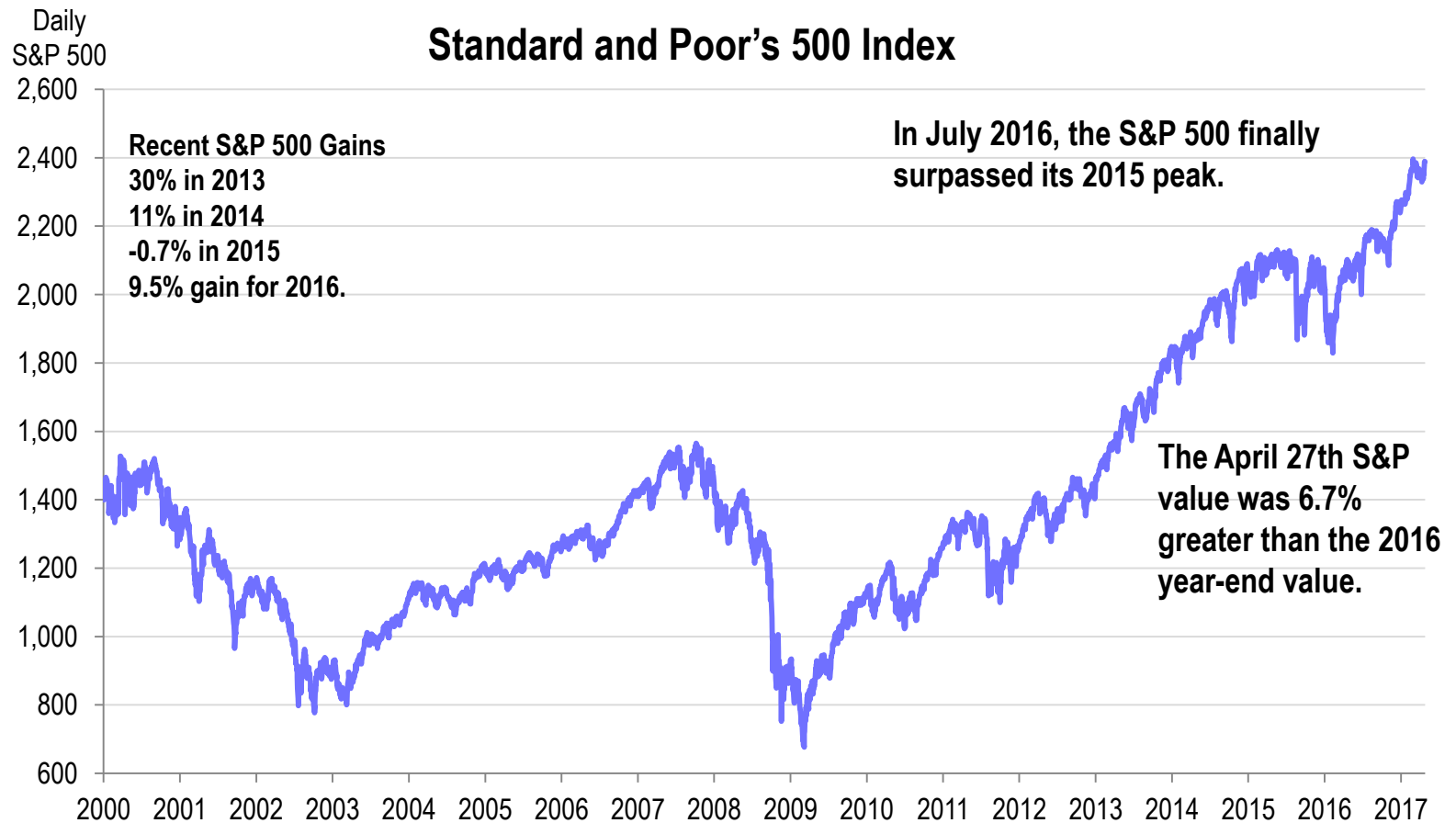
Source: FRED, S&P 500, cber.co.

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CBOE Volatility Index
VIX (VIXCLS)

CBOE Volatility Index - VIX

VIX Percent

2010
Flash crash – glitch in market and 1,000 point drop.
European Sovereign Debt Crisis.
SEC files charges against Goldman Sachs.
Deepwater Horizon oil spill.
Quantitative Easing #2.

2011
Italian debt crisis.
Downgrade of U.S. bonds.
Weak economic data.
Japanese earthquake and Tsunami.

2015
Brexit vote.
Weak jobs data.
China concerns.
Terrorist attacks.

2016
Presidential elections

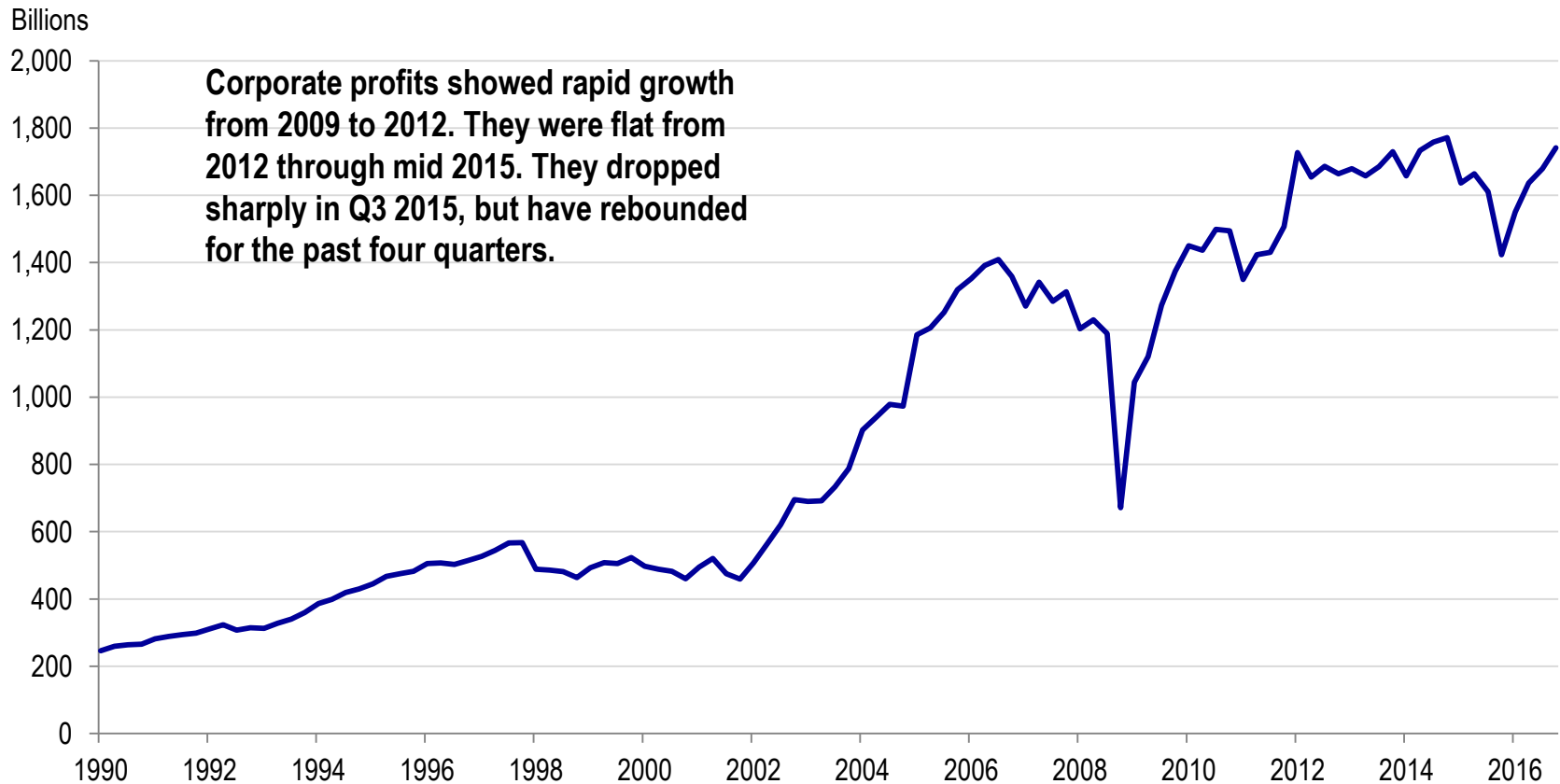VIX measures market expectations of near term volatility conveyed by stock index option prices (S&P 500).

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

Corporate Profits After Tax (without IVA and CCAdj)

Corporate Profits After Tax

Billions

Corporate profits showed rapid growth from 2009 to 2012. They were flat from 2012 through mid 2015. They dropped sharply in Q3 2015, but have rebounded for the past four quarters.

Employment, Equities, Corporate Profits

Three Reasons We Will Not See a Recession in the Near-Term

- The Fed likes the strength of the job market; through Q1 it is stronger than expected.

- Investors like the return on their equities; there is minimal volatility. They are confident.

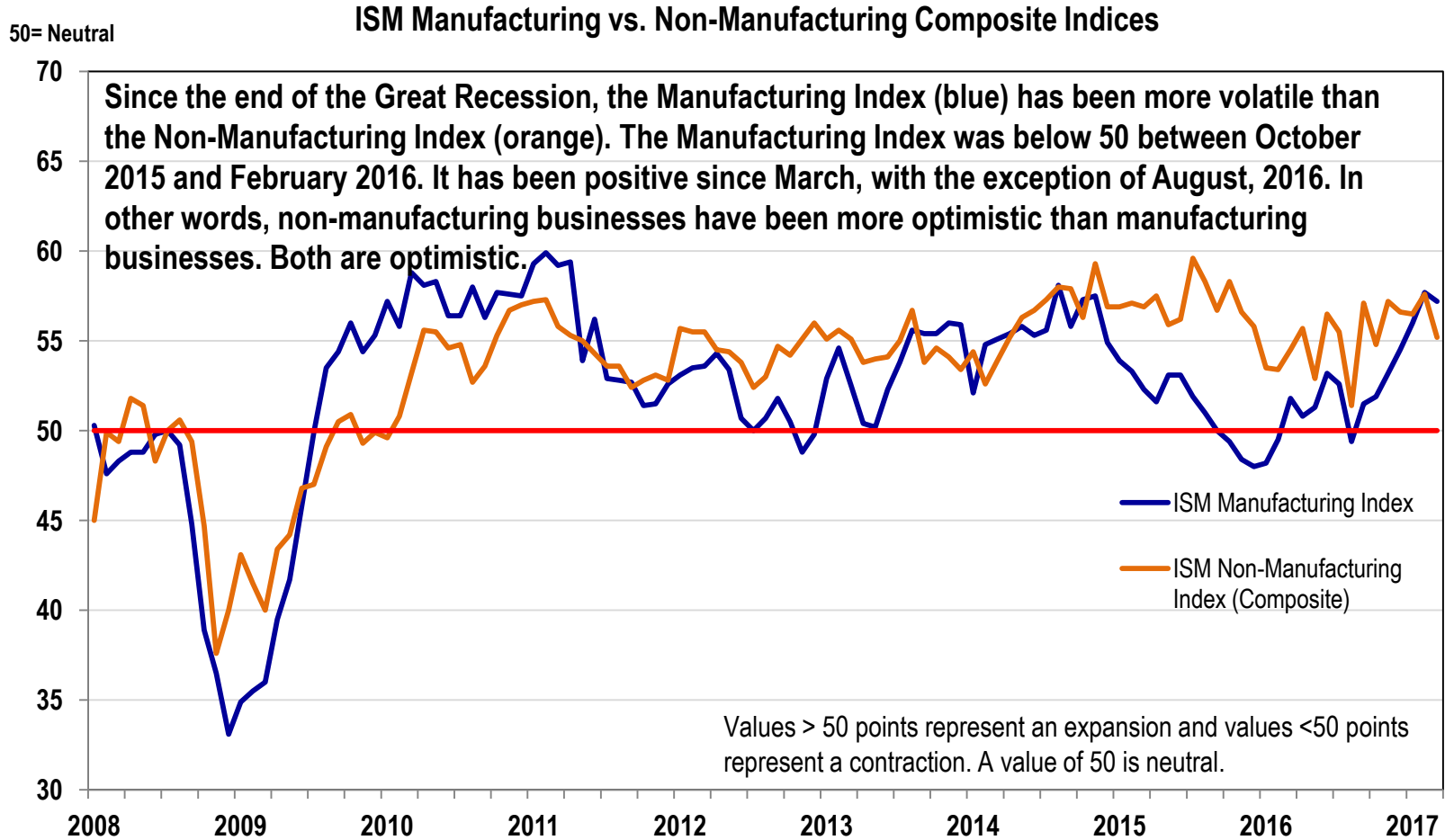- Corporate profits have rebounded. Companies are confident.

The U.S. Economy
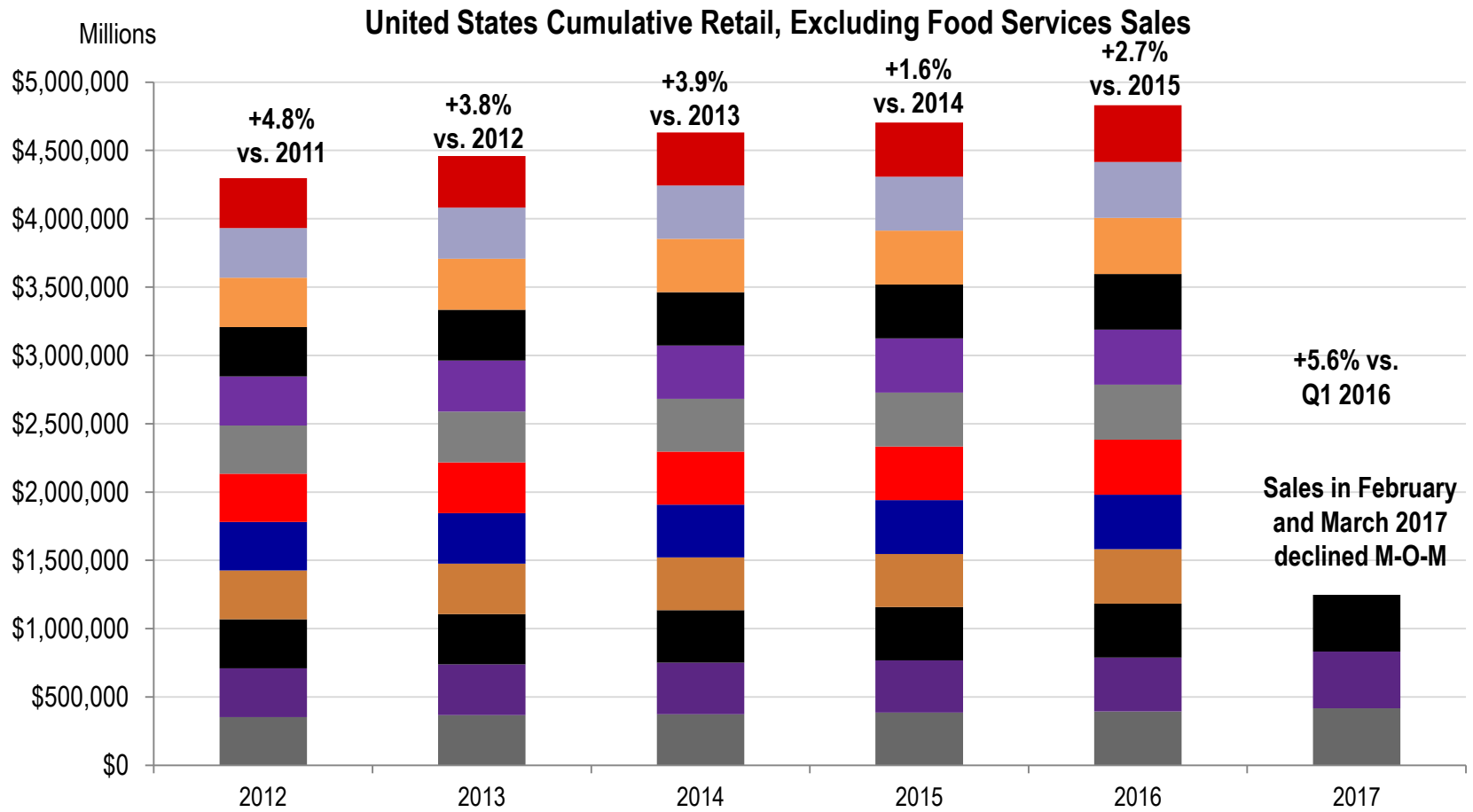## Manufacturing, Non-Manufacturing, Retail, Auto Sales

ISM PMI Composite Indices Manufacturing vs. Non-manufacturing

50= Neutral

ISM Manufacturing vs. Non-Manufacturing Composite Indices

Since the end of the Great Recession, the Manufacturing Index (blue) has been more volatile than the Non-Manufacturing Index (orange). The Manufacturing Index was below 50 between October 2015 and February 2016. It has been positive since March, with the exception of August, 2016. In other words, non-manufacturing businesses have been more optimistic than manufacturing businesses. Both are optimistic.

ISM Manufacturing Index

ISM Non-Manufacturing Index (Composite)

Values > 50 points represent an expansion and values <50 points represent a contraction. A value of 50 is neutral.

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

18

Cumulative Retail, Excluding Food Services Sales

United States Cumulative Retail, Excluding Food Services Sales

Millions

+4.8% vs. 2011

+3.8% vs. 2012

+3.9% vs. 2013

+1.6% vs. 2014

+2.7% vs. 2015

+5.6% vs. Q1 2016

Sales in February and March 2017 declined M-O-M

19

U.S. Weekly Auto and Light Truck Sales
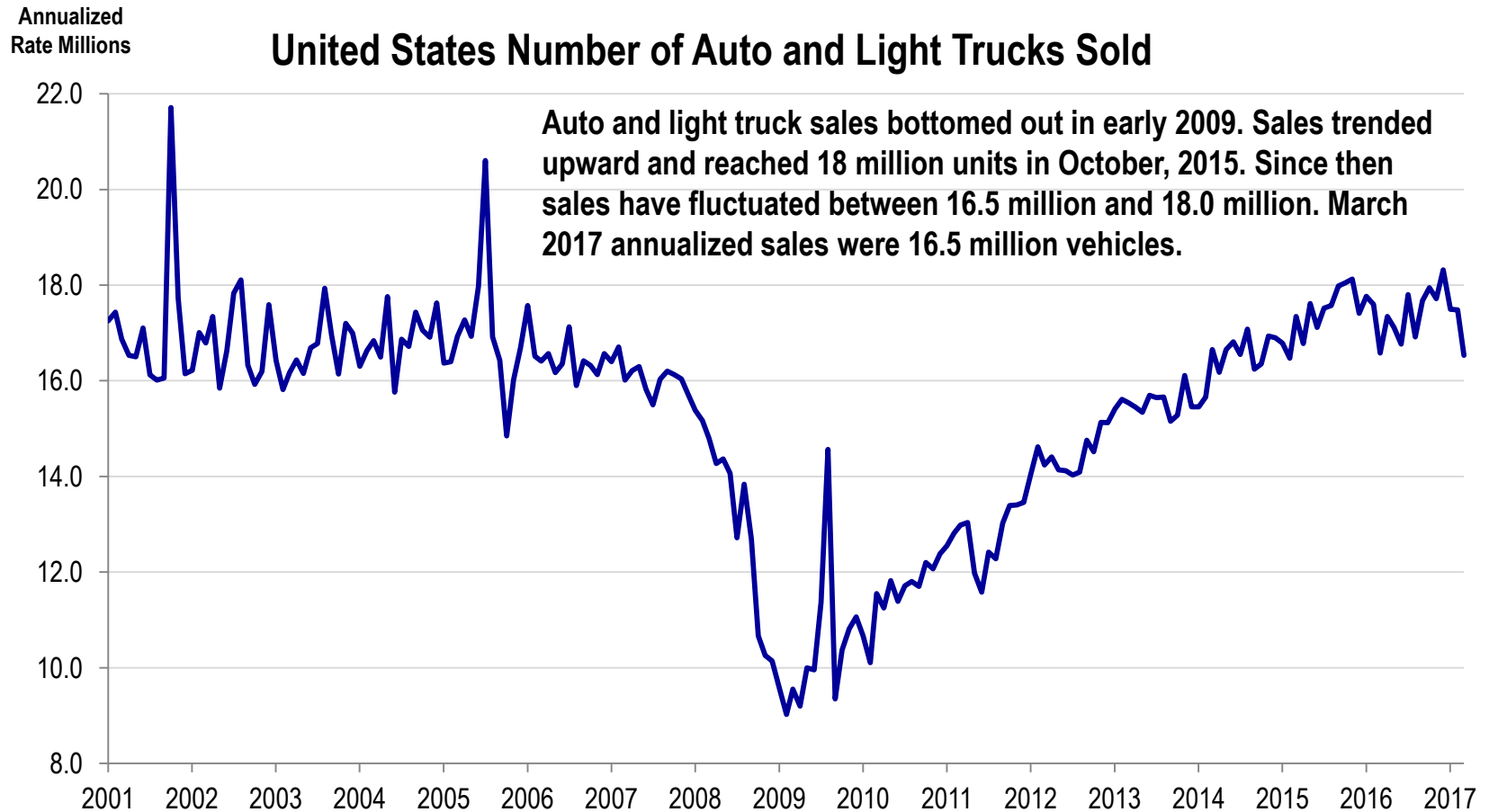
Annualized Rate Millions

United States Number of Auto and Light Trucks Sold

Auto and light truck sales bottomed out in early 2009. Sales trended upward and reached 18 million units in October, 2015. Since then sales have fluctuated between 16.5 million and 18.0 million. March 2017 annualized sales were 16.5 million vehicles.

Purchasing Managers and Consumers

Mostly Good News in These Areas

- Manufacturers are optimistic.
- Non-manufacturers are optimistic.
- Y-O-Y retail sales are up; M-O-M retail sales are flat.
- Auto sales fell off – one month.
- Consumers are spending – maybe not as much as we want, but they are spending.

21

The U.S. Economy

Summary

The Global and U.S. Economies in 2017
Factors that Will Affect the U.S. and Colorado Economies

1. Improved global economy (real GDP growth), 2.9%. Brexit will be a topic of discussion in 2017.

2. Stronger real GDP growth for the U.S., 2.1% to 2.5% (2017) vs. 1.6% (2016).

3. Nationally, 1.9 million to 2.1 million jobs will be added.

4. Good news - the Fed is optimistic about the economy. Bad news (for some) - interest rates will we raised.

5. The Fed says inflation will be near their target , 2.0 to 2.5%.

6. Personal consumption will be solid in 2017. Light truck and auto sales will be solid, but down slightly.

7. Purchasing managers are optimistic about the future.

8. The price of oil is about $50 per barrel.

9. The dollar with continue to be strong, which will be bad for exports.

10. Debt will continue to be a concern.

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2017 will be a year of extremes – both good and bad.

In the short-term, there is more upside potential than downside risk.

There is a much smaller pool of potential workers!

