



Colorado Manufacturing Update Analysis of Employment Data Through 2012

Colorado-based Business and Economic Research

April 25, 2013



U.S. Manufacturing

This section includes data related to U.S. manufacturing – output, shipments, productivity, producer price index, ISM data, industrial production, capacity utilization, employment, employment by region, and the manufacturing unemployment rate.

Annual Change in U.S. Real GDP and Real Personal Consumption

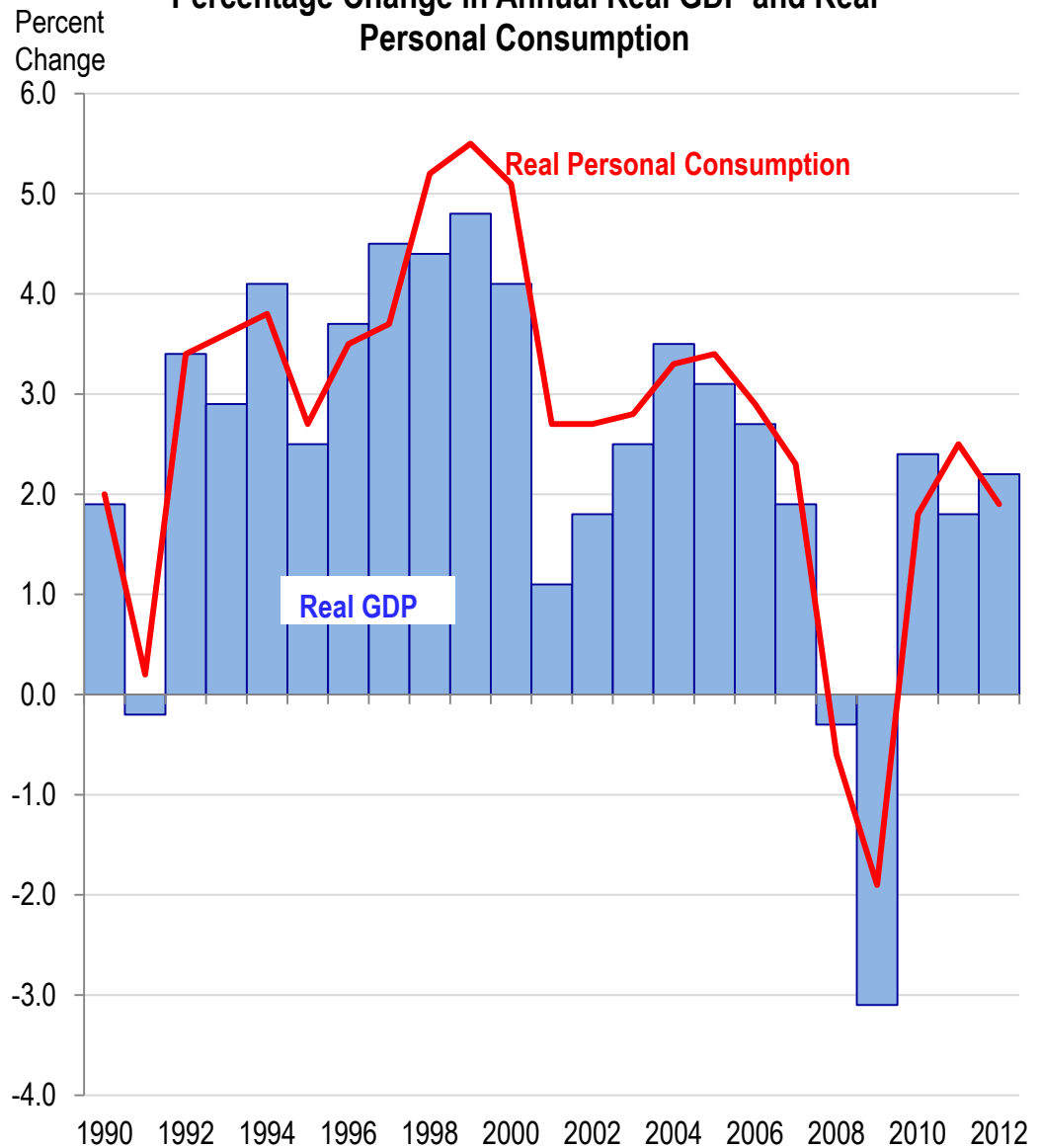
In 1990 Personal Consumption accounted for about 66.1% of GDP; in 2012 it was 70.9%.

Because consumption is such a high percentage of output it is no surprise that quarterly growth rates for both are similar.

The recent lack of growth in consumption parallels the lack of growth in Real GDP. Lower consumption translates into reduced demand for manufactured goods.

It is also obvious to see that output and consumption posted weaker growth rates during the period 2000-2012 than the previous 10 years.