The Colorado Economy

The Colorado Economy
Population, Unemployment, Employment
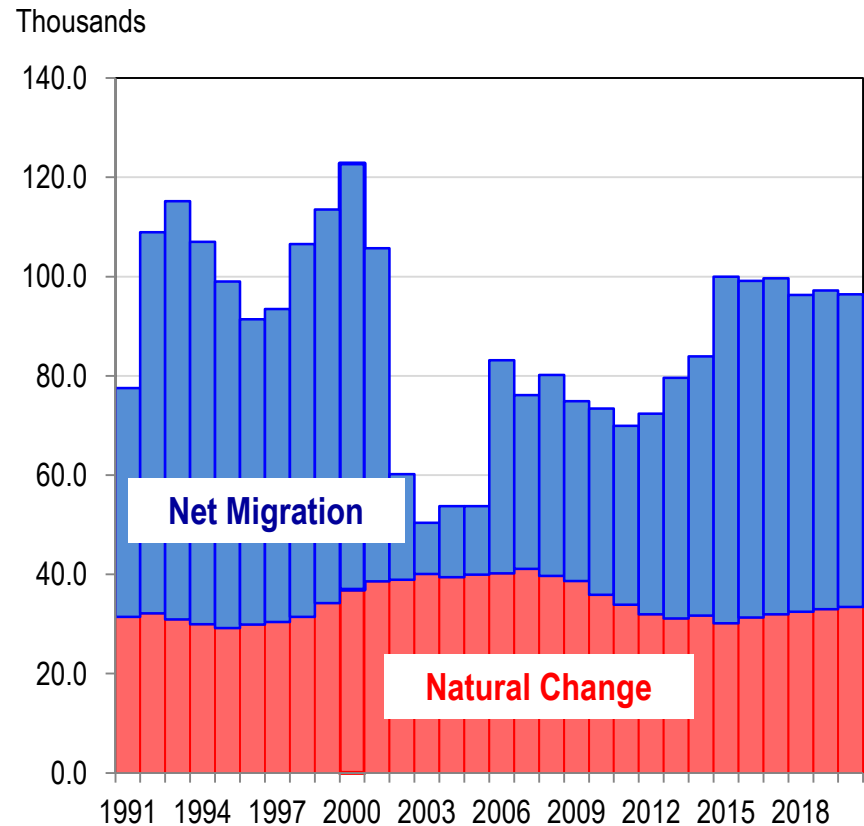
Colorado Population
Components of Change

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. In both cases, it was difficult for people to move anywhere to escape the downturn.

The Colorado population will increase by about 100,000 in through 2020. In 2017 the state's population will increase by 1.8% to 5.655,405.

Change in Colorado Population 1991 - 2020

Unemployment Rate
United States vs. Colorado

United States vs. Colorado Unemployment Rate

Percent

The natural rate of unemployment is an academic concept. It is reached when the labor market is in equilibrium. In most cases this rate is between 4.5% and 5.5%. At rates above and below this level, the economy operates inefficiently – for different reasons.

U.S. Unemployment Rate

The March unemployment rate for the U.S. was 4.5% and the rate for Colorado was 2.6%.

Colorado Unemployment Rate

Natural Rate of Unemployment

Since 2001 Colorado's unemployment rate has usually been below the U.S. rate. At present, the Colorado economy is not operating efficiently because of challenges caused by its low rate of unemployment.

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

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Unemployment by MSA
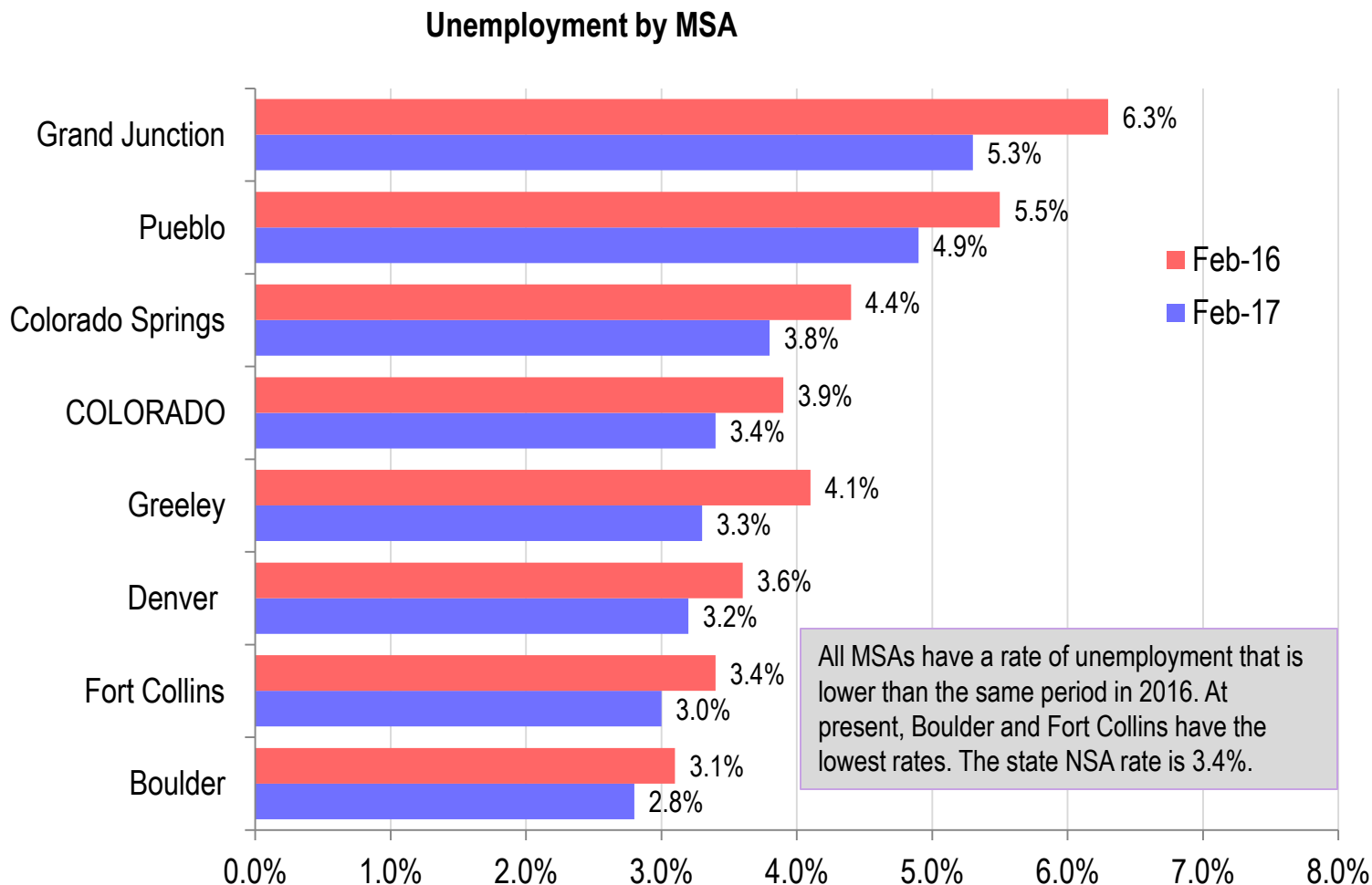## 2016 vs. 2017

Unemployment by MSA

MSA	Feb-16	Feb-17
Grand Junction	6.3%	5.3%
Pueblo	5.5%	4.9%
Colorado Springs	4.4%	3.8%
COLORADO	3.9%	3.4%
Greeley	4.1%	3.3%
Denver	3.6%	3.2%
Fort Collins	3.4%	3.0%
Boulder	3.1%	2.8%

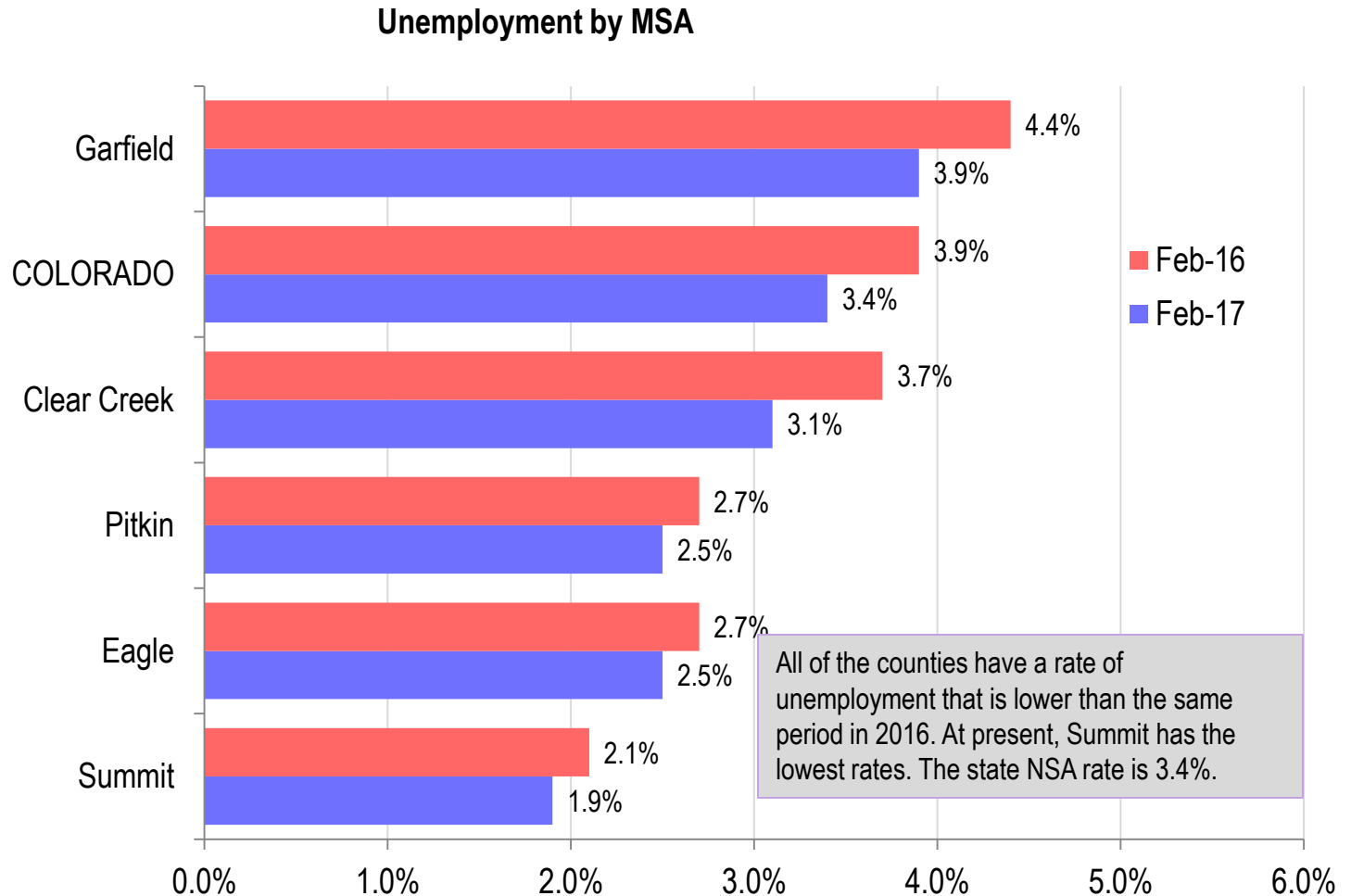All MSAs have a rate of unemployment that is lower than the same period in 2016. At present, Boulder and Fort Collins have the lowest rates. The state NSA rate is 3.4%.

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.

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Unemployment by County (I-70)
2016 vs. 2017

Unemployment by MSA

County	Feb-16	Feb-17
Garfield	4.4%	3.9%
COLORADO	3.9%	3.4%
Clear Creek	3.7%	3.1%
Pitkin	2.7%	2.5%
Eagle	2.7%	2.5%
Summit	2.1%	1.9%

All of the counties have a rate of unemployment that is lower than the same period in 2016. At present, Summit has the lowest rates. The state NSA rate is 3.4%.

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.
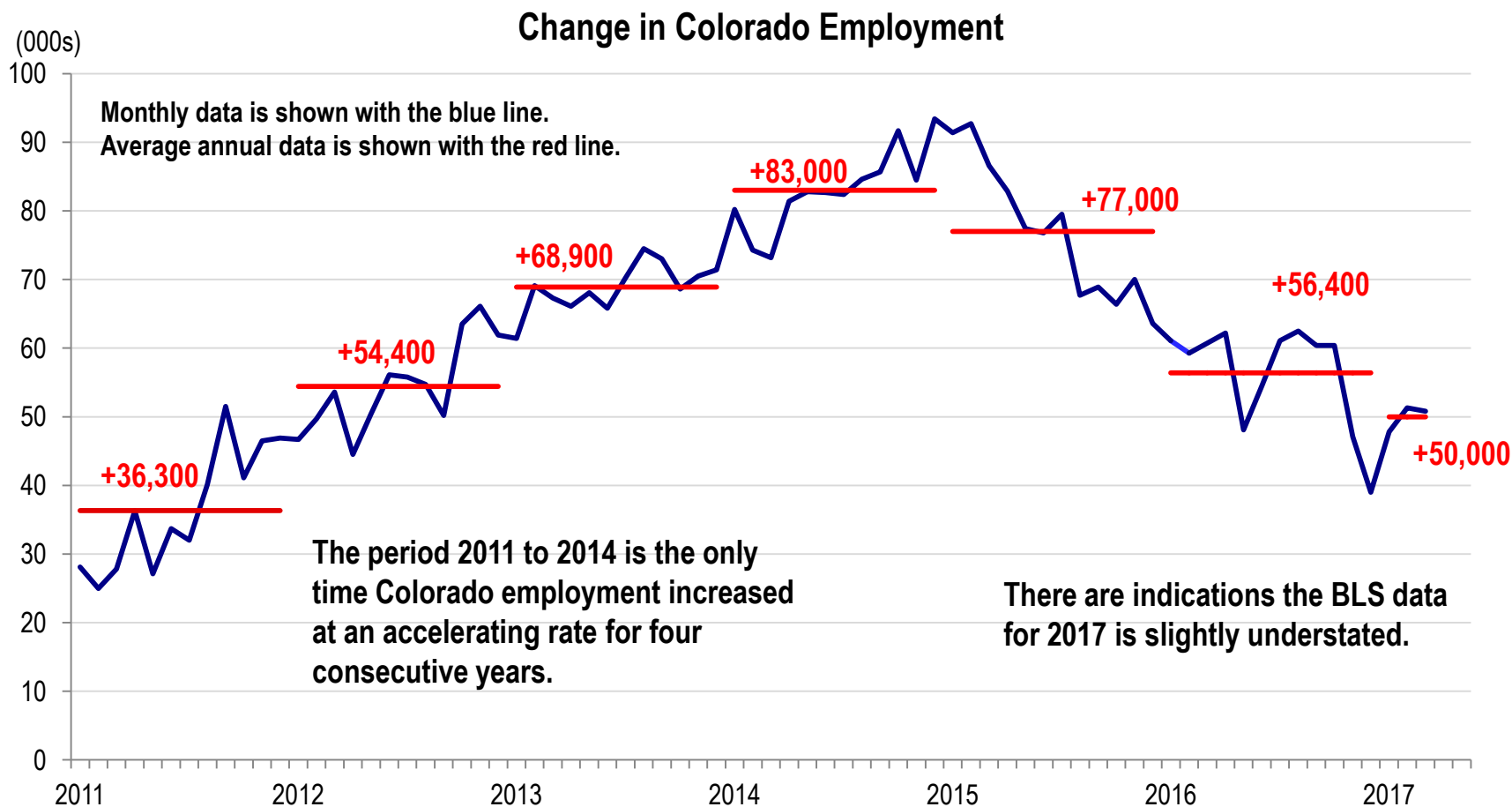
29

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Change in Colorado Employment Year-Over-Year

Change in Colorado Employment

(000s)

Monthly data is shown with the blue line.
Average annual data is shown with the red line.

+36,300
+54,400
+68,900
+83,000
+77,000
+56,400
+50,000

The period 2011 to 2014 is the only time Colorado employment increased at an accelerating rate for four consecutive years.

There are indications the BLS data for 2017 is slightly understated.

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

Colorado Economy
Employment in Strong Growth, Solid Growth, Volatile Categories

Colorado Economic Forecast
Sector Portfolio Analysis

Attempt to Improve Forecast Accuracy

The primary focus of most state economic forecasts is to project total employment.

Some economists also produce sector forecasts. They usually add projections for the sectors to derive the state total, an approach that introduces more variables for error.

cber.co feels the most accurate forecast is achieved by projecting total employment based on projections for categories of sectors. Sectors are grouped into three categories based on their past performance.

Projections for the categories and overall employment are based on trends, feedback from business leaders, economic developers, and other economists. The sum of these categories are then compared to the projections for overall total employment. Minor adjustments are made and the final forecast is produced for three scenarios. The most likely scenario is used as the final cber.co forecast. This final step helps create a better understanding of upside and downside risk.

Strong Growth, Solid Growth, and Volatile Categories

This portfolio approach has made it easy to see that some sectors consistently create jobs at a higher rate of growth, some show solid growth, and others are more volatile. Ultimately, the volatile category tends to have a greater influence on the amount of change in <u>total</u> job growth than the sectors with steady growth.

From 2012 through 2015 cber.co evaluated the performance of 23 sectors over the past two decades and refined the manner in which the sectors are grouped. 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. In this short period that 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 and when changes might occur.

Overview of Job Growth by Category
Strong, Solid, Volatile

Strong Growth Category – 23,600 jobs added, 2.8% growth rate.

- **This category continues to post <u>solid-to-strong job growth</u>,**
- **The health care sector is posting solid-to-strong job growth.**
- **The PST sector is recording solid job growth.**

Solid Growth Category – 20,200 jobs added, 2.0% growth rate

- **Job growth is <u>modest;</u> however, fewer jobs will be added than in 2016.**
- **Job growth in the AFS sector is experiencing <u>strong</u> job growth.**
- **Jobs in the retail trade sector are being added at a <u>modest</u> pace, albeit at a slower rate than in the past.**

Volatile Growth Category – 6,100 jobs added 0.8% growth rate

- **Job growth in this category is <u>weak</u>.**
- **Currently, <u>jobs will be lost</u> in the extractive industries and manufacturing.**
- **Currently, <u>weak job growth</u> in on tap for construction and financial activities.**

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
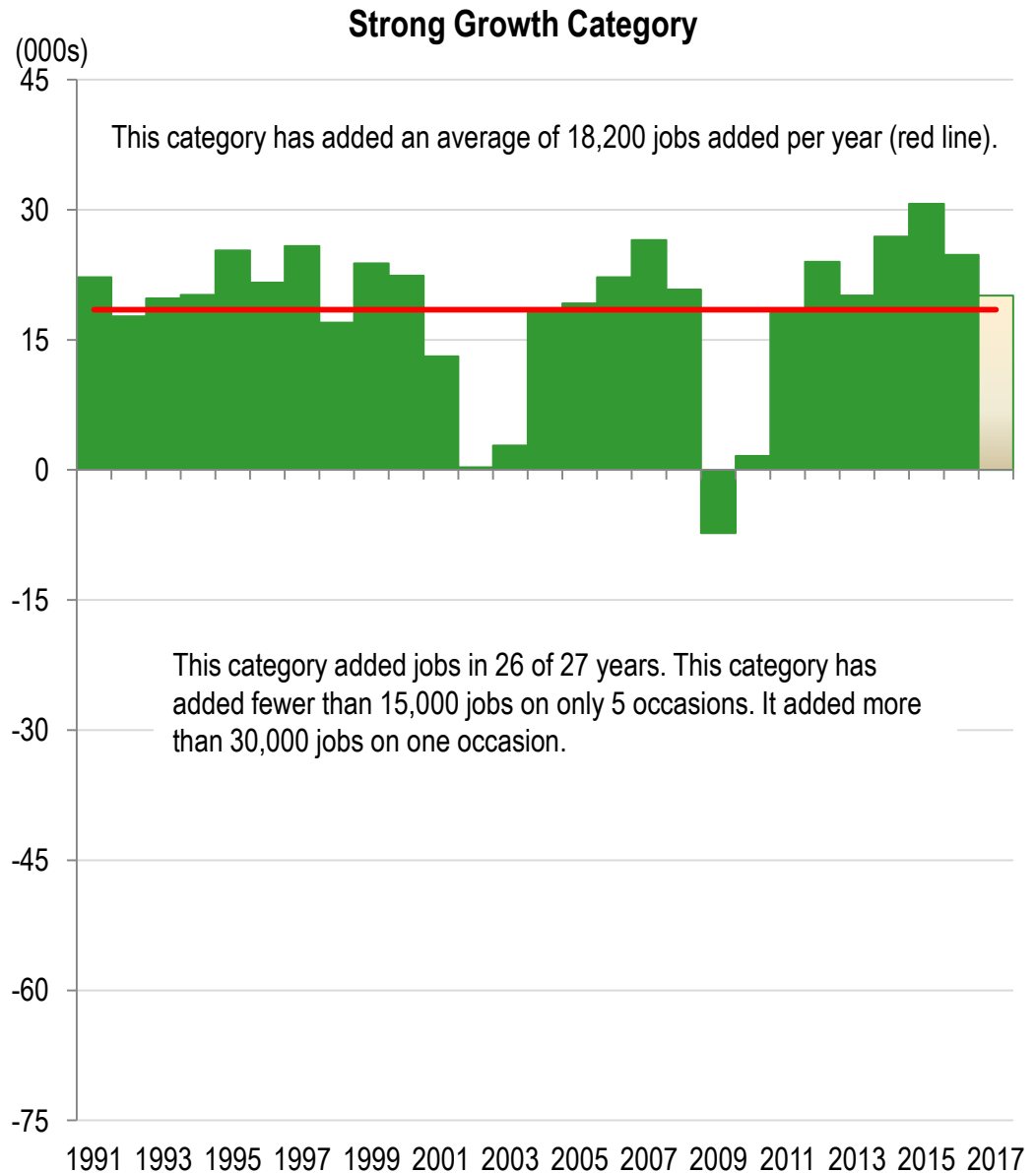- Arts, Entertainment, and Recreation
- Other Services.

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.

Strong Growth Category

(000s)

This category has added an average of 18,200 jobs added per year (red line).

This category added jobs in 26 of 27 years. This category has added fewer than 15,000 jobs on only 5 occasions. It added more than 30,000 jobs on one occasion.

Source: Bureau of Labor Statistics, cber.co.

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34

Average Change in Employment for the First Quarter of 2017
Strong Growth Category

- This category of sectors added 23,600 jobs compared to the same period last year. The rate of change in this category is 2.8%.

- The health care sector led job growth, followed by the PST sector.

- In 2017, this category is expected to account for 33.3% of total job gains and 32.3% of total employees.
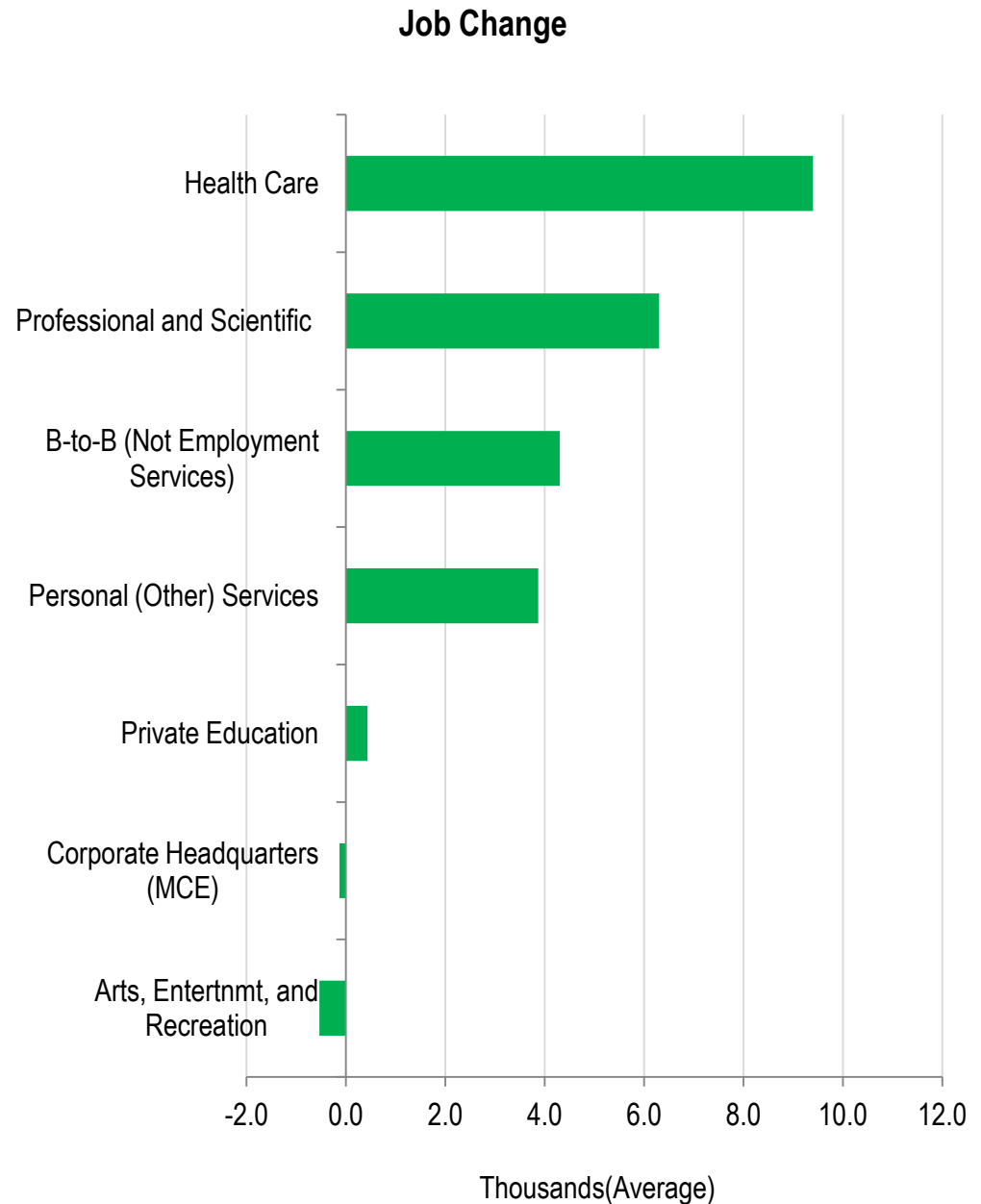
Job Change

Horizontal bar chart titled "Job Change" with x-axis "Thousands(Average)" ranging from -2.0 to 12.0:
- Health Care: ~9.4
- Professional and Scientific: ~6.3
- B-to-B (Not Employment Services): ~4.3
- Personal (Other) Services: ~3.8
- Private Education: ~0.5
- Corporate Headquarters (MCE): ~-0.1
- Arts, Entertnmt, and Recreation: ~-0.5

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.

Solid Growth Category

(000s)

This category added an average of 16,100 jobs added each year (red line).

This category added jobs in 24 of 27 years. This category has added fewer than 15,000 jobs on 7 occasions. It has only added above 30,000 jobs once.

36

Average Change in Employment for the First Quarter of 2017 Solid Growth Category

- This category of sectors added 20,200 jobs compared to the same period last year. The rate of change in this category is 2.0%.

- The leisure and hospitality sector (AFS + AER) has had a strong year.

- Retail trade has also posted modest job gains as a result of population and job growth. In addition, Colorado has enjoyed another solid winter tourism season.

- In 2017, this category is expected to account for 41.7% of total job gains and 39.3% of total employees.

Source: Bureau of Labor Statistics, cber.co.

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Job Change

Thousands(Average)

37

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.

Volatile Category

(000s)

This category has added an average of 7,800 jobs per year (red line).

This category added jobs in 19 of the 27 years. This category has added fewer than 15,000 jobs on 13 occasions. It has only added above 30,000 jobs on six occasions.

Source: Bureau of Labor Statistics, cber.co.
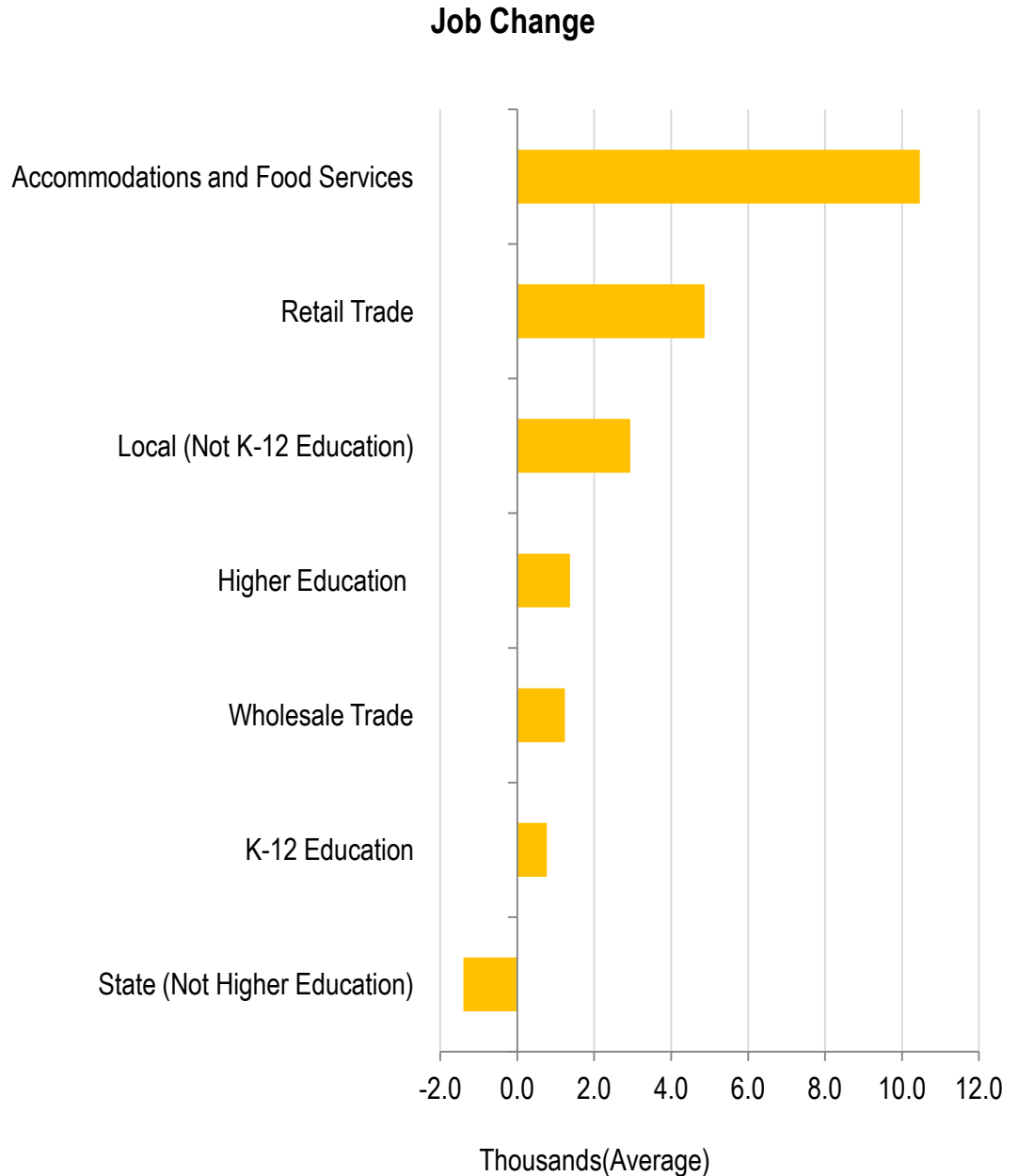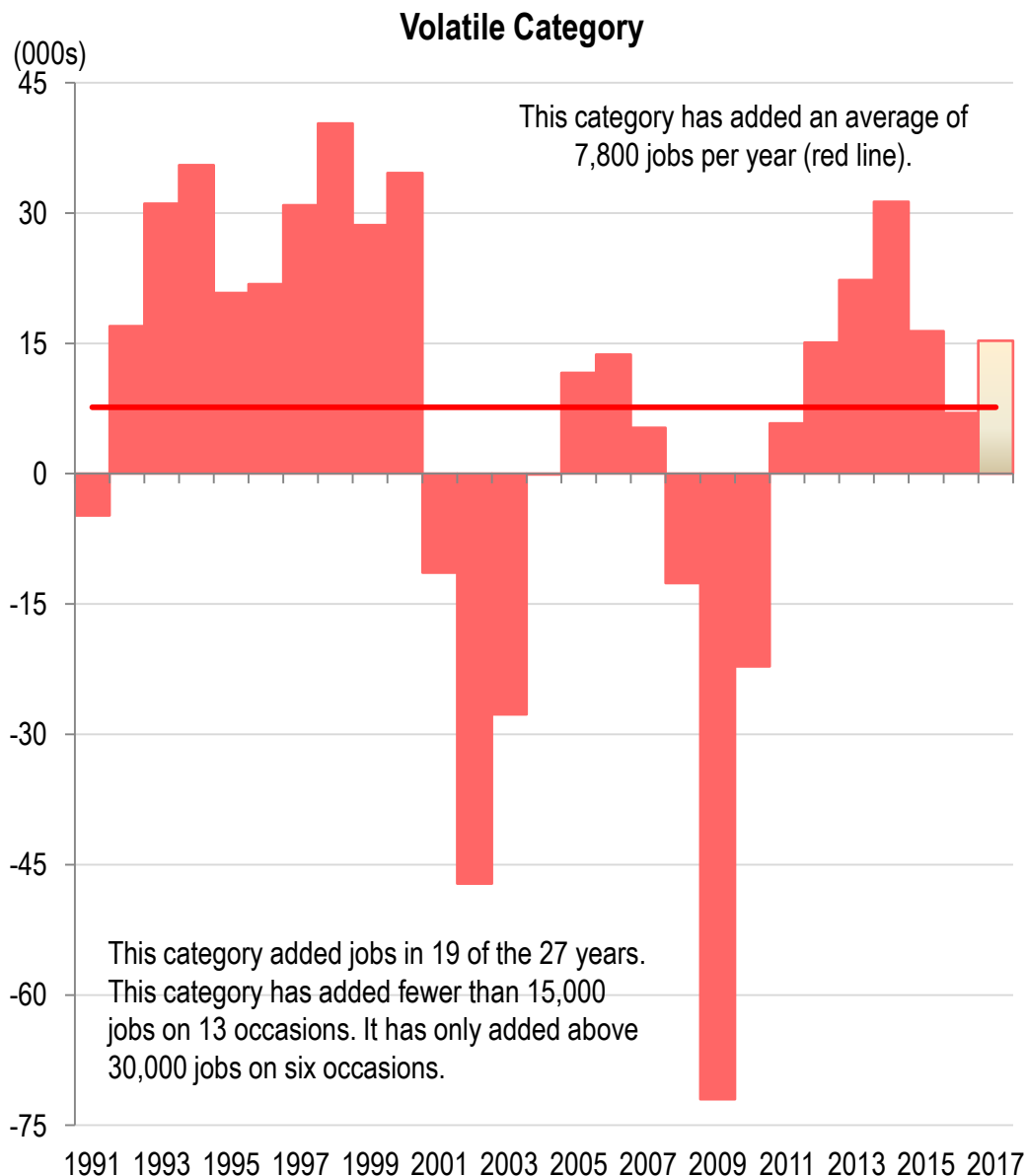
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Average Change in Employment for the First Quarter of 2017 Volatile Growth Category

•This category of sectors added 6,100 jobs compared to the same period last year. The rate of growth for this category is 0.8%.

•For this period, financial activities, TWU, and construction led job growth. Information, employment services, manufacturing, and the extractive industries are areas of concern.

•It was thought the job losses in the extractive industries had subsided - obviously not.

•In 2017, this category is expected to account for 25.0% of total job gains and 28.5% of total employees.

Job Change

Thousands(Average)
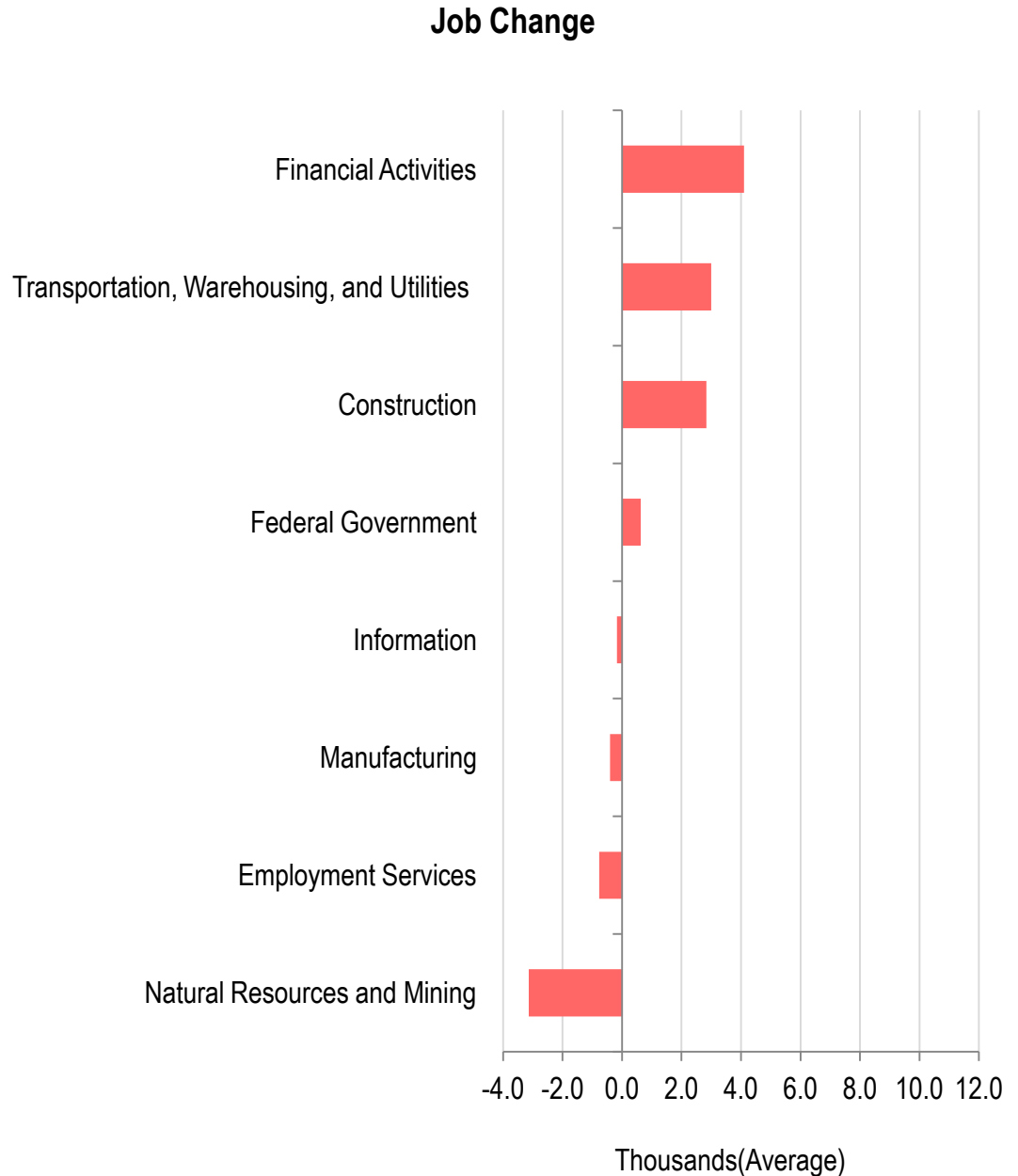
The Colorado Economy
Questions About the Economy

Questions About the Economy
Strong Growth, Solid Growth, and Volatile Categories

Strong Growth Category

- How will the strong growth category prevent a recession?

Solid Growth Category

- Are too many low- paying jobs being added?

- Are the AFS and retail sectors in a slowdown?

Volatile Category

- Is there reason to worry that the major industries in the volatile category (financial activities, manufacturing, construction, extractive industries) are not producing more jobs?

- How has employment in financial activities fared during the recovery?

- How is construction faring in Colorado?

- Given the number of job losses over the past 17 years, is manufacturing still important to Colorado?

- Are the extractive industries still losing jobs?

Question #1
How will the Strong Growth Category Prevent a Recession?

As its name suggests, the sectors in this category have demonstrated strong and consistent job growth over time. These sectors are the foundation of the economy. As long as the category adds more than 15,000 jobs per year, the state will not slip into a recession.

- This category has added jobs in 26 of 27 years. It has added fewer than 15,000 jobs on only 5 occasions. It added more than 30,000 jobs on one occasion.
- For the six years, 2011 to 2016, it has added an average of 24,200 jobs per year, with a range of 18,400 to 30,700.
- In 2017, employment in this category will increase by at least 2.8%, or 23,600 jobs. Strong growth jobs will account for 47.2% of the jobs added in 2017.

- By contrast solid growth jobs will be added at a rate of 2.0%, while volatile jobs will increase at a rate of 0.8%.
- Projected 2017 HCSA job growth is less than the past three years; however, it is the fourth strongest year of job growth since 1991.
- Together, the HCSA and PST sectors will add 15,600 jobs or 31.2% of the total for 2017.

Change in Employment
Strong Growth Category

Change in Employment

(000s)

The strong growth category is on track to add 23,600 jobs in 2017, an increase of 2.8%.

Source: Bureau of Labor Statistics, cber.co.

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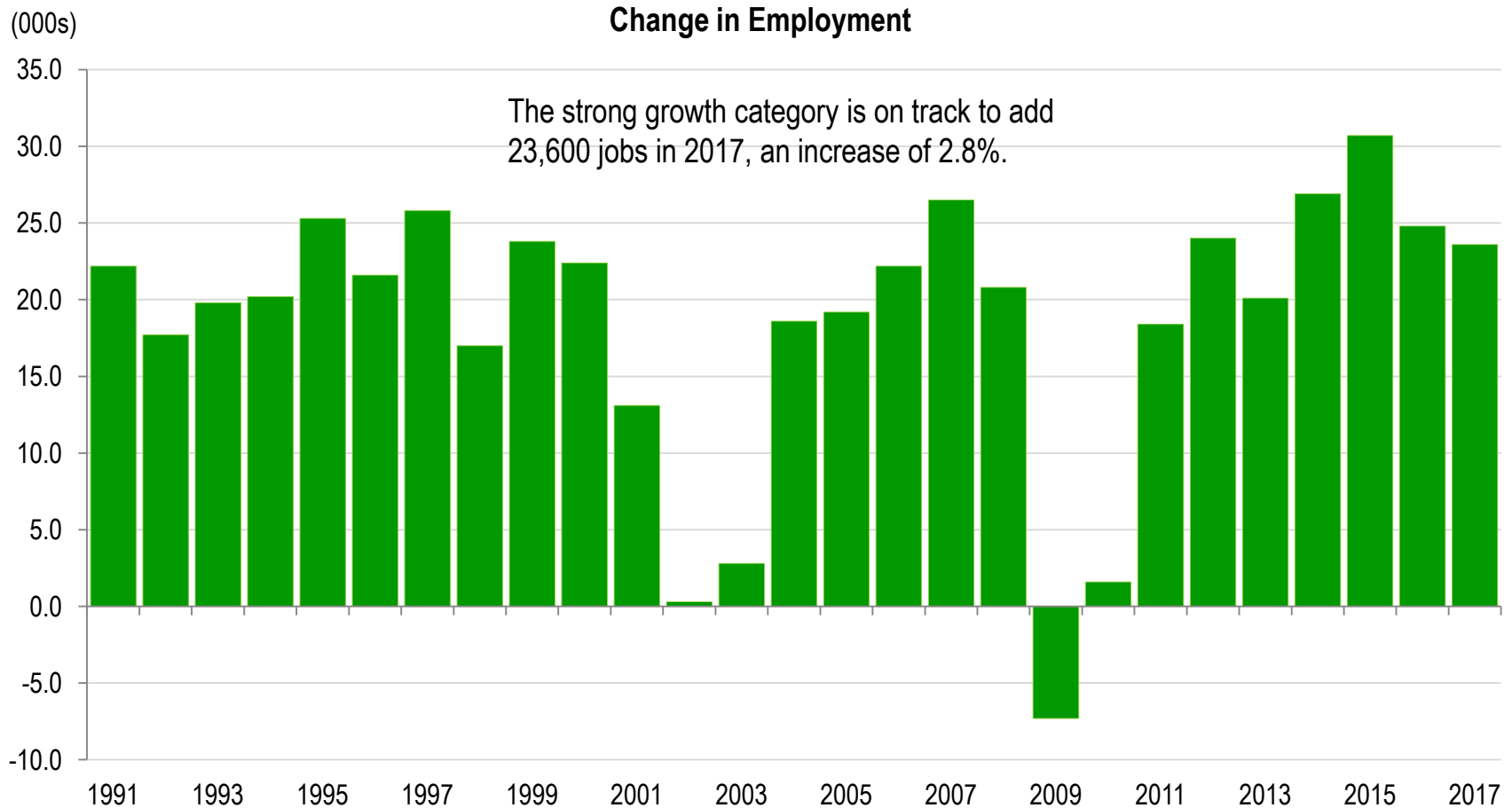
Change in Employment
Health Care and Social Assistance
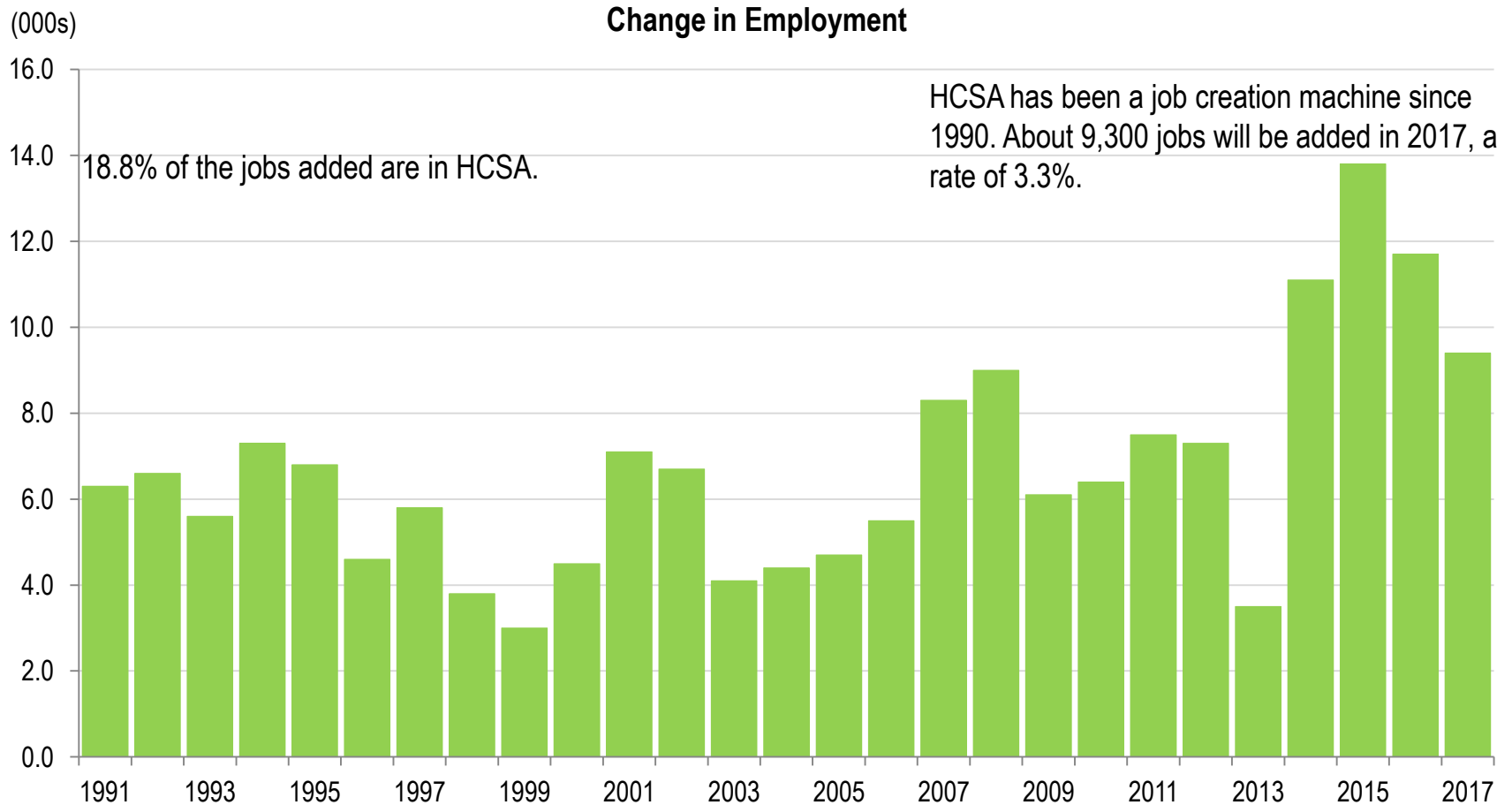
Change in Employment

(000s)

18.8% of the jobs added are in HCSA.