Percentage Change in Annual Real GDP and Real Personal Consumption



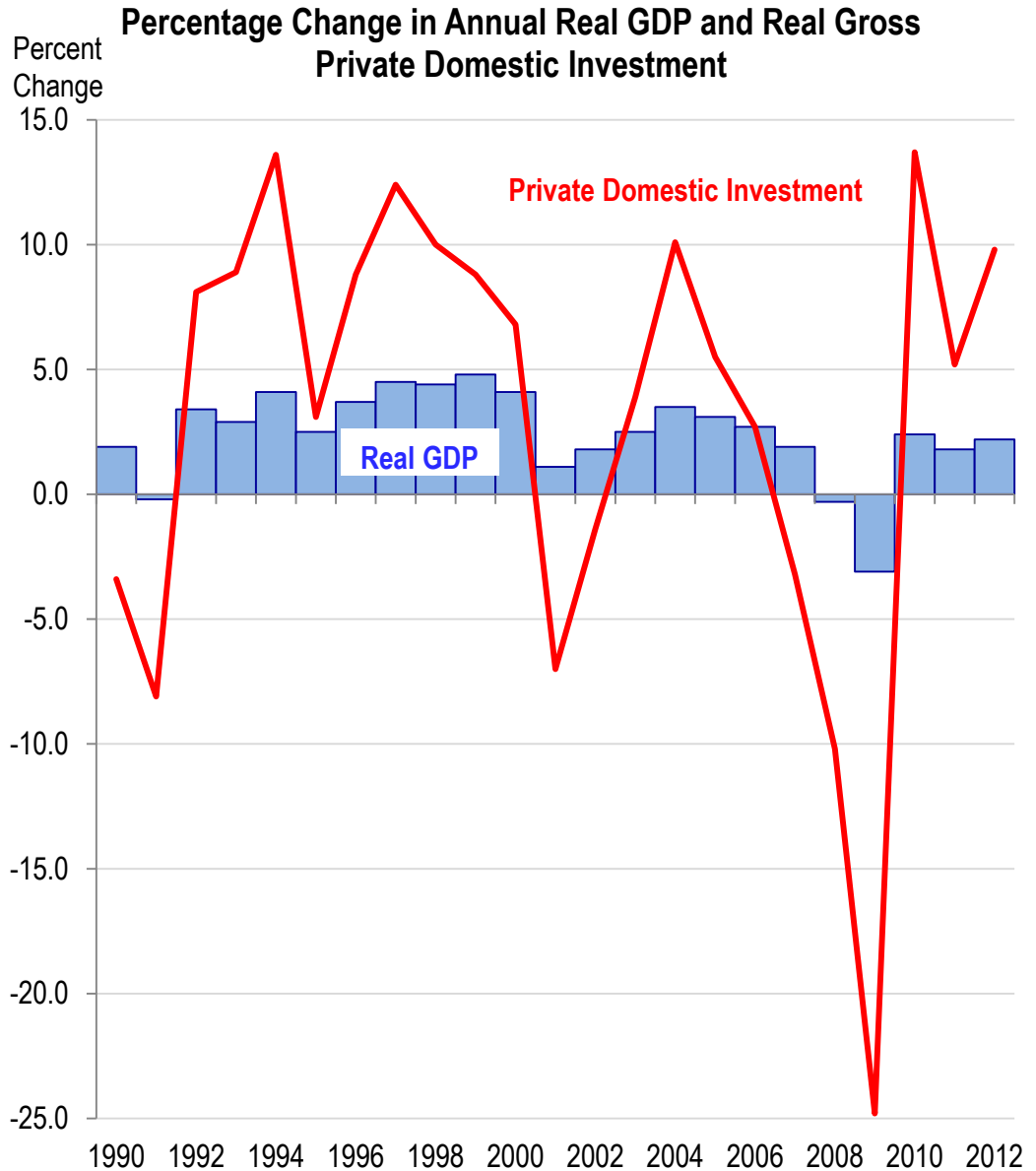
Source: Bureau of Economic Analysis.

Annual Change in U.S. Real GDP and Private Domestic Investment

In 1990 Private Domestic Investment accounted for about 14.8% of GDP. At the end of 2012 it was 13.1%.

The pattern of changes (growth and declines) in private investment and the real GDP is similar; however, the change in private investment is more volatile because it has a smaller base.

Change in the level of private investment impacts the growth of manufacturing.