HCSA has been a job creation machine since 1990. About 9,300 jobs will be added in 2017, a rate of 3.3%.

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Change in Employment
Professional, Scientific, and Technical Services

Change in Employment

(000s)

12.6% of the jobs added are in PST.

PST has been an important source of job creation in the recovery. About 6,300 jobs will be added in 2017, a rate of 3.0%.

Source: Bureau of Labor Statistics, cber.co.

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

45
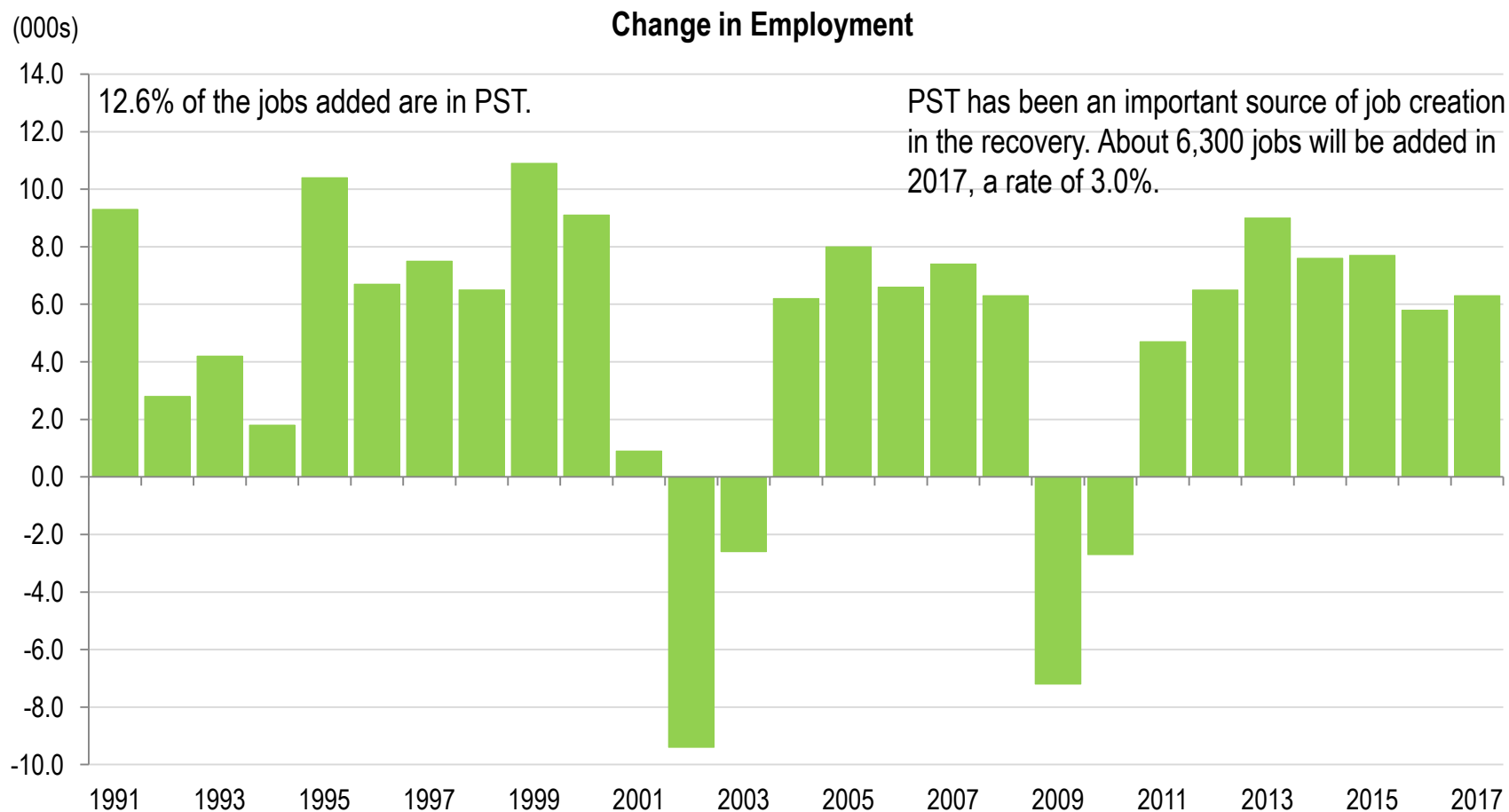
Question #2

Are too many low-paying jobs being added?

The good news is the economy is adding jobs for people with a variety of skills.

- When primary jobs are added they support between 0.5 and 2.5 lower paying jobs. This is called the multiplier effect. It stands to reason that a number of lower paying jobs are being added.

- Jobs are not always added evenly, especially when an economy is in a period of expansion.

- The two largest sectors to add jobs in the solid growth category are AFS and retail trade. Average annual wages for both sectors are lower than the state average.

- Average annual wages (QCEW 2015) for Colorado
    - All industries $54,182.
    - Retail trade $30,072
    - Accommodations and food services $20,375.

- In 2017, these two sectors are on track to add at total of 15,400 jobs That is about 31% of the total jobs added.

Change in Employment
Solid Growth Category

Change in Employment

(000s)

The Solid Growth category is on track to add 20,200 jobs in 2017, an increase of 2.0%.

Source: Bureau of Labor Statistics, cber.co.
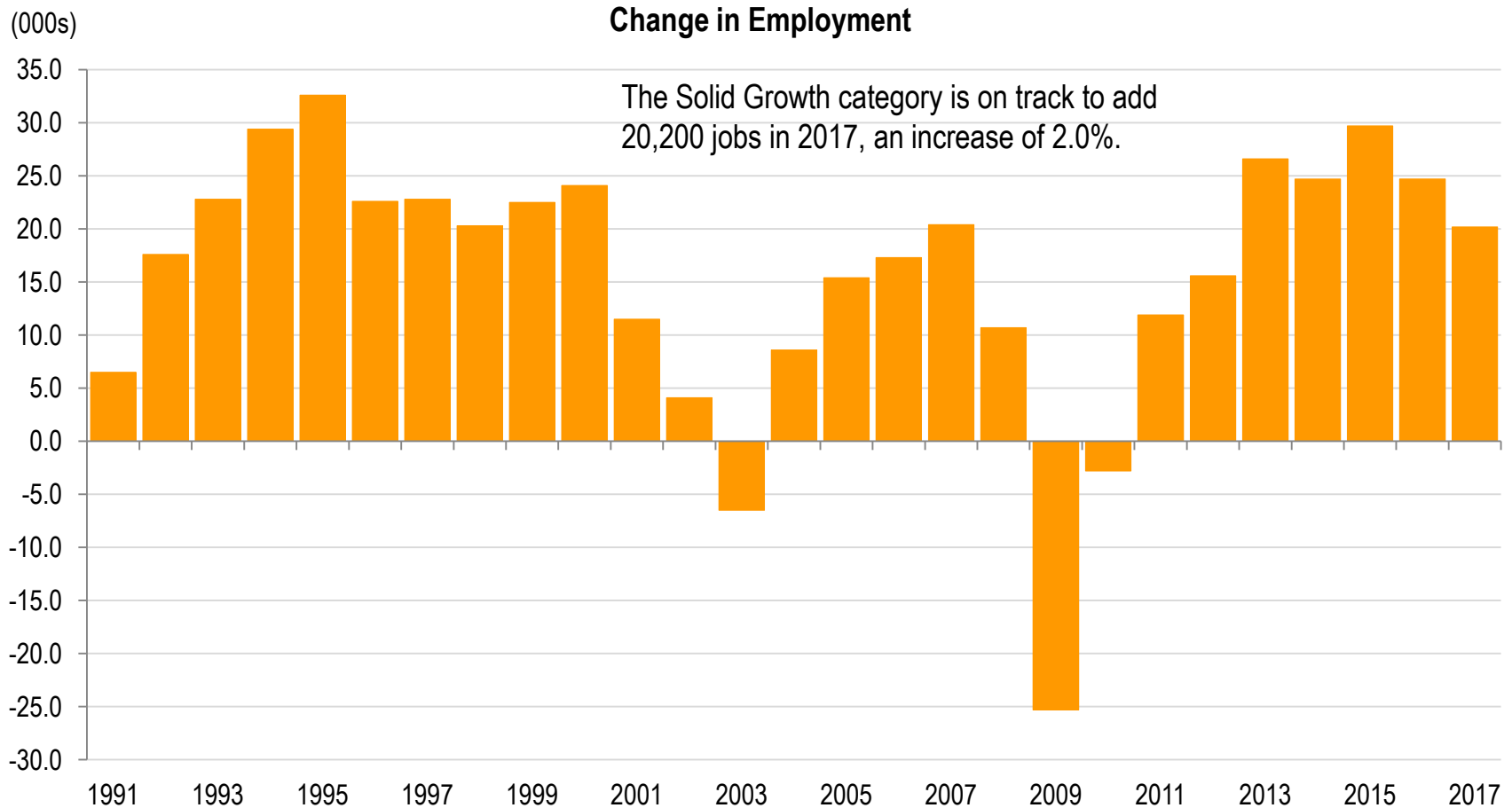
Colorado-based Business and Economic Research http://cber.co

Question #3

Are the AFS and retail sectors in a slowdown?

In the short-term the changes in these sectors appear to be part of the normal business cycle.

Accommodations and Food Services (AFS)

- About 10,500 accommodations and food service jobs will be added in 2017. Jobs are being added at a rate of 4.0% - strong growth.
- If businesses within the AFS sector do not provide quality service they go out of business quickly. Competition is stiff.
- There is continued construction of hotel rooms across the state. From a long-term perspective, this is an indicator that developers think Colorado will continue to be a place to visit and conduct business.
- The change in the number of AFS establishments has paralleled the growth of private sector establishments.

Retail Trade

- The state is on track to add 4,900 retail jobs in 2017. That is lower than each of the four previous years; however, it is still modest-to-solid growth.
- Major retail chains have struggled within the past five years. Sports Authority is a prime example. Retail stores are forced to adapt to the changing needs of customers quickly – or go out of business. The current struggles reflect companies who did not adapt and companies trying to adapt so they can stay in business.
- The number of Colorado retail business establishments decreased from 2007 to 2011; they were flat from 2011 to 2014. There has been a slight increase since 2015.
- A good indicator of personal consumption is the sale of new and used cars. In 2016, used car sales topped new car sales. Both used car and new car sales are expected to show modest growth in 2017.

Change in Employment
Accommodations and Food Services Category

Change in Employment

(000s)

AFS category is on track to add 10,500 jobs in 2017, an increase of 4.0%.

21.0% of the jobs added are in AFS.

Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research http://cber.co
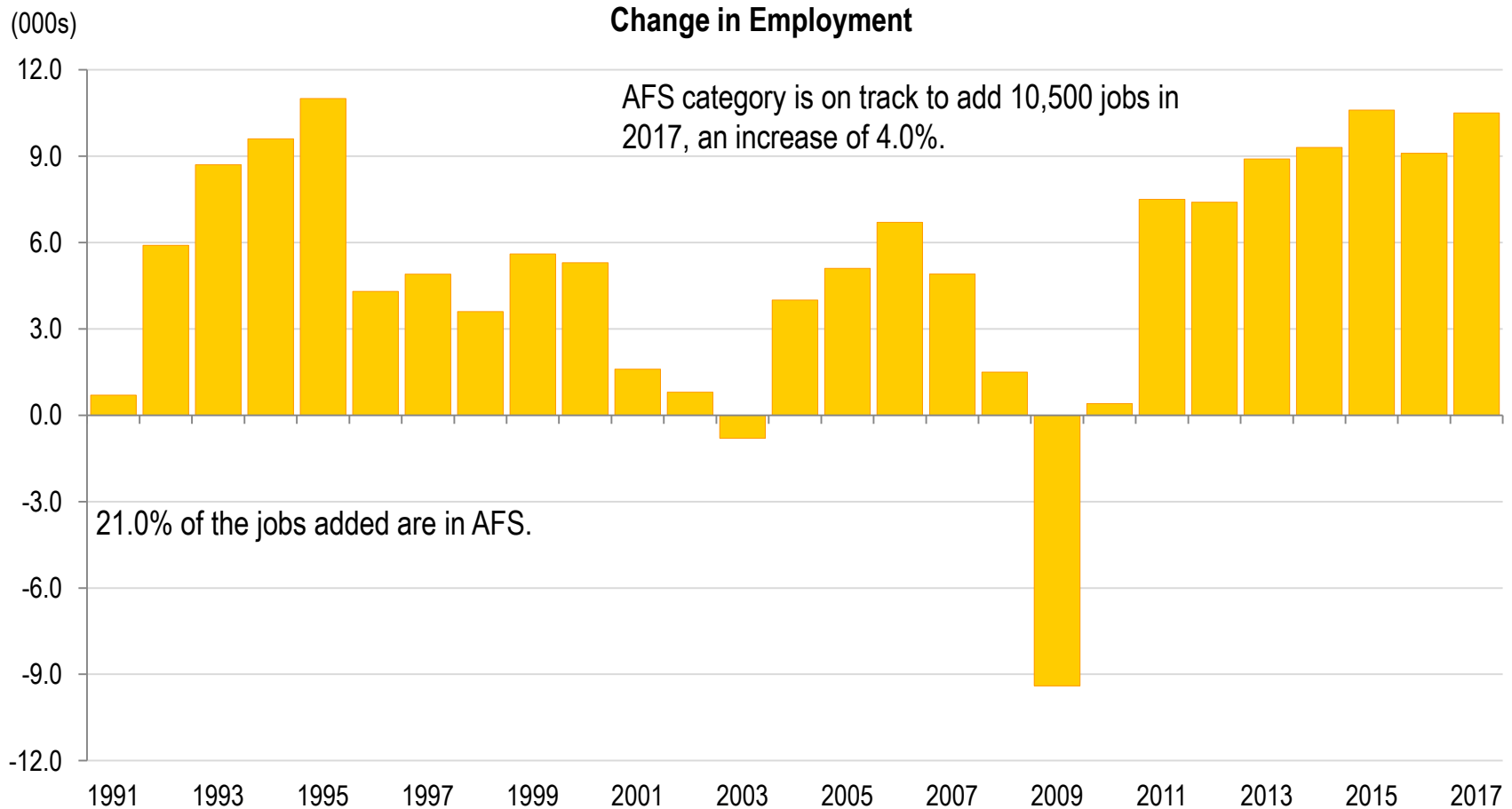
Change in Employment
Retail Trade Category

Change in Employment

(000s)

The retail trade category is on track to add 4,900 jobs in 2017, an increase of 1.8%.

9.8% of the jobs added are in Retail Trade.

Source: Bureau of Labor Statistics, cber.co.

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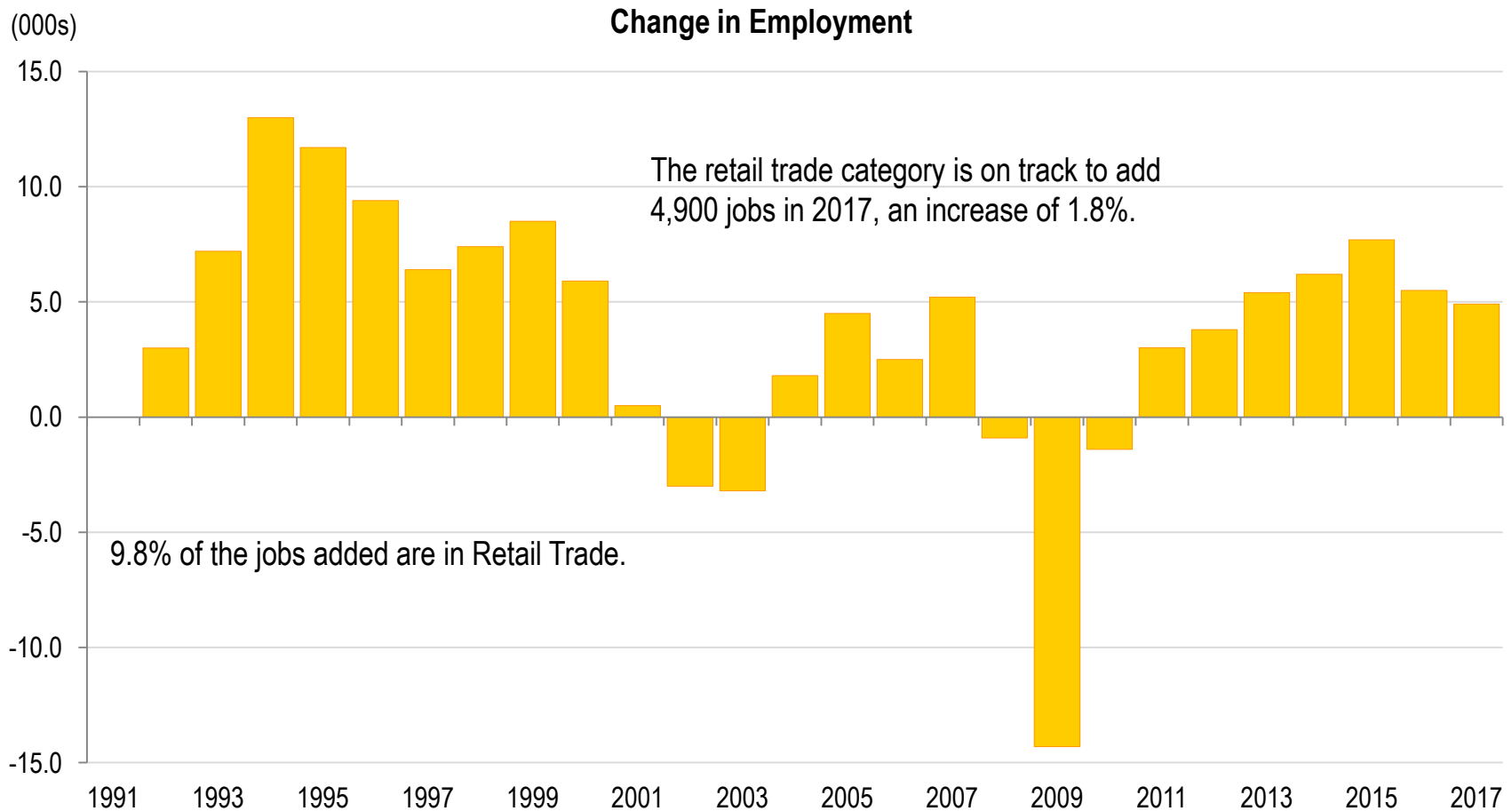
Colorado-based Business and Economic Research http://cber.co

Index of Colorado Establishments
Private Sector, Retail Trade, AFS

2001=100

Index of Number of Private Establishments

# of Establishments Q3 2016
Total 190,100
Retail 17,808
AFS 13,186

# of Establishments 2001
Total 151,025
Retail 18,104
AFS 10,621

— Total All Industries (Private)
— Retail Trade
— Accommodations and Food Services
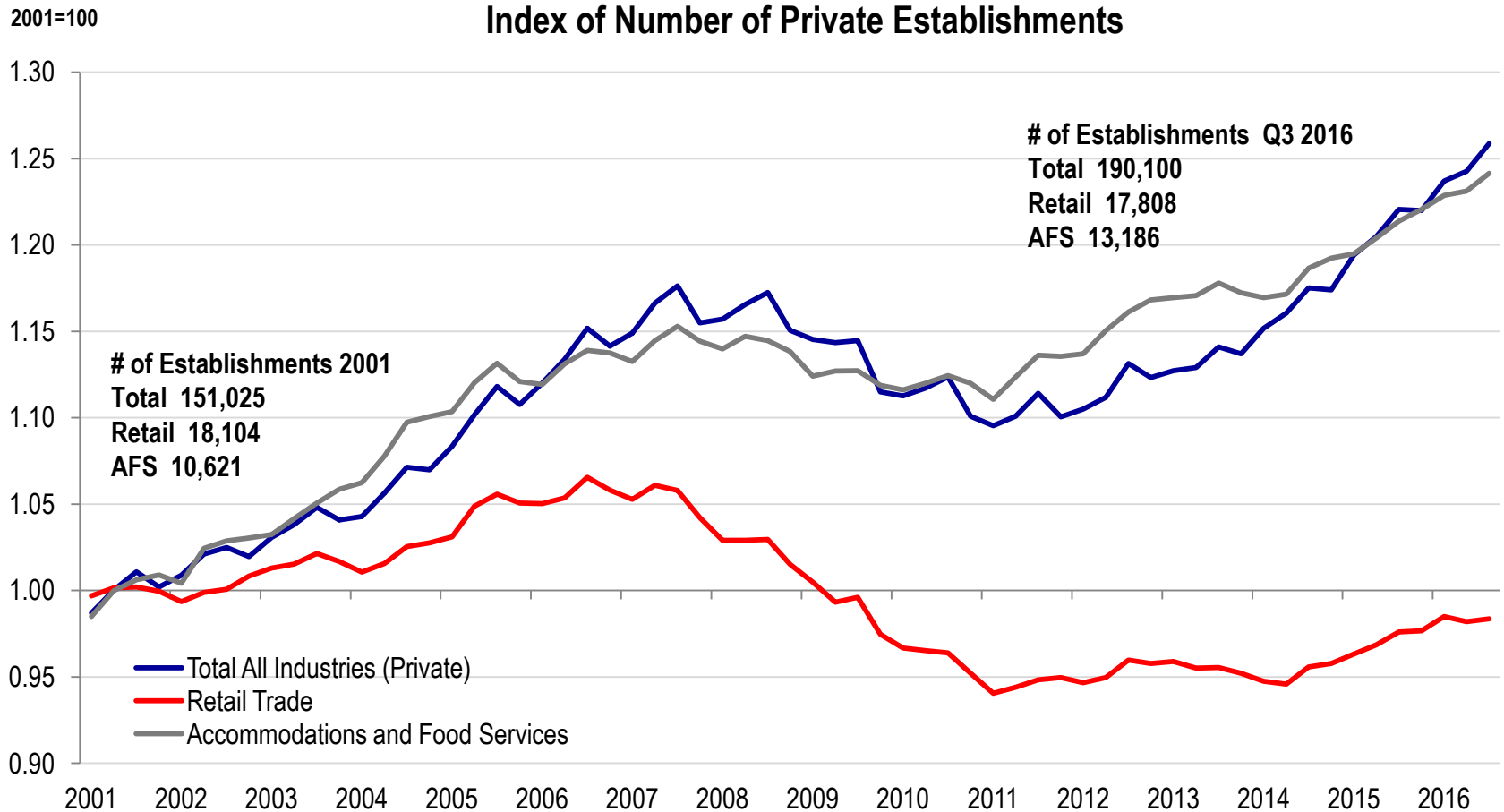
Colorado-based Business and Economic Research http://cber.co

Colorado New and Used Vehicle Registrations

New vs. Used Vehicle Registrations

Registrations

The number of new and used vehicles registered is a good indicator of personal consumption. The number of new vehicles registered will increase by at least 2.2% in 2017.

■ New Vehicles
■ Used Vehicles

The number of new and used vehicle registrations has increased since the end of the recession. Between 2009 and 2013, used vehicle registrations (red) were more prevalent than new vehicle registrations (blue). That trend reversed for 2014 and 2015. About 420,000 new and used vehicles will be registered in 2017.

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |

Source: Colorado Auto Dealers Association, cber.co.

Question #4

Is there reason to worry that the major industries in the volatile category (financial activities, manufacturing, construction, extractive industries) are not producing more jobs?

No. These sectors are in the volatile category because they are more random in the way they add and lose jobs, i.e. the change in employment for these sectors does not necessarily fit the normal business cycle. Questions and comments about each sector are addressed prior to their employment chart.

Change in Employment
Volatile Growth Category

Change in Employment

(000s)

The volatile growth category is on track to add 6,100 jobs in 2017, an increase of 0.8%.

Source: Bureau of Labor Statistics, cber.co.
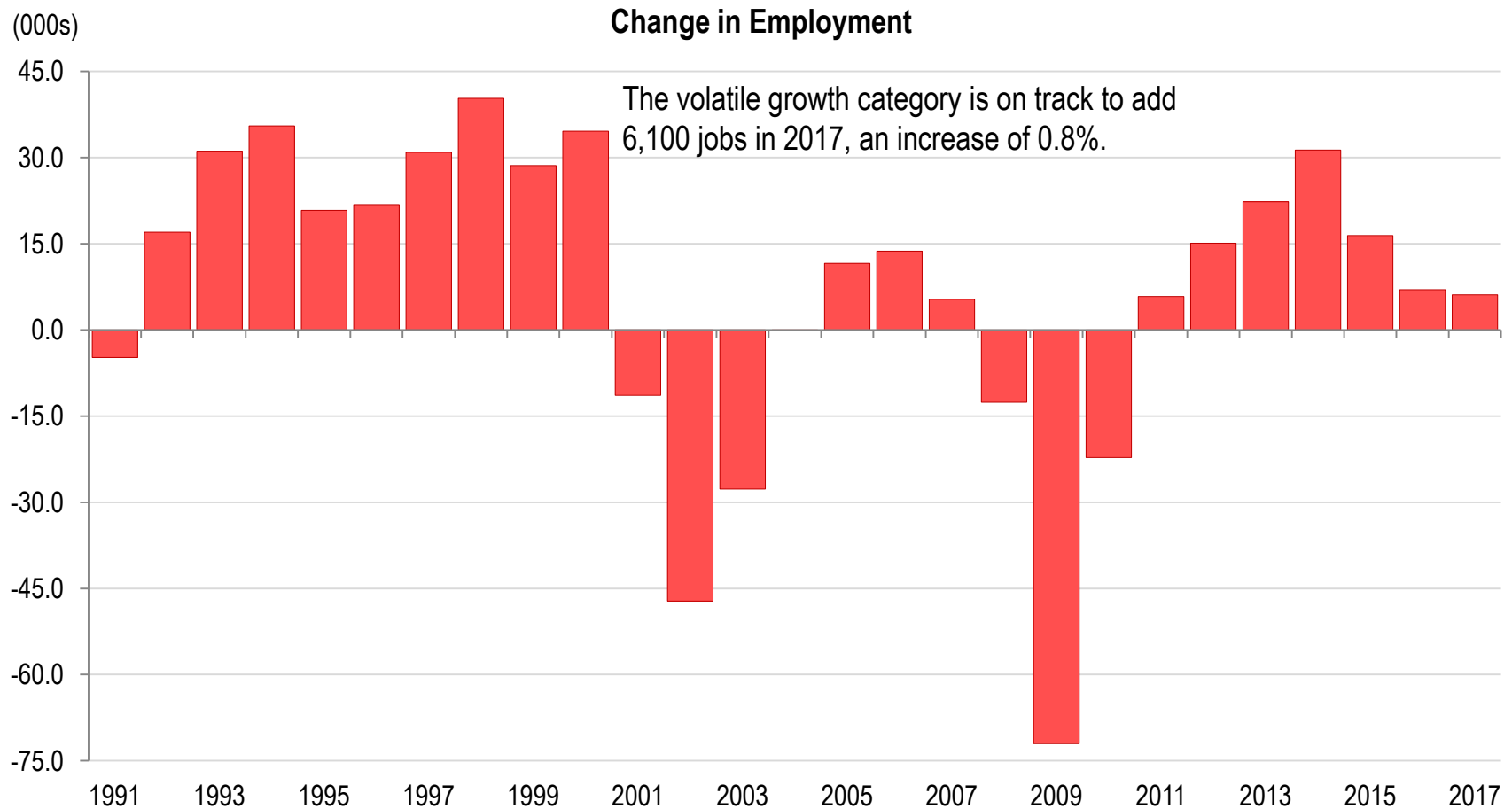
Colorado-based Business and Economic Research http://cber.co

Question #5

How has employment in financial activities fared during the recovery?

In the thirteen years from 2000 to 2012, the net change in employment for the financial sector was -700 jobs. From 2013 to 2017, the recovery has been solid.

- The sector has experienced job changes resulting from increases and decreases in interest rates, booms and busts in the housing market, and the addition and closure of industry call centers.

- The strong and rapid appreciation in housing prices continues to be a blessing and a curse to Denver and most of Colorado.

- As the Fed raises interest rates, the housing market will be impacted, which in turn may cause a reduction in employment in the sector.

Change in Employment
Financial Activities

Change in Employment

(000s)

The Financial Activities category is on track to add 4,100 jobs in 2017, an increase of 2.5%.

8.2% of the jobs added are in Financial Activities.

Source: Bureau of Labor Statistics, cber.co.
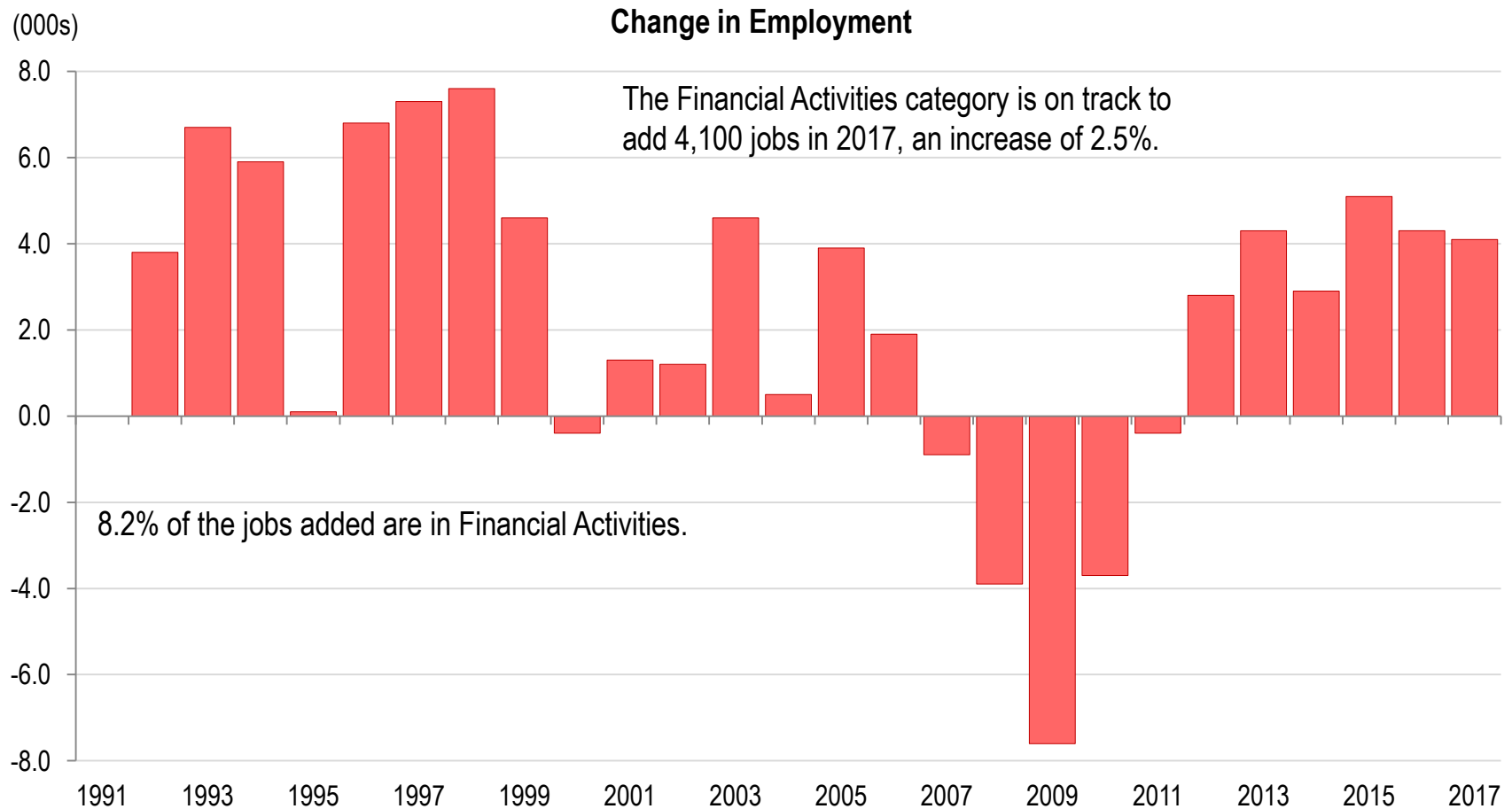
Colorado-based Business and Economic Research http://cber.co

Case Shiller Home Price Index
National vs. Denver (Colorado)

S&P CoreLogic Case Shiller Home Price Index
U.S. (National) vs. Denver (Colorado)

Q1 2000=100

Denver (gray) did not experience the boom and the bust of the housing bubble of the 2000s. Denver prices are currently greater than cities such as Las Vegas (black) and Phoenix (purple) that experienced the boom and the bust.

Legend:
- US - National
- Denver
- Phoenix
- Las Vegas
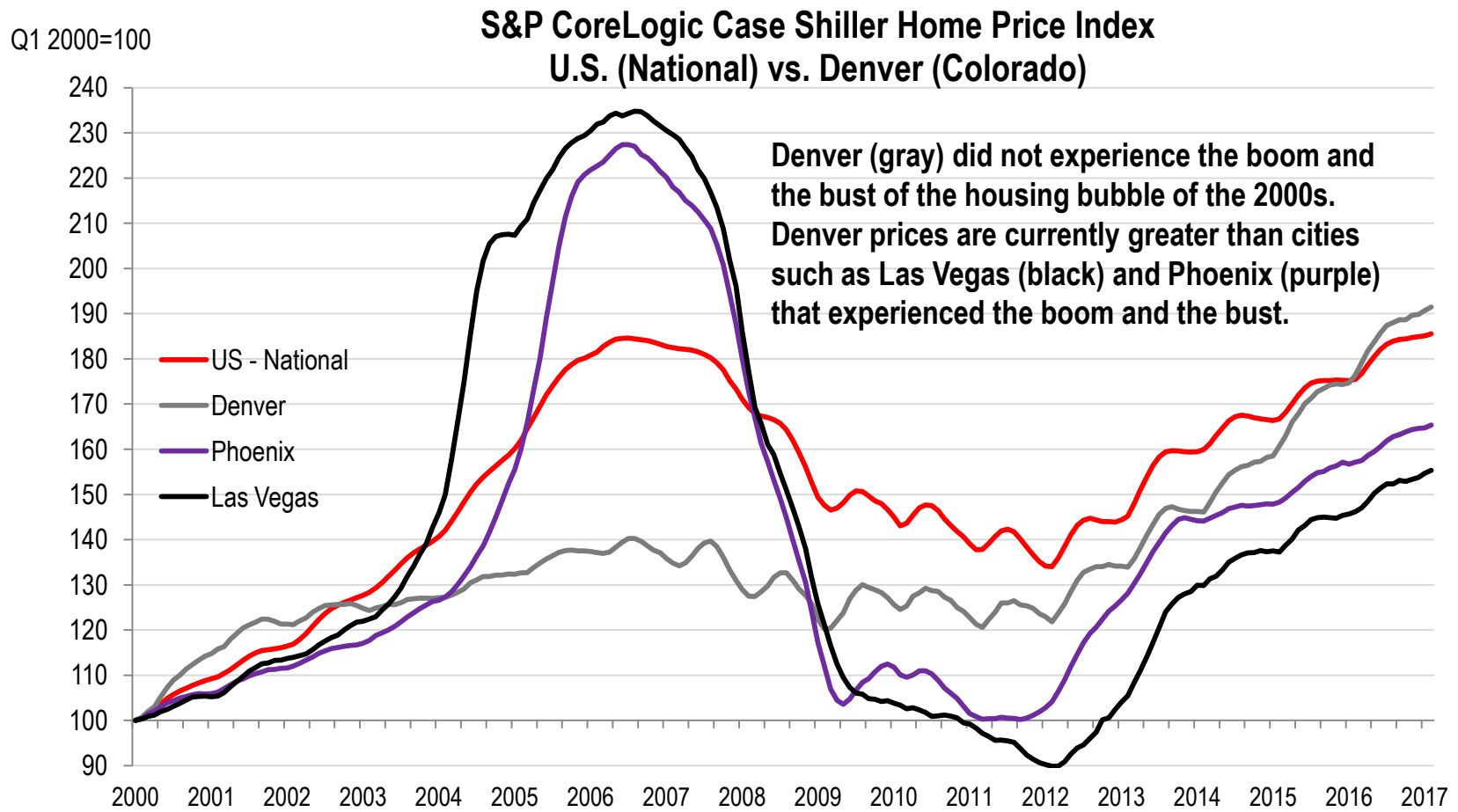
Source: S&P Core-Logic Case-Shiller, cber.co.

FHFA MSA Housing Price Index Changes
Top Ten and Colorado (All Transactions Index, 2016Q4)

FHFA Housing Price Changes (%) in HPI-One Year

MSA	Value
1 Palm Bay-Melbourne-Titusville, FL	13.18
2 Seattle-Bellevue-Everett, WA	11.84
3 Portland-Vancouver-Hillsboro, OR-WA	11.45
4 Tampa-St. Petersburg-Clearwater, FL	11.38
5 Jacksonville, FL	11.33
6 Salem, OR	11.14
7 Deltona-Daytona Beach-Ormond..	10.95
8 Bend-Redmond, OR	10.89
9 Port St. Lucie, FL	10.85
10 Yuba City, CA	10.70
11 Fort Collins, CO	10.48
12 Greeley, CO	10.44
14 Denver-Aurora-Lakewood, CO	10.17
15 Boulder, CO	10.15
51 Colorado Springs, CO	7.64
81 Pueblo, CO	6.40
132 Grand Junction, CO	4.92

> The top ten is dominated by MSAs in Florida, Oregon, Washington, and California. Denver, Boulder, and Northern Colorado are ranked in the top fifteen.

> Boulder, Denver and Northern Colorado are ranked in the top 15.

Source: FHFA, cber.co.

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

FHFA Housing Price Index Changes
Top Ten States(All Transactions Index, 2016Q4)

FHFA Housing Price Changes (%) in HPI (One-Year)

Colorado is ranked #2 behind Oregon. Arizona is #10.

State	Value
1 Oregon	10.98
2 Colorado	10.62
3 Florida	10.4
4 Washington	10.19
5 Nevada	8.95
6 Utah	8.44
7 Montana	8.37
8 Texas	7.69
9 Idaho	7.41
10 Arizona	7.36

Source: FHFA, cber.co.

Colorado-based Business and Economic Research http://cber.co
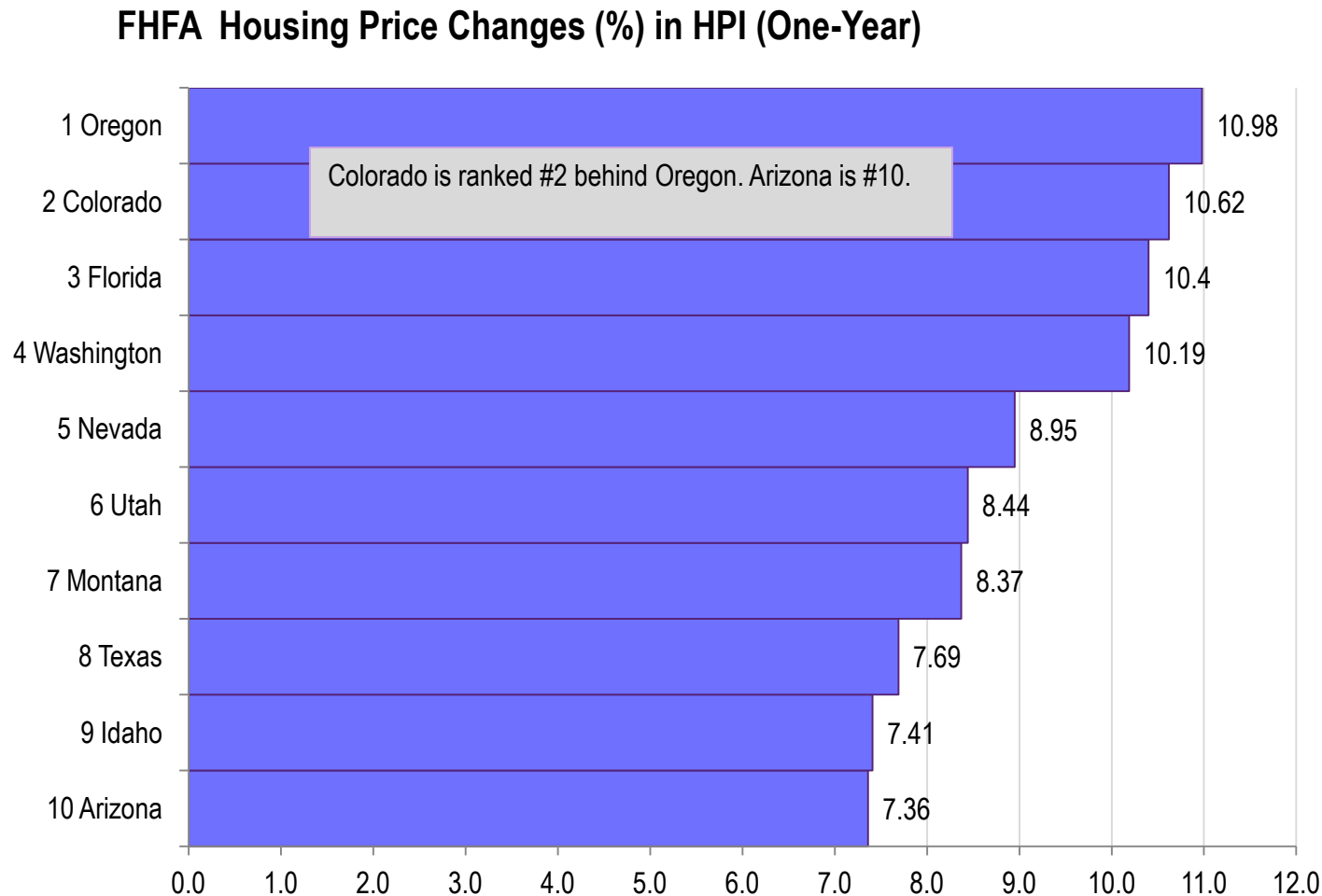
FHFA Housing Price Index Changes
I-70 Mountain Corridor

FHFA Housing Price Index Changes

Q1 2000=100

There was separation in the rate of appreciation between 2004 and 2008. The bubble burst in 2008.

Highest Appreciation Today
Summit
Eagle
Garfield

The rate of appreciation was "similar" - 1990 to 2004.

Least Appreciation
In the Bubble
Colorado (Black)
Clear Creek (Royal)
Summit (Red)

Returned to peak
Colorado
Clear Creek
Summit

Legend:
- Summit
- Eagle
- Garfield
- Colorado
- Clear Creek
- Pitkin

Source: FHFA, cber.co.

Question #6

How is construction faring in Colorado?

- Since 1990, the number of Colorado construction workers has increased at a faster rate than the United States.

- Despite efforts by the Colorado workforce system to train construction workers, there is a shortage of qualified workers.

- The current number of residential construction permits in Colorado is similar to the number of permits during the period 2005 to 2006. It has taken more than ten years to get back to return to the 2006 level of growth.

- It is interesting to compare the mix of single family permits and multifamily permits between the years 2006 and 2017. The current mix includes a much higher percentage of multifamily permits.

Change in Employment
Construction Category

Change in Employment

(000s)

The Construction category is on track to add 2,800 jobs in 2017, an increase of 1.9%. Through Q1, growth is well below expectations.