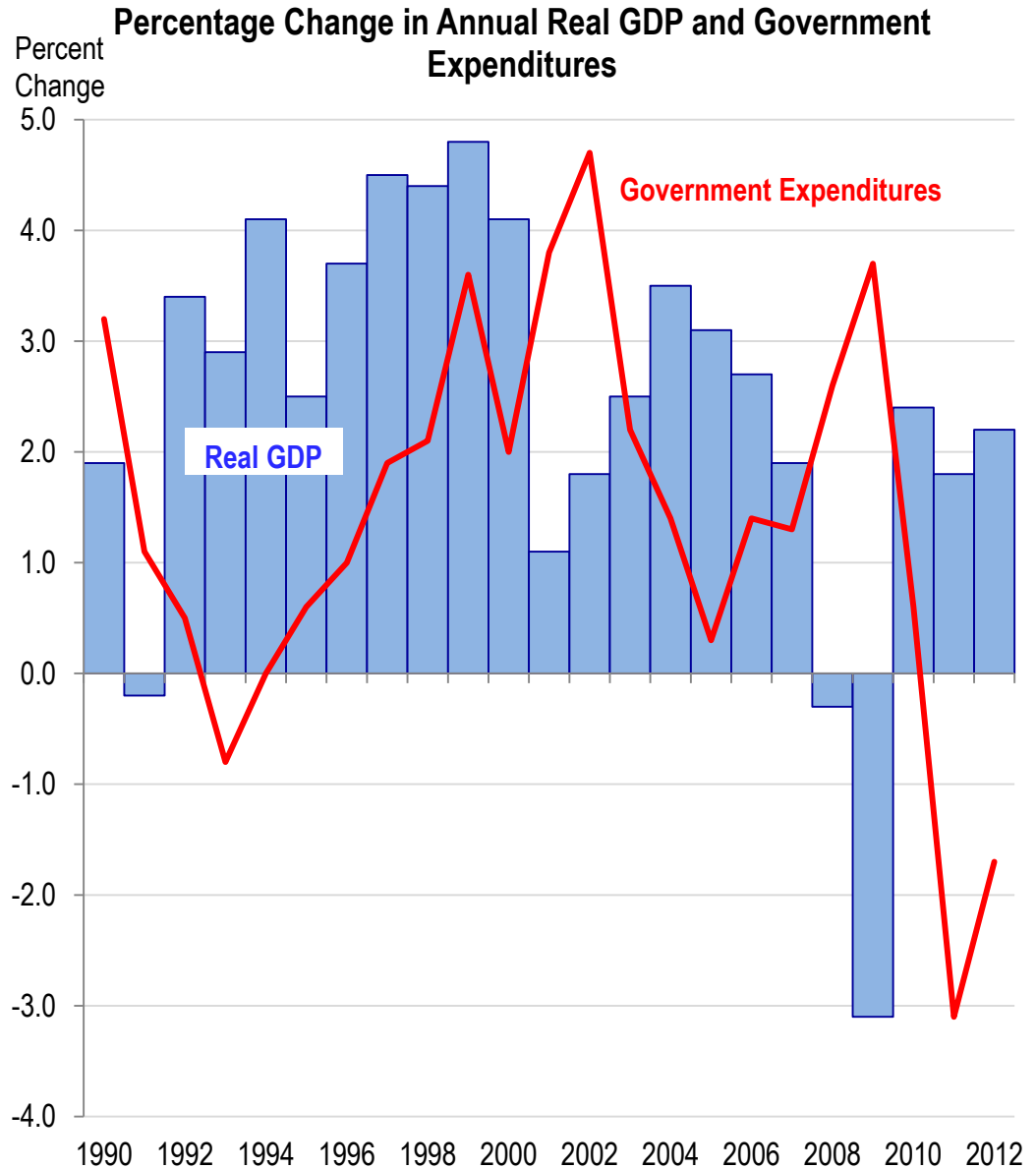


Source: Bureau of Economic Analysis.