Source: Bureau of Labor Statistics, cber.co.
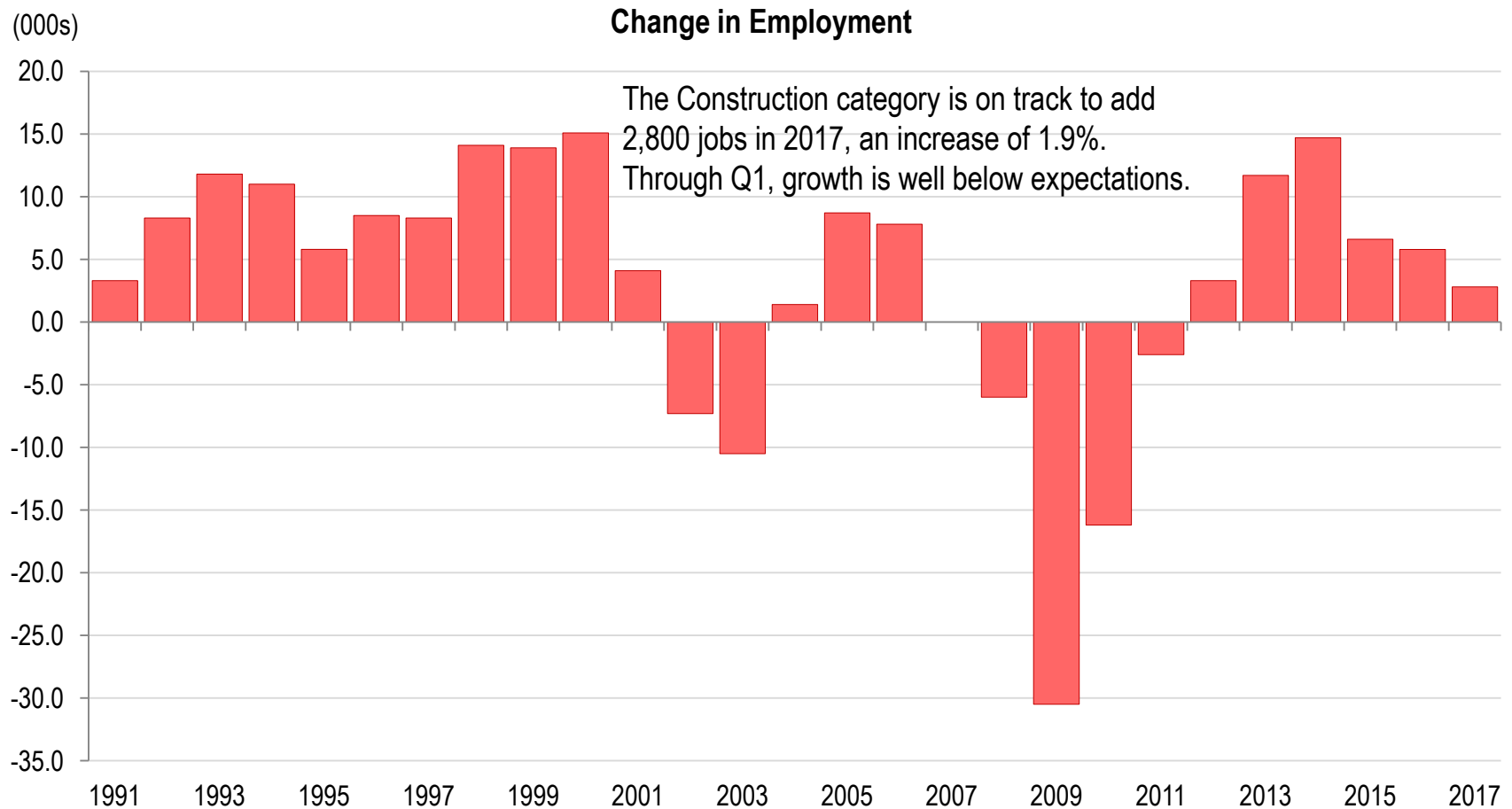
Colorado-based Business and Economic Research http://cber.co

Index of Construction Employment
Colorado vs. United States
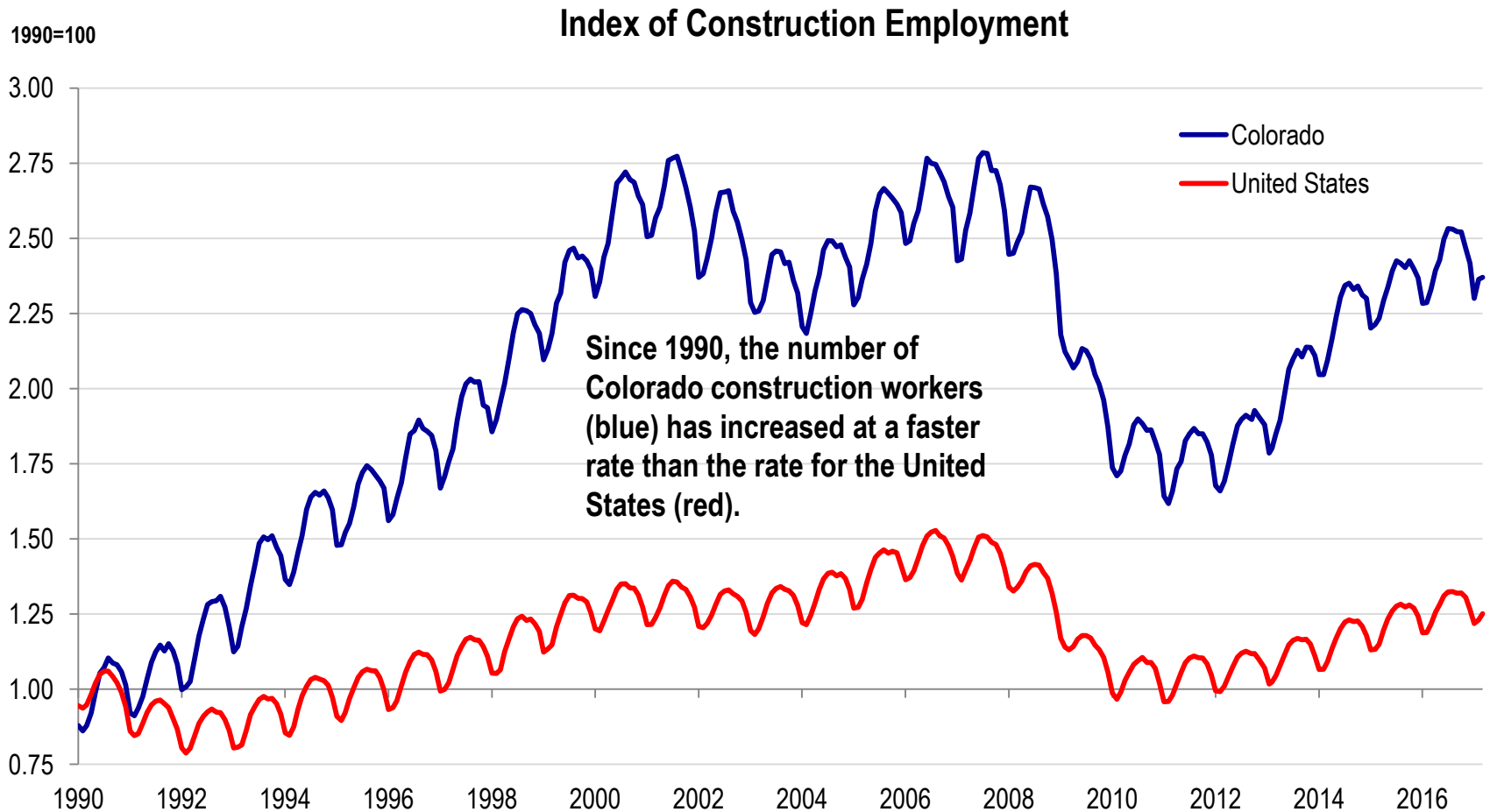
Index of Construction Employment

1990=100

Since 1990, the number of Colorado construction workers (blue) has increased at a faster rate than the rate for the United States (red).

Source: Bureau of Labor Statistics, cber.co.

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

Colorado Residential Building Permits - Units

Colorado Building Permits

Through Q1 2017, the number of single family permits (blue) is up 10.9% and the number of multi-family permits (red) is up 86.7% compared to the same period in 2016. A majority of the multi-family units are for 5+ units.

Number of Permits

■ Multifamily
■ Single Family
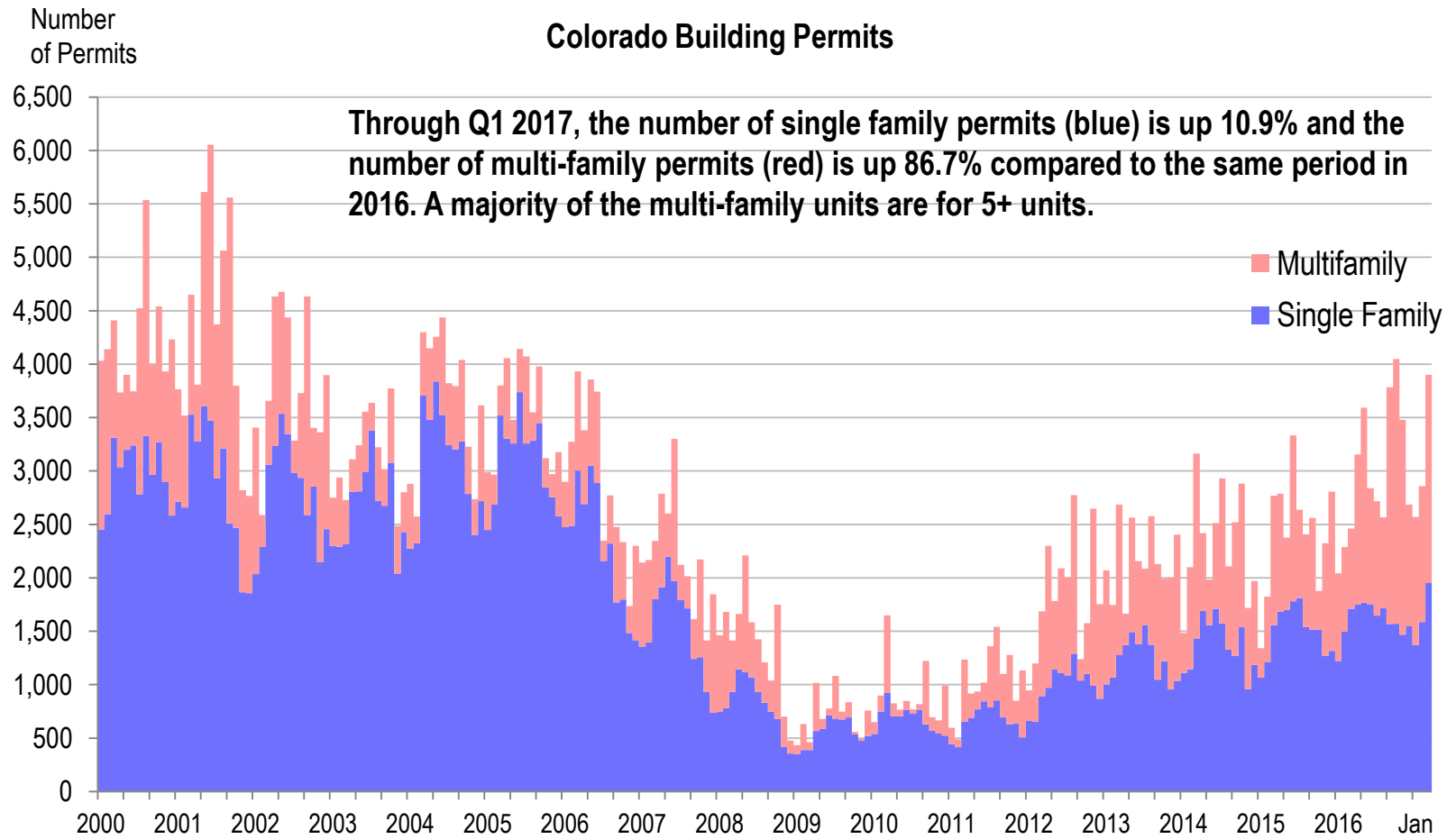
Source: TAMU Real Estate Center, U.S. Census Bureau, cber.co.

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

Colorado Residential Building Permits - Valuation

Colorado Building Permit Valuation

Thousands

Through Q1 2017, the valuation of single family permits (blue) is -2.3% and the change in the valuation for multi-family permits (red) is -15.0% compared to the same period in the previous year.

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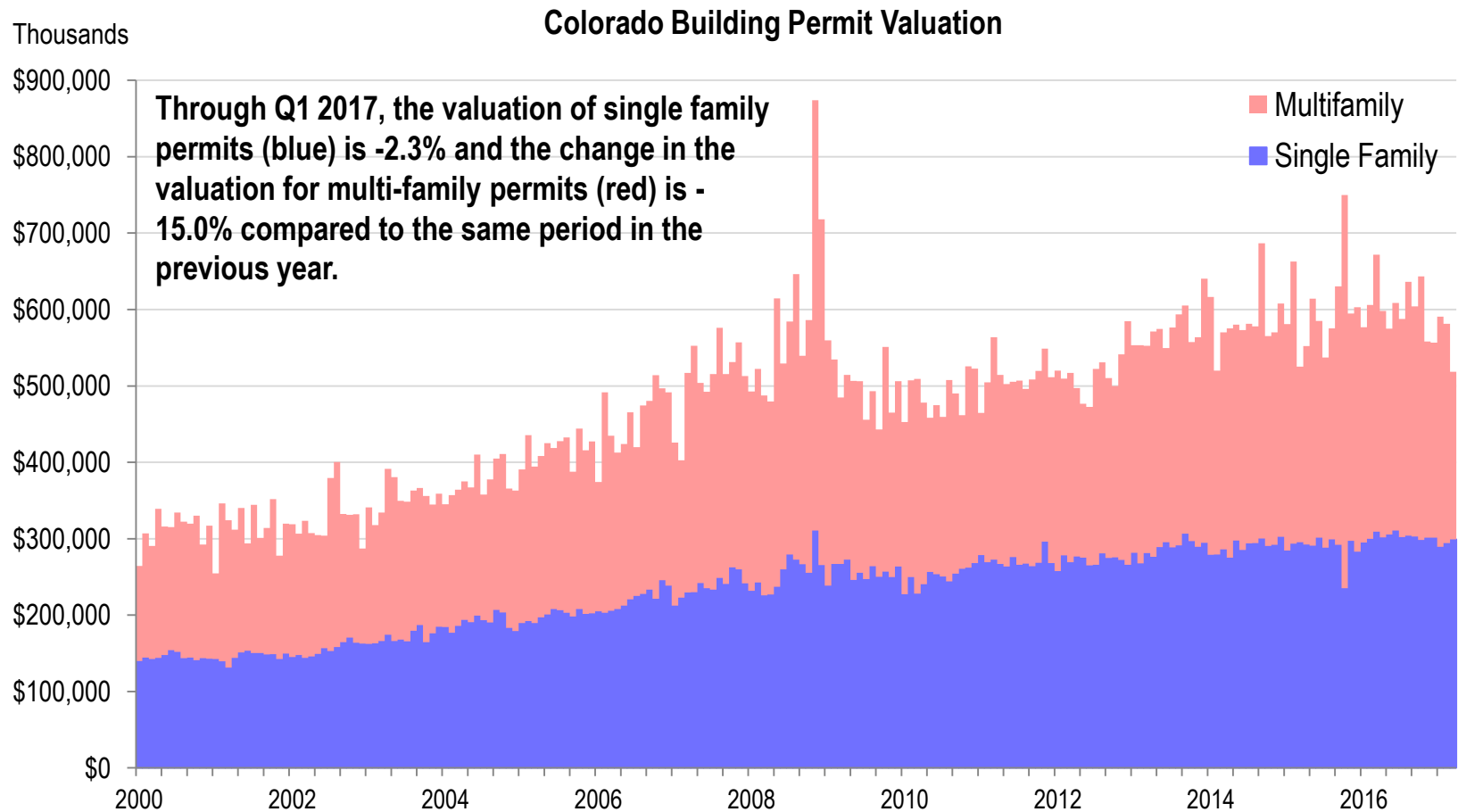
Source: TAMU Real Estate Center, U.S. Census Bureau, cber.co. Note: Not adjusted for inflation.

Question #7

In light of the job losses in manufacturing over the past 17 years, is manufacturing still important to Colorado?

Manufacturing is critical to the Colorado economy for several reasons. Many manufacturers provide primary jobs, i.e. outside money is invested locally to add value to products that are sold outside the state. Many manufacturing jobs pay higher than average wages.

- Colorado is not regarded as a manufacturing state because of its low concentration of manufacturers; however, it has a competitive advantage in sectors such as brewing, aerospace, and value-added agriculture.
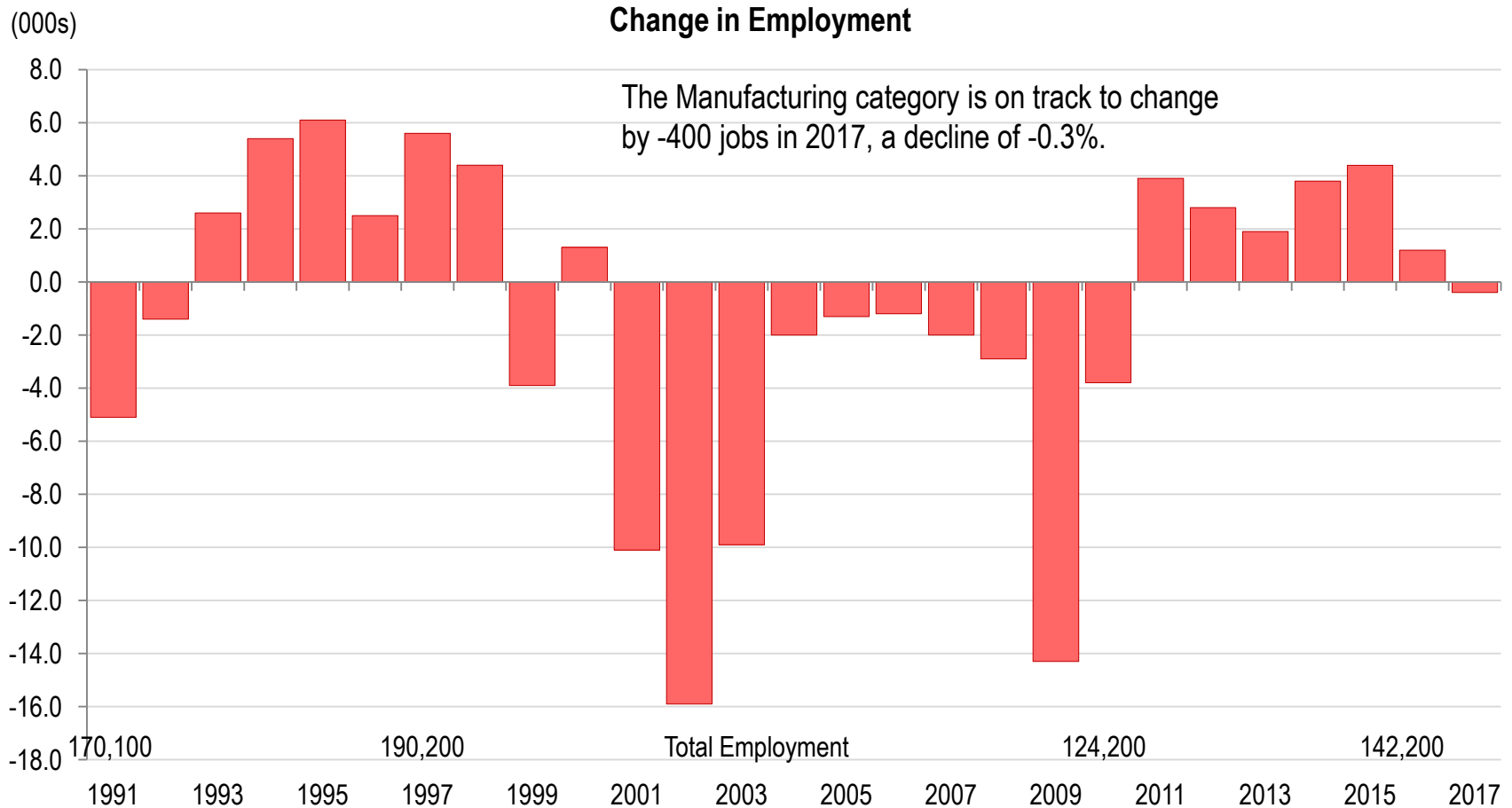
- Since 1990, the number of Colorado manufacturing workers has decreased at a slower rate than the rate for the United States. The number of Colorado factory workers has increased at a faster rate that the U.S. during the recovery from the Great Recession.

- Over the past ten years, the growth in the state's real GDP for durable goods has grown at a faster rate than the rate for non-durable goods and the overall economy.

- Despite weak employment growth over the past ten years, the growth in the real GDP for manufacturing has been at a rate similar to overall real GDP rate of growth.

Change in Employment
Manufacturing Category

Change in Employment

(000s)

The Manufacturing category is on track to change by -400 jobs in 2017, a decline of -0.3%.

Source: Bureau of Labor Statistics, cber.co.

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

Index of Manufacturing Employment
Colorado vs. United States

Index of Manufacturing Employment

1990=100

Legend:
- Colorado
- United States

Since 1990, the number of Colorado manufacturing workers (blue) decreased at a slower rate than the rate for the United States (red). The number of Colorado factory workers has increased at a faster rate during the recovery from the Great Recession.

Source: Bureau of Labor Statistics, cber.co.

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

68
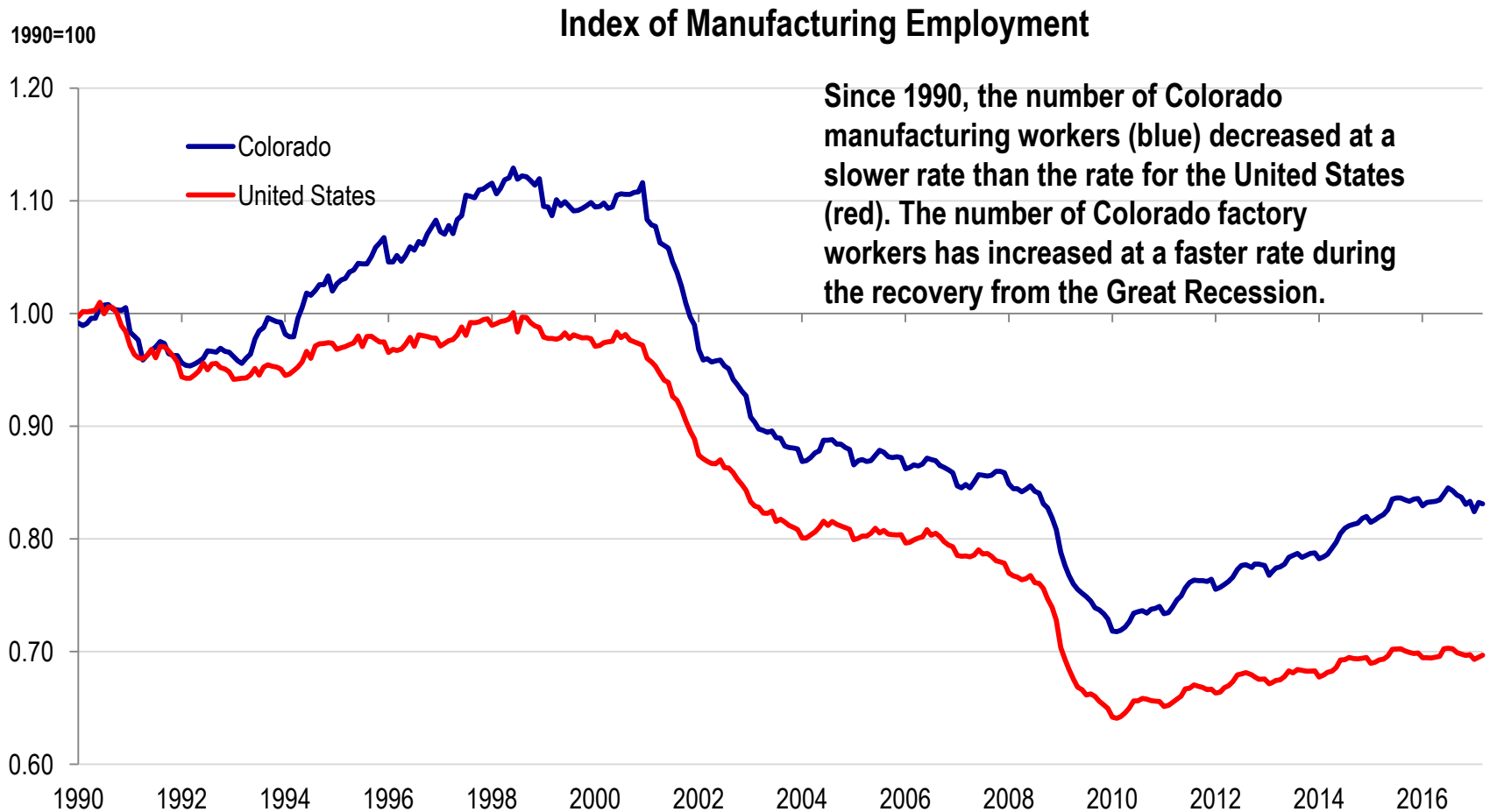
Index of Colorado Real GDP
State Private Sector, Manufacturing, Durable Goods, Non-Durable Goods

Index of Colorado Real GDP

2006 = 100

The real GDP for Colorado's durable goods GDP (gray) has increased at a faster rate than the real GDP for non-durable goods and the private sector.

Real GDP Q3 2016
Private $258.7 billion
Manufacturing $21.0 billion
Durable Goods $13.6 billion
Nondurable Goods $7.5 billion

Legend:
- State Private Sector
- Manufacturing
- Durable Goods
- Nondurable Goods
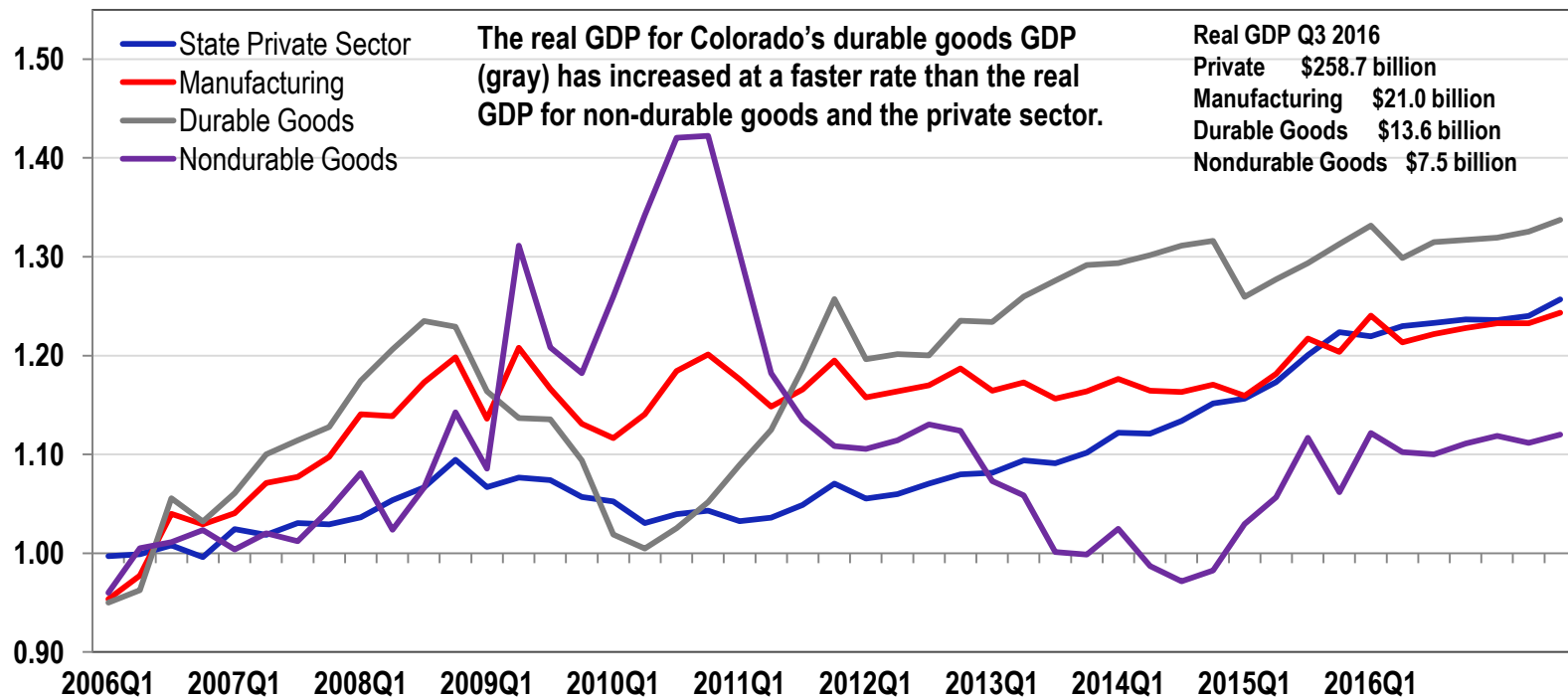
Source: Bureau of Economic Analysis. Note: U.S. real GDP is summary of states GDP.

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

Question #8

Are the extractive industries still losing jobs?

The sector is on track to lose 3,100 jobs in 2017, although the amount of losses is decreasing each month?

- The price for a barrel of oil is about $50 per barrel.
- As the price of oil has increased, the amount of drilling has increased. The number of rigs has increased from a low of 19 in 2016 to 28 in Q1 2017.

- In 2016 Colorado produced an average of 9,614 thousand barrels per month, down from 10,519 thousand barrels per month in 2017.

Change in Employment
Extractive Industries Category

Change in Employment

(000s)

The Extractive Industries category is on track to lose 3,100 jobs in 2017, a change of -12.4%.

17,100

Total Employment

23,500

1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017

Source: Bureau of Labor Statistics, cber.co.

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

Crude Oil Prices
West Texas Intermediate

Dollars per Barrel

Crude Oil Prices: West Texas Intermediate, Cushing, Oklahoma

Since 2005, <u>average annual</u> prices for crude oil have ranged from $46 to $100 per barrel. There has been greater variability in the <u>daily</u> prices, $26 to $146.

During 2015, the average price per barrel was $48.83. In early 2016, it dipped to $26.19 but returned to the range of $45.00 to $55.00 per barrel. Some economists have projected it will reach $60 per barrel in 2017.

Source: FRED, EIA, cber.co.

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Colorado Annual Rotary Rig Count
1987 to 2017

Rotary Rig Count

Rigs

In 2008, the number of rotary rigs in Colorado peaked at 114. In January 2015 there were 64 rigs. By March the number had fallen to 38 – it stayed near that level until August. By December 2015 the rig count was only 25.

The average rig count for 2016 was 19, but the monthly rig count was 26 at the end of the year. Average rig count for Q1 2017 will be 28.
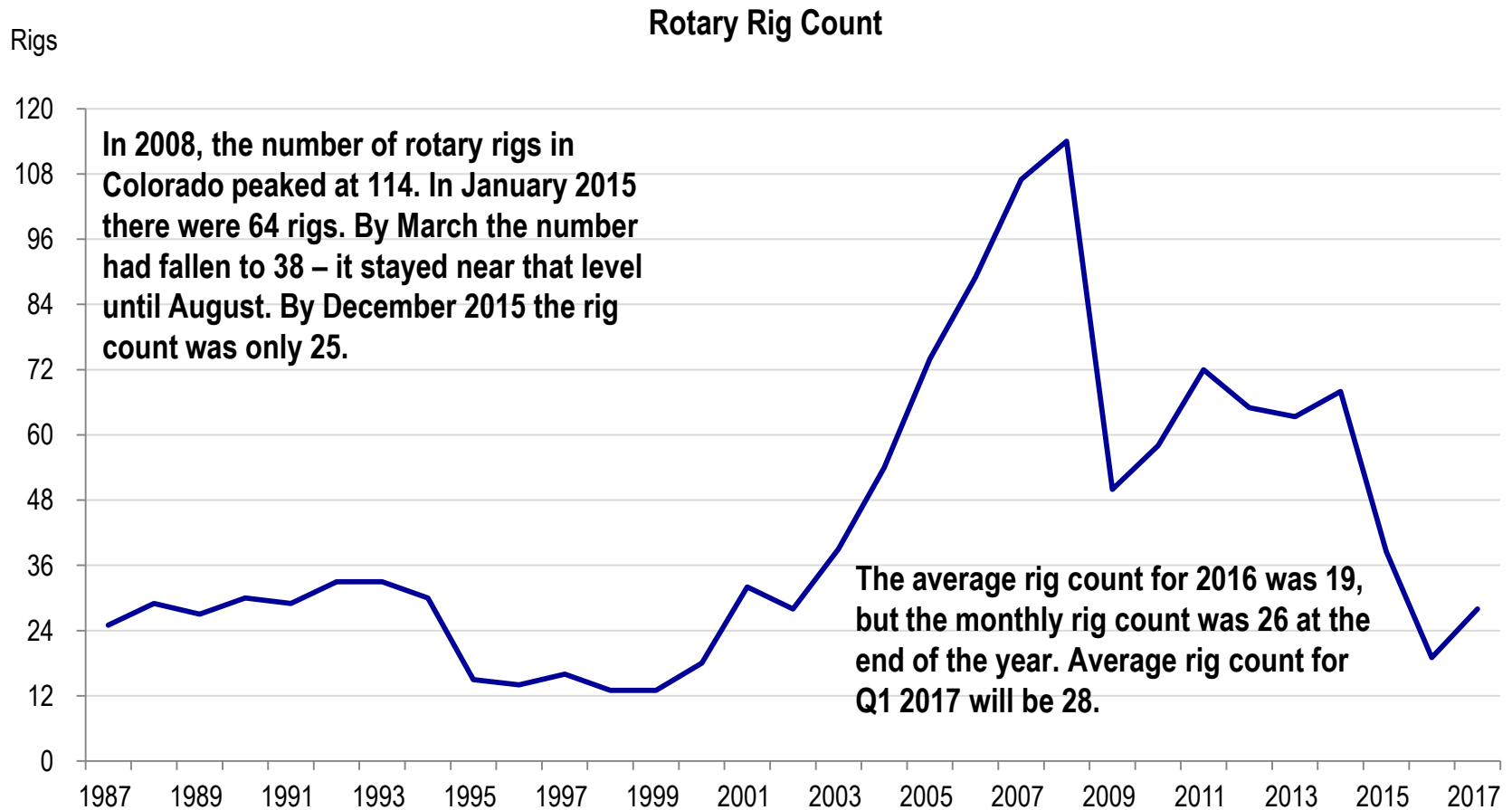
Source: Baker-Hughes, cber.co.

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

Average Monthly Colorado Crude Oil Production
2011 to 2017 (Thousand Barrels)

Thousand Barrels

Average Monthly Crude Oil Production

Colorado's production of crude oil reached record levels in 2015 despite the drop in the price of oil. In 2016, rig count was down, but production remained strong, albeit at a slightly lower level than 2015. Production is expected to remain strong in 2017.

10,519

7,982

5,452

4,131

3,288

9,614

Blue line = monthly total
Red line = monthly average

Jan-2011   Jan-2012   Jan-2013   Jan-2014   Jan-2015   Jan-2016   Jan

Source: EIA, cber.co.

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

The Colorado Economy
Summary

Job Changes
2017 YTD Through March

Job Change All Sectors

Accommodations and Food Services
Health Care
Professional and Scientific
Retail Trade
B-to-B (Not Employment Services)
Financial Activities
Personal (Other) Services
Transportation, Warehousing, and Utilities
Local (Not K-12 Education)
Construction
Higher Education
Wholesale Trade
K-12 Education
Federal Government
Private Education
Corporate Headquarters (MCE)
Information
Manufacturing
Arts, Entertnmt, and Recreation
Employment Services
State (Not Higher Education)
Natural Resources and Mining

-4.0   -2.0   0.0   2.0   4.0   6.0   8.0   10.0   12.0   14.0

Thousands (Average)

About 70.7% of total jobs were added in the top five sectors. These sectors are projected to increase by 3.2% in 2017.

Approximately 20.0% of all jobs were added in leisure and hospitality (AFS + AER). These sectors are projected to increase by 1.1% in 2017.

About 11.5% of total jobs were added in the PST, manufacturing, and information sectors. These sectors are the source of primary and advanced technology jobs. They are projected to increase by 2.4% in 2017.

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

Source: Bureau of Labor Statistics, cber.co.

76

Colorado-based Business and Economic Research http://cber.co
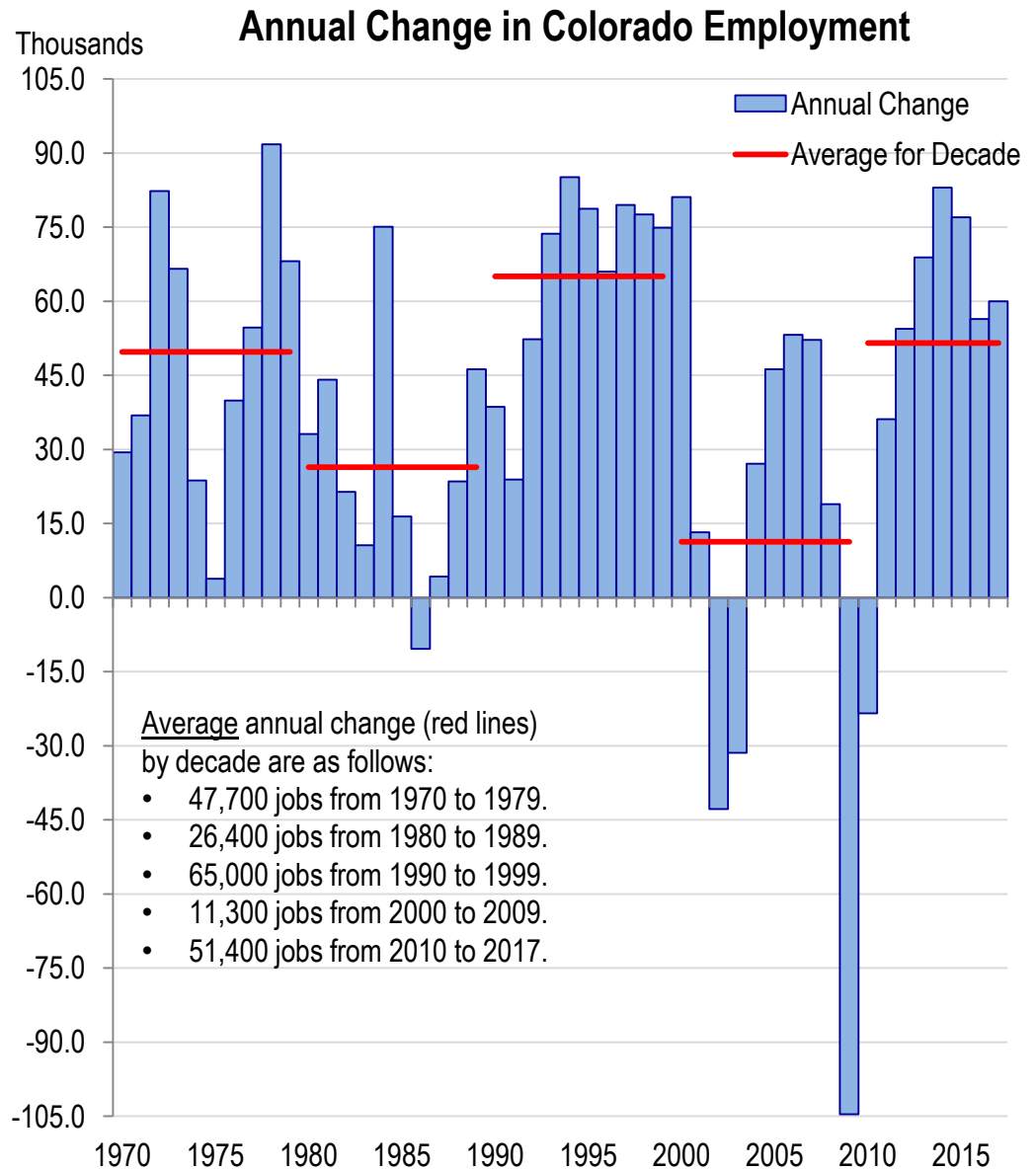
Annual Employment Change in Colorado Employment

Colorado added 77,000 jobs in 2015 and 56,400 jobs in 2016.

For the first 7 years of this decade, Colorado has added an average of 50,400 jobs.

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

Through Q1 2017, the state is on track to add 50,000 jobs, an increase of 2.0%. Based on "activity on the streets", the BLS data appears to be understated.

Annual Change in Colorado Employment

Thousands

Average annual change (red lines) by decade are as follows:
- 47,700 jobs from 1970 to 1979.
- 26,400 jobs from 1980 to 1989.
- 65,000 jobs from 1990 to 1999.
- 11,300 jobs from 2000 to 2009.
- 51,400 jobs from 2010 to 2017.

The Colorado Economy in 2017
Factors that Will Affect the Colorado Economy

1. Real GDP growth for Colorado will be similar to or slightly greater than the U.S. rate.
2. The Philadelphia Federal Reserve Leading Index points to continued growth for Colorado.
3. There will be modest and diverse establishment and job growth.
4. Construction will experience solid growth if the industry can find enough workers.
5. Employment in the extractive industries will flatten out.
6. The state will continue to enjoy strong population growth.
7. State government will continue to have budget challenges that will have an impact on the infrastructure – particularly in transportation.
8. New and used car sales will remain solid.
9. DIA passenger activity will continue to be strong.
10. It will continue to be difficult to find attainable and affordable housing.

The state will see positive and negative changes resulting from policies put in place by the Trump administration.

The three major categories (strong, solid, and volatile) are adding jobs at declining rates. This appears to be a normal fluctuation in the business cycle rather than a downturn in the economy.

The growth of the economy will be limited by the very small pool of potential workers.

Appendix

Summary of the 2017 cber.co forecast

Colorado Economic Forecast
Sector Portfolio Analysis

Attempt to Improve Forecast Accuracy

The primary focus of most state economic forecasts is to project total employment.

Some economists also produce sector forecasts. They usually add projections for the sectors to derive the state total, an approach that introduces more variables for error.

cber.co feels the most accurate forecast is achieved by projecting total employment based on projections for categories of sectors. Sectors are grouped into three categories based on their past performance.

Projections for the categories and overall employment are based on trends, feedback from business leaders, economic developers, and other economists. The sum of these categories are then compared to the projections for overall total employment . Minor adjustments are made and the final forecast is produced for three scenarios. The most likely scenario is used as the final cber.co forecast. This final step helps create a better understanding of upside and downside risk.

Strong Growth, Solid Growth, and Volatile Categories

This portfolio approach has made it easy to see that some sectors consistently create jobs at a higher rate of growth, some show solid growth, and others are more volatile. Ultimately, the volatile category tends to have a greater influence on the amount of change in <u>total</u> job growth than the sectors with steady growth.

From 2012 through 2015 cber.co evaluated the performance of 23 sectors over the past two decades and refined the manner in which the sectors are grouped. 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. In this short period that 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.

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 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.

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 that 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.

Source: cber.co.

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

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.

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.

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

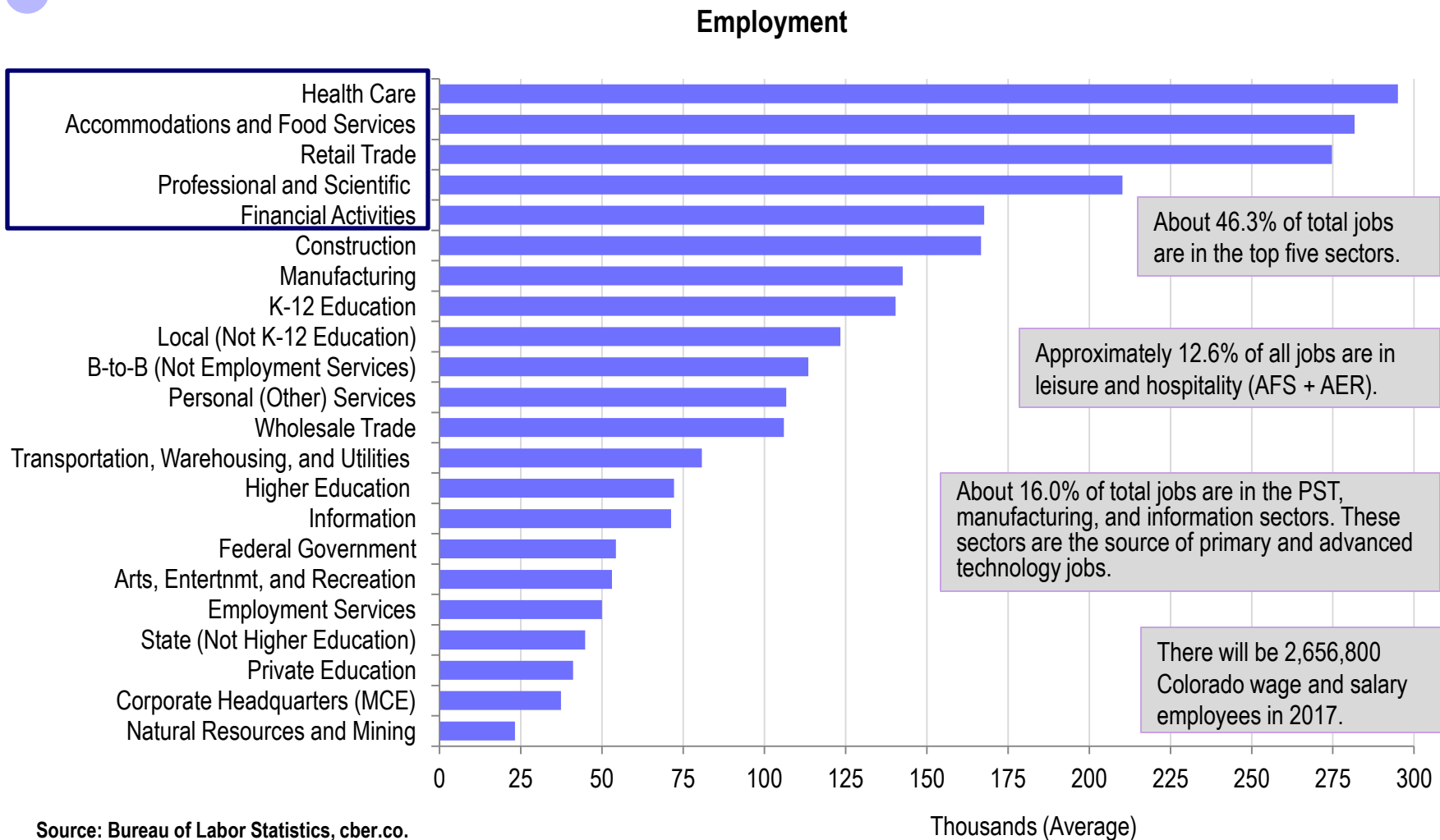### Volatile Growth Category
+14,000 to +16,000 Employees

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

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

Source: cber.co.