Annual Change in U.S. Real GDP and Government Expenditures

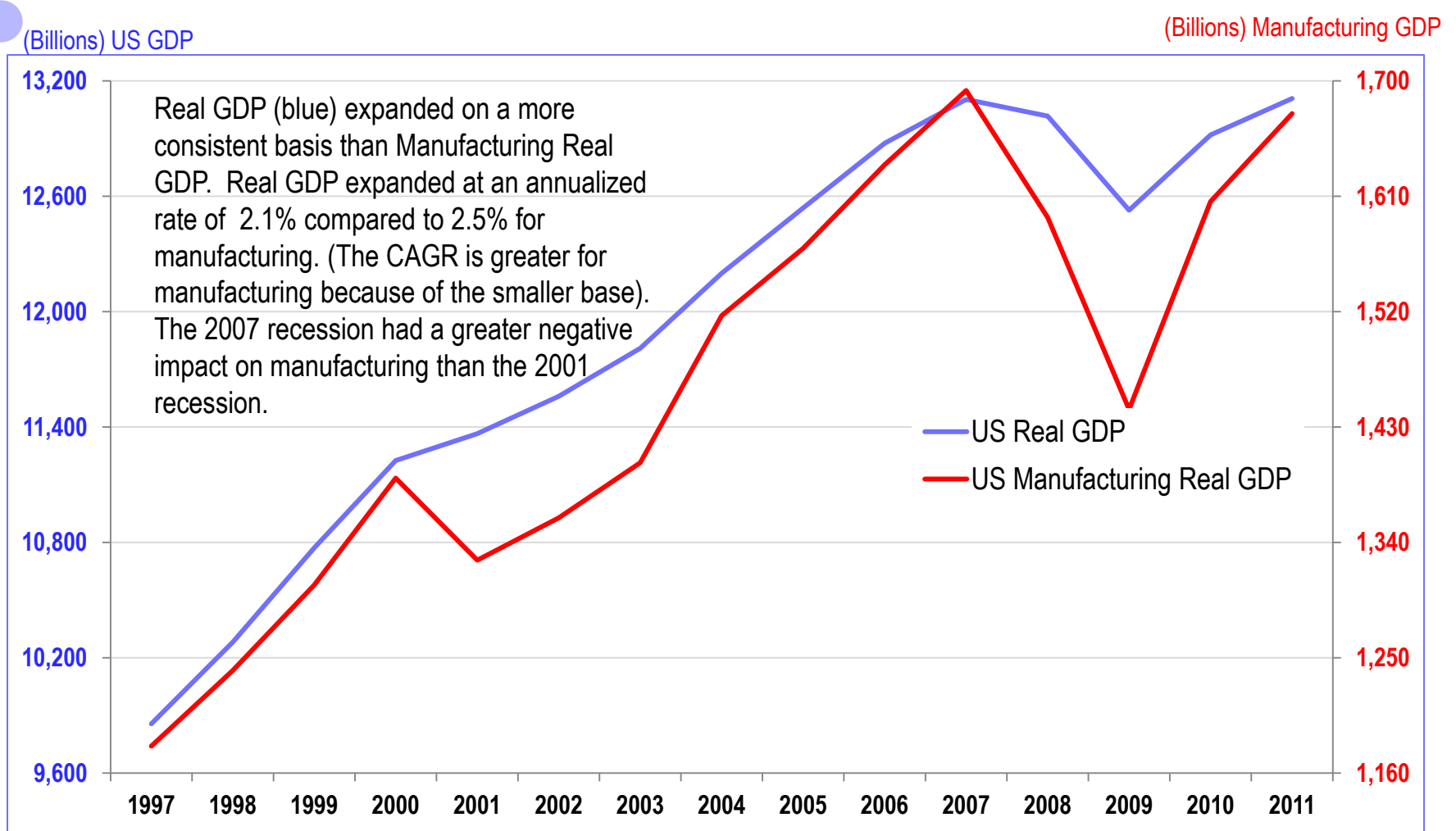
In 1990 Government expenditures accounted for about 20.4% of GDP. At the end of 2012 it was 19.5%. The pattern of changes (growth and declines) in government spending is somewhat countercyclical to changes in output.

The changes in government spending may have an impact on the growth of manufacturing, particularly for defense related goods.



Source: Bureau of Economic Analysis.

- US Manufacturing Real GDP vs.
- US Real GDP (State Totals Chained 2005 Dollars)



Source: Bureau of Economic Analysis.

Value of U.S. Manufacturing Shipments

After plunging from \$485 billion in July 2008 to \$356 billion in May 2009, manufacturing shipments have since posted steady gains.

By contrast ,the impact of the 2001 recession paled compared to the 2007 recession.

The Census Bureau states, “Manufacturers’ shipments measure the dollar value of products sold by manufacturing establishments and are based on net selling values, f.o.b. (free on board) plant, after discounts and allowances are excluded. Freight charges and excise taxes are excluded. “

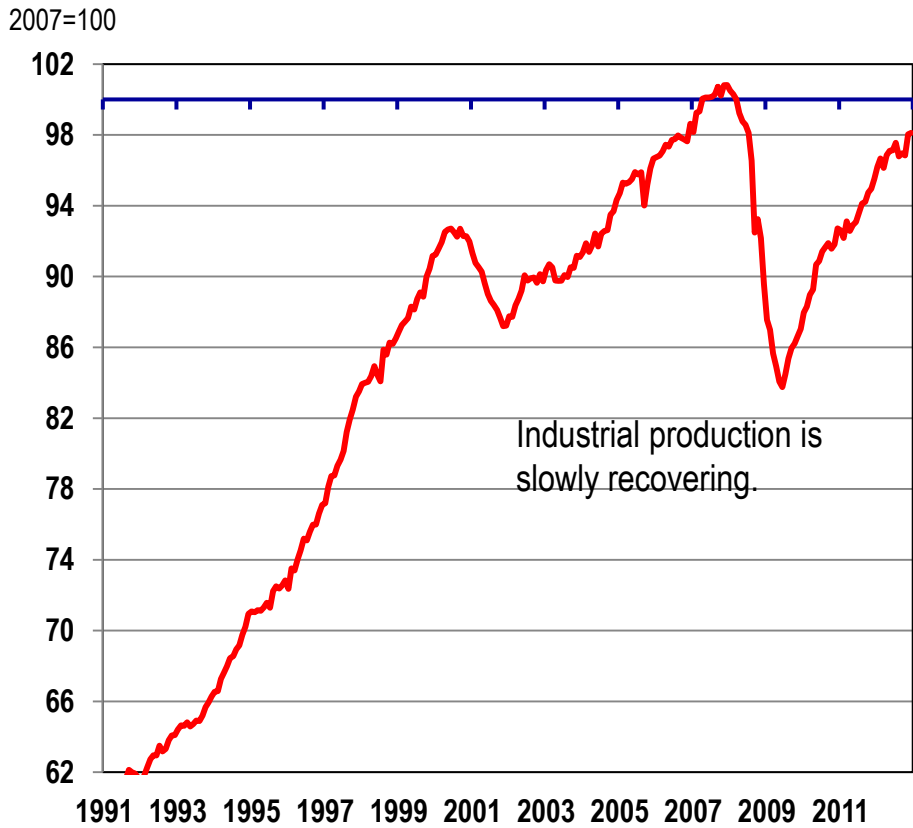
Value of U.S. Manufacturing Shipments



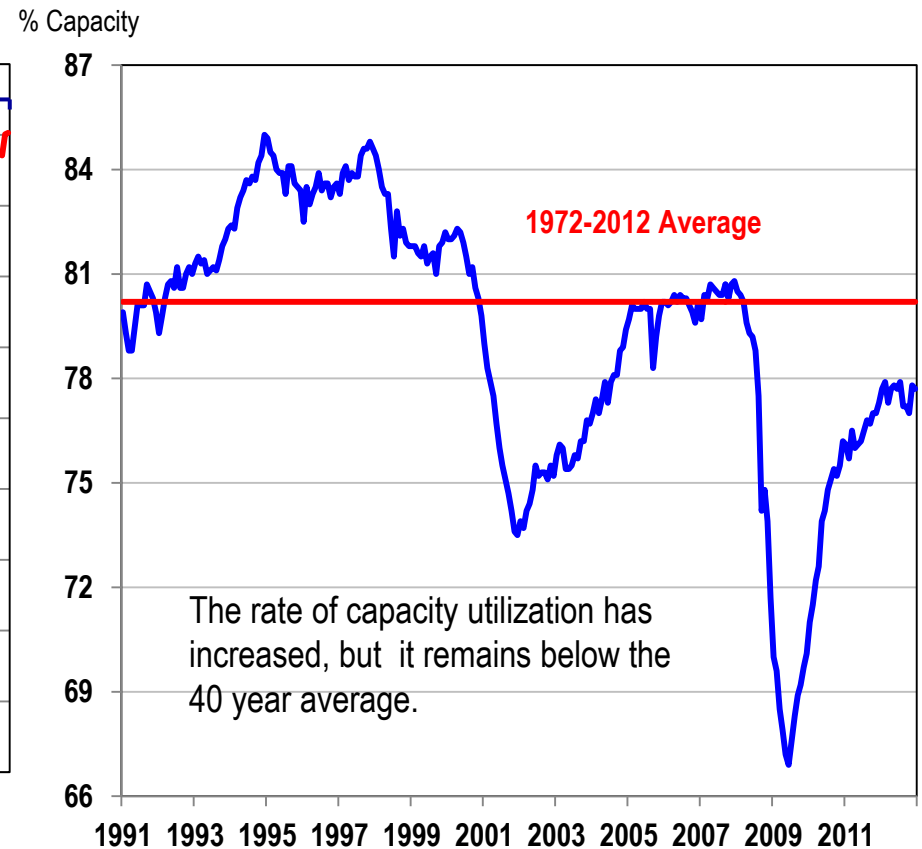
Source: US Department of Commerce, Census Bureau.