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

83

Colorado Wage and Salary Employment
2017 Forecast

Employment

Sector	
Health Care	
Accommodations and Food Services	
Retail Trade	
Professional and Scientific	
Financial Activities	
Construction	
Manufacturing	
K-12 Education	
Local (Not K-12 Education)	
B-to-B (Not Employment Services)	
Personal (Other) Services	
Wholesale Trade	
Transportation, Warehousing, and Utilities	
Higher Education	
Information	
Federal Government	
Arts, Entertnmt, and Recreation	
Employment Services	
State (Not Higher Education)	
Private Education	
Corporate Headquarters (MCE)	
Natural Resources and Mining	

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.

Thousands (Average)

x-axis: 0, 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300

Source: Bureau of Labor Statistics, cber.co.

Colorado-based Business and Economic Research http://cber.co
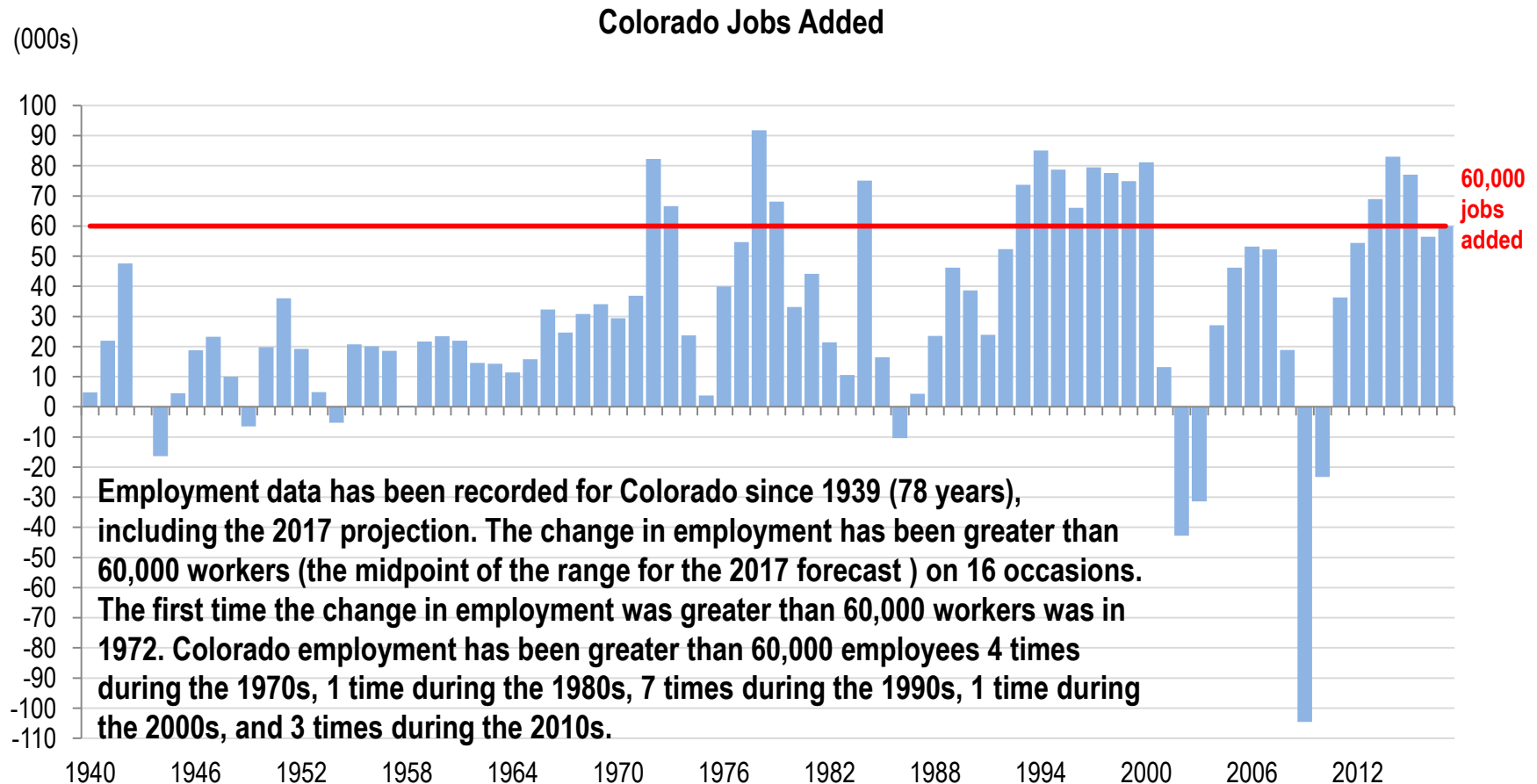
Colorado Employment Forecast
Putting the Forecast in Perspective

Putting the Forecast in Perspective

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

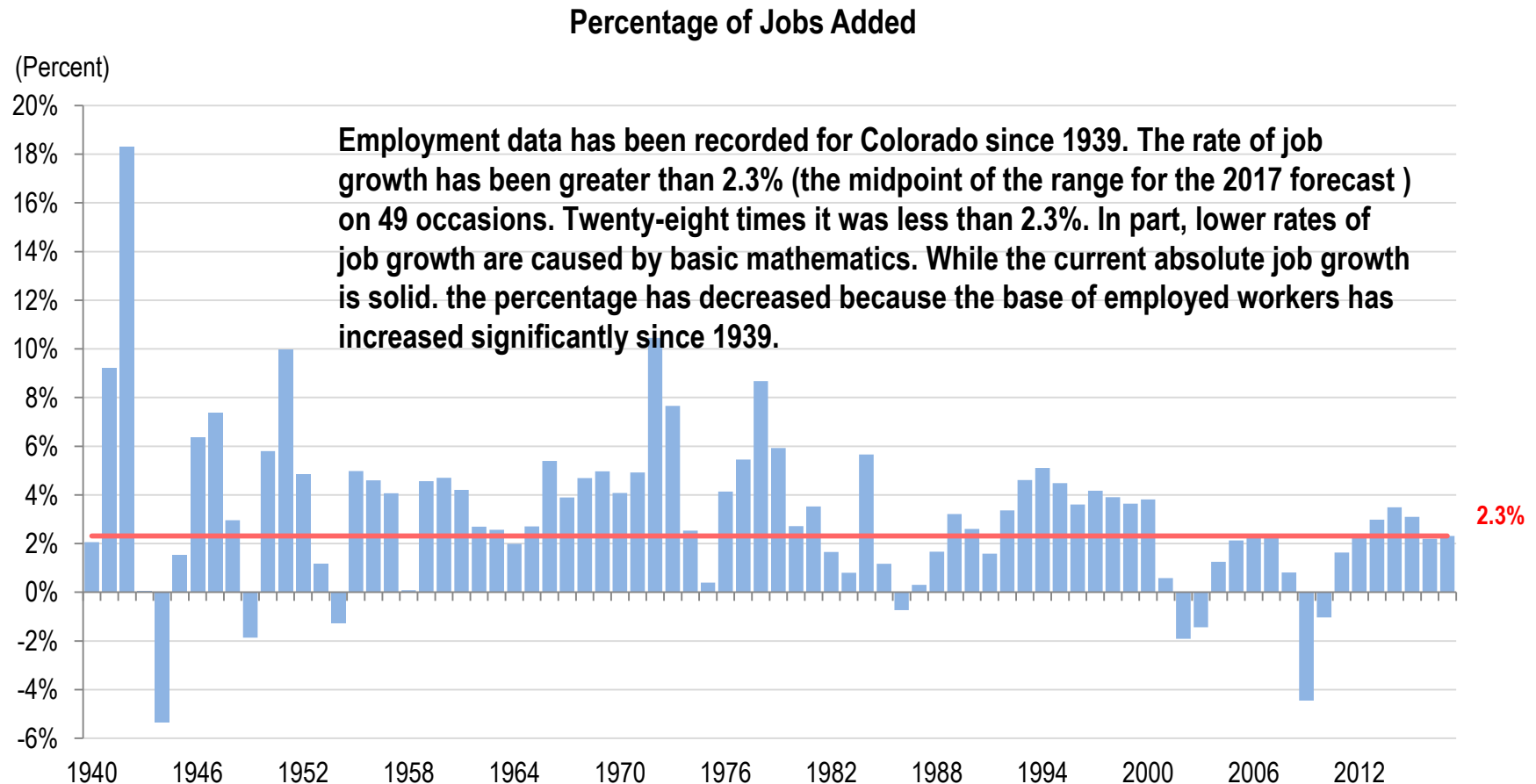Using concepts from Huff, the following charts put the 2017 forecast in perspective.

- 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 strong year for job growth.

- 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 17th Strongest since 1939.

Colorado Jobs Added

(000s)

60,000 jobs added

Employment data has been recorded for Colorado since 1939 (78 years), including the 2017 projection. The change in employment has been greater than 60,000 workers (the midpoint of the range for the 2017 forecast) on 16 occasions. The first time the change in employment was greater than 60,000 workers was in 1972. Colorado employment has been greater than 60,000 employees 4 times during the 1970s, 1 time during the 1980s, 7 times during the 1990s, 1 time during the 2000s, and 3 times during the 2010s.

Source: Bureau of Labor Statistics, cber.co.

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

The Projected Rate of Colorado Job Growth for 2017 will be the 50th Strongest in 78 Years

Percentage of Jobs Added

(Percent)

Employment data has been recorded for Colorado since 1939. The rate of job growth has been greater than 2.3% (the midpoint of the range for the 2017 forecast) on 49 occasions. Twenty-eight times it was less than 2.3%. In part, lower rates of job growth are caused by basic mathematics. While the current absolute job growth is solid. the percentage has decreased because the base of employed workers has increased significantly since 1939.

2.3%

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

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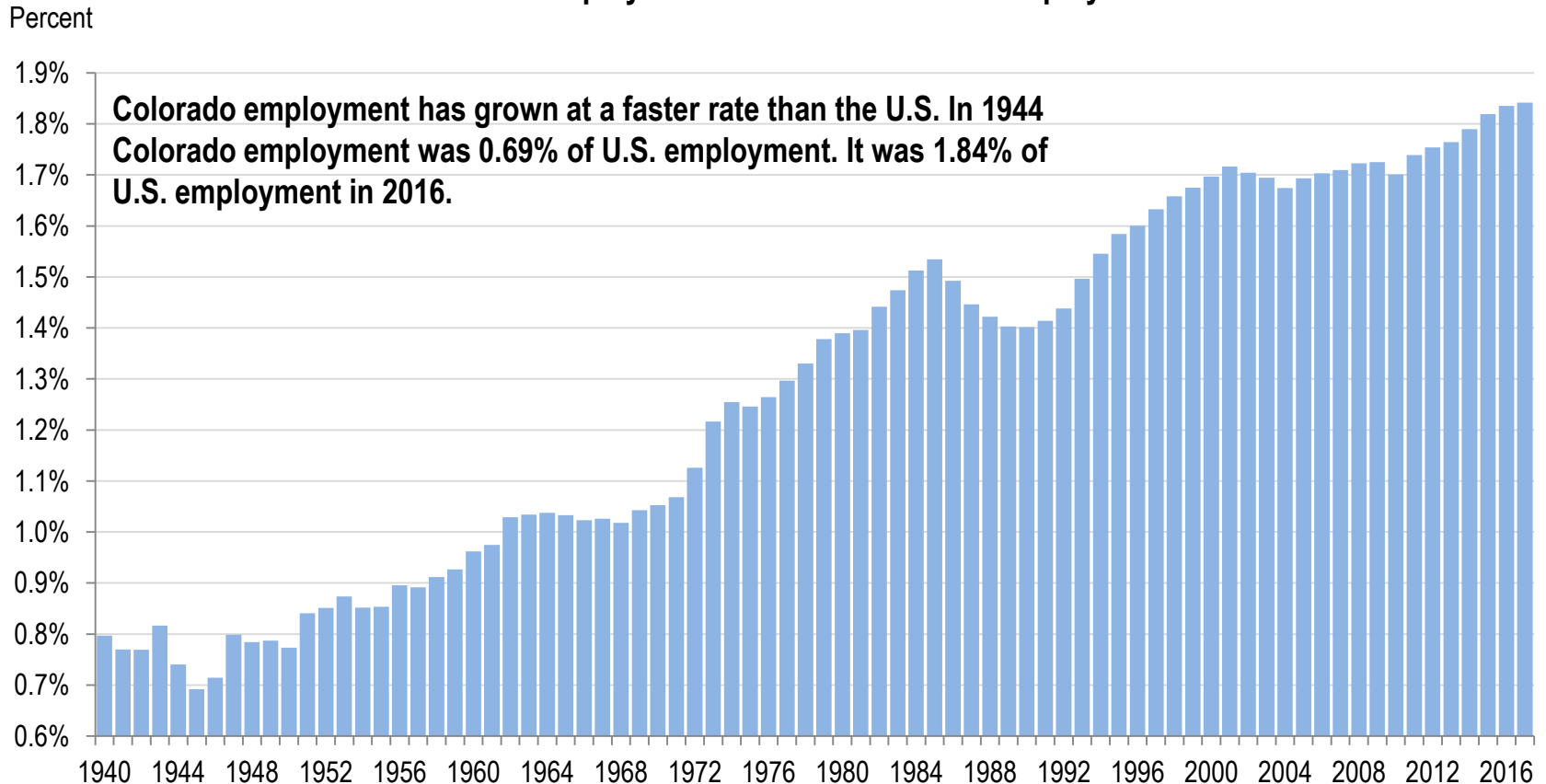
Percent

Colorado employment has grown at a faster rate than the U.S. In 1944 Colorado employment was 0.69% of U.S. employment. It was 1.84% of U.S. employment in 2016.
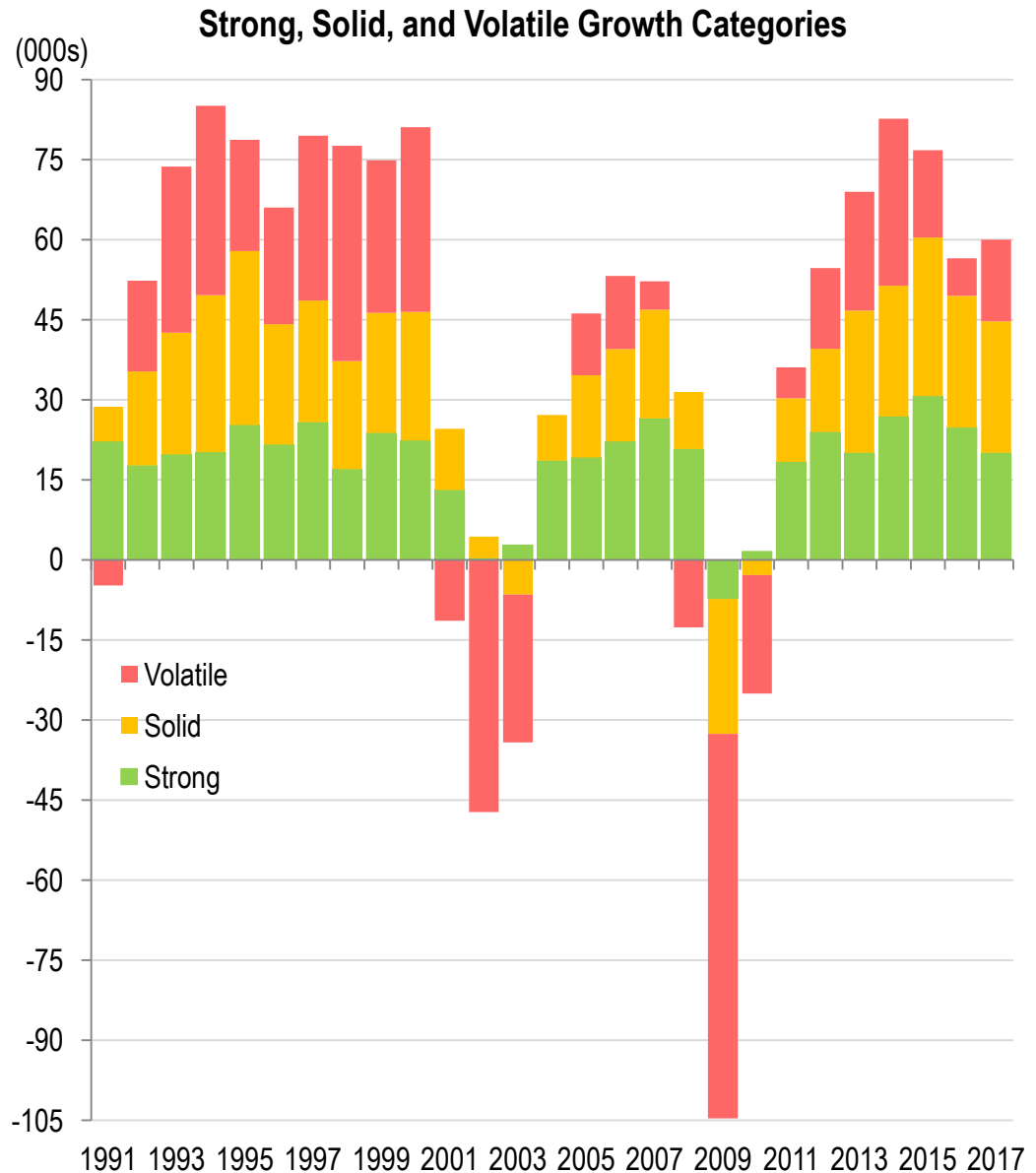
Comparison of Job Growth to Prior Years

Change in Employment 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. <u>Overall</u> growth will be in the range of 2.1% to 2.5% in 2017, or 57,000 to 63,000 jobs.

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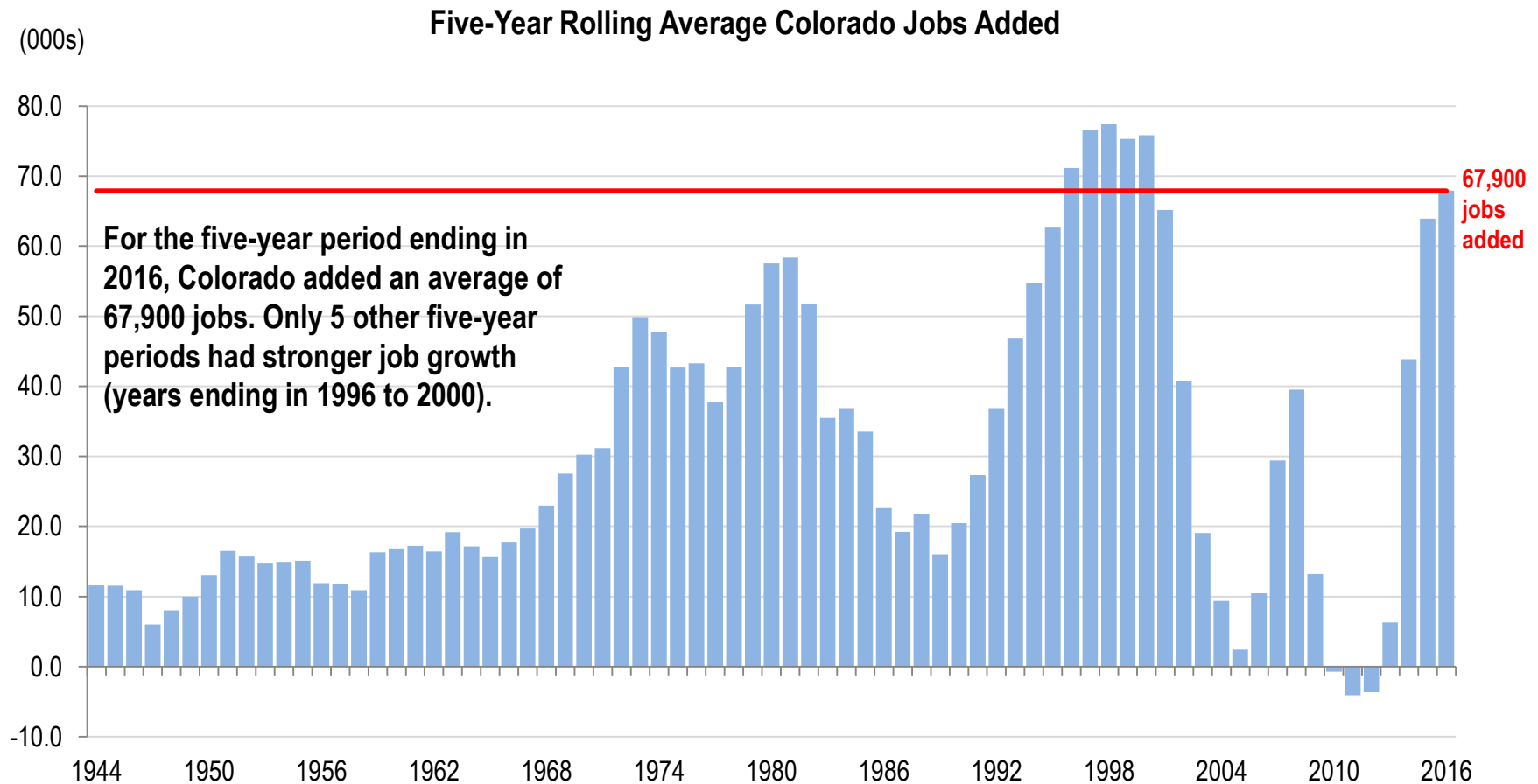
The Solid Growth category of sectors (yellow) will continue to post moderate growth. In 2016, this category grew at a rate of 2.7% and will add jobs at a rate of 2.3% to 2.5% in 2017.

Finally, the Volatile category of sectors (red) was a <u>very</u> 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.

Strong, Solid, and Volatile Growth Categories

Legend: Volatile, Solid, Strong

Five-Year Rolling Average Absolute Job Growth

Five-Year Rolling Average Colorado Jobs Added

(000s)

For the five-year period ending in 2016, Colorado added an average of 67,900 jobs. Only 5 other five-year periods had stronger job growth (years ending in 1996 to 2000).

67,900 jobs added

Source: Bureau of Labor Statistics, cber.co.

Review of Colorado Economy and Employment Data Through March 2017

This analysis is for informational purposes only. Any opinions or interpretations of data are those of the presenter. As such, they do not represent the viewpoints of any group or particular organization.
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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, which is part of OEDIT's early stage and proof of concept programs.

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