Industrial Production and Capacity Utilization

U.S. Industrial Production



Capacity Utilization



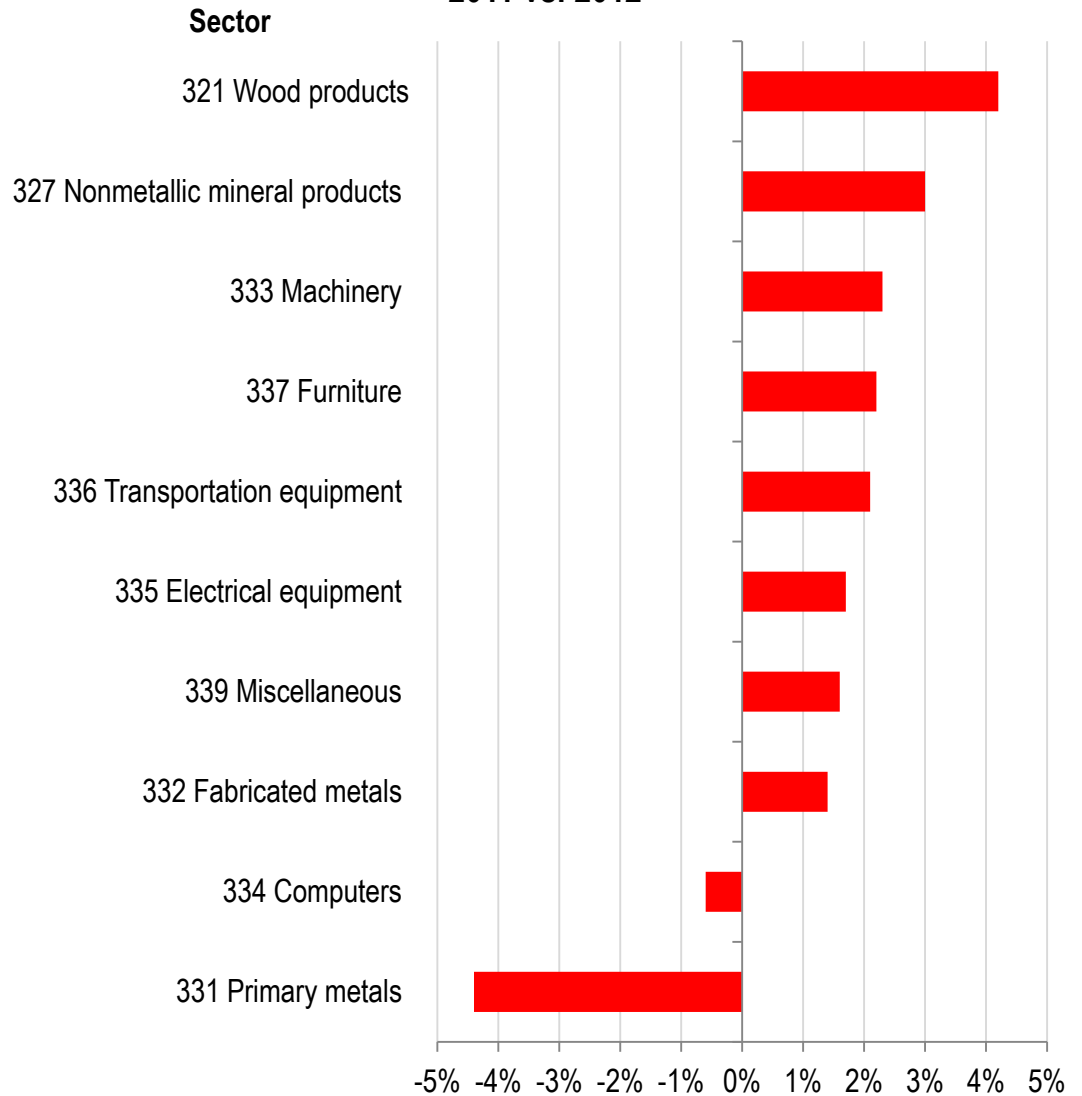
Source: Federal Reserve.

- Producer Price Index
- Durable Goods
- Manufacturing

Wood Products and Nonmetallic Mineral Products posted the largest gains for Durable Goods.

The Computer Sector posted a slight decrease and Primary Metals posted a decrease of 4.4%.

**Durable Goods PPI
2011 vs. 2012**



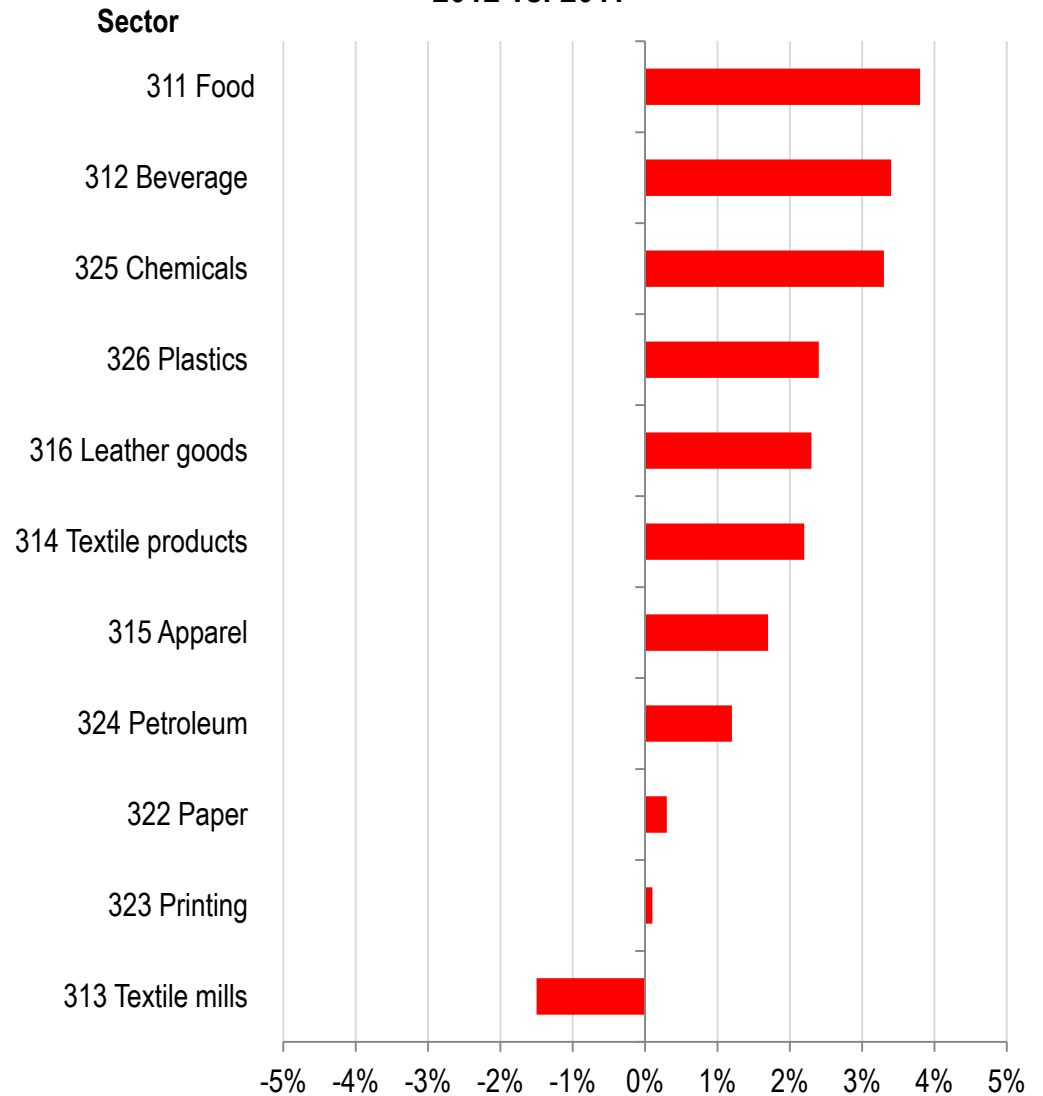
Source: Bureau of Labor Statistics.

- Producer Price Index
- Nondurable Goods
- Manufacturing

The largest sector, Food, recorded a PPI increase of 3.8%.

Textile mills, which are a small sector in Colorado posted a decline.

Nondurable Goods PPI 2012 vs. 2011



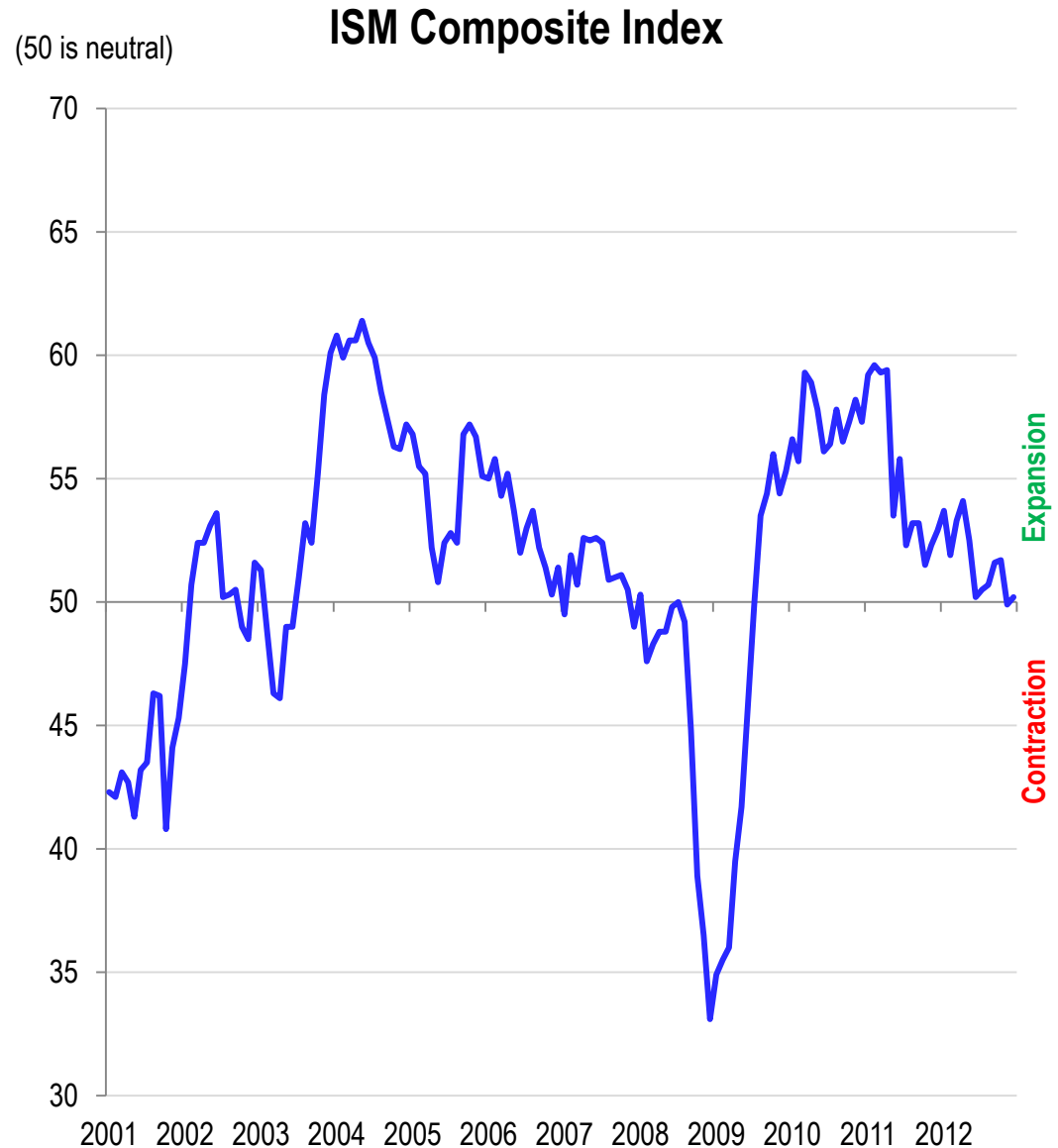
Source: Bureau of Labor Statistics.

Decreased Optimism in 2012 ISM Manufacturing Composite Index

This index measures the sentiment of manufacturing purchasing managers.

Purchasing managers became less optimistic about manufacturing beginning in mid-2004. Sentiment bottomed out in December 2008.

Sentiment began improving in early 2009 and peaked in February 2011. It tapered off through 2012. Year-end 2012 sentiment was near the neutral mark of 50.

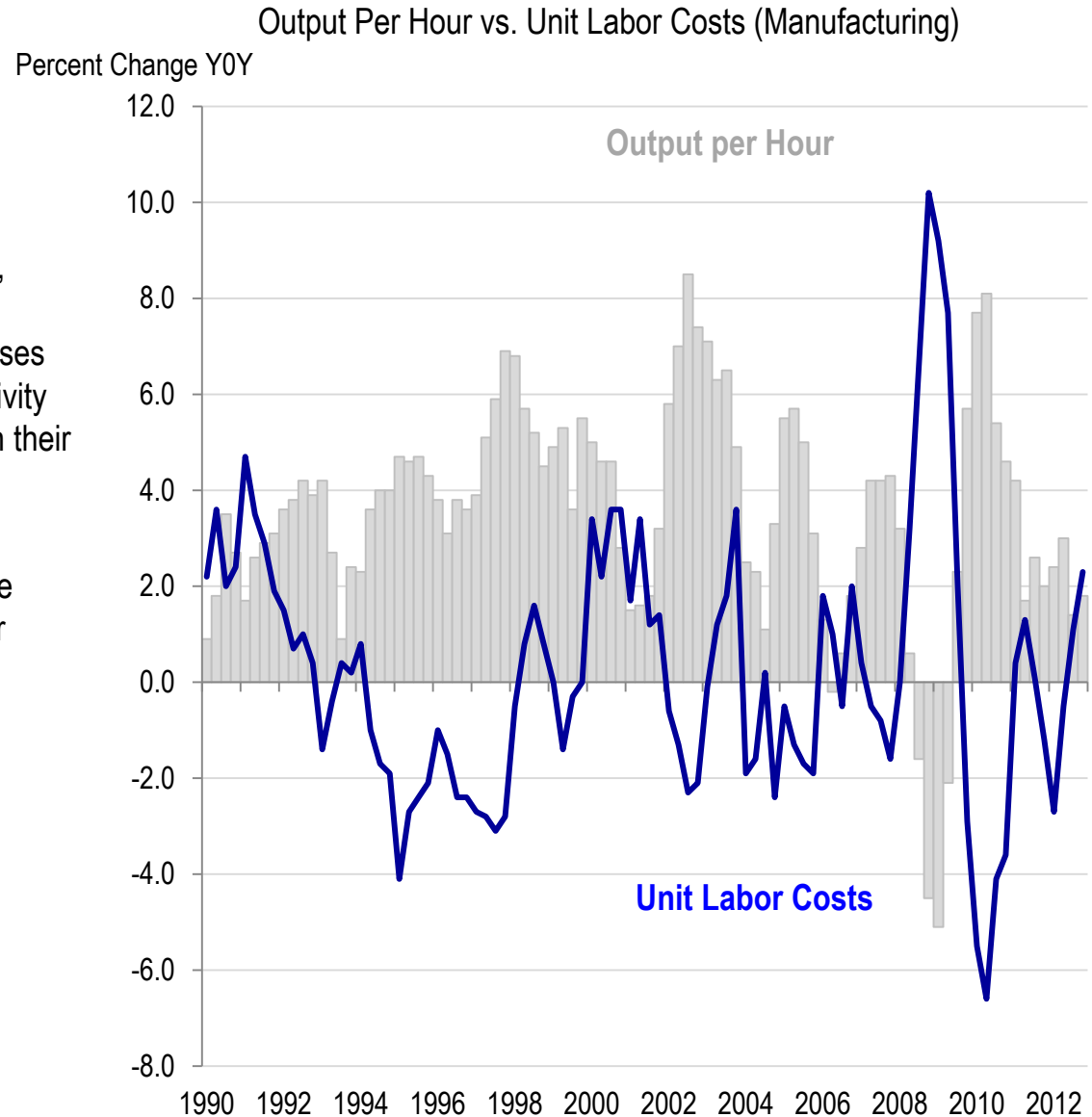


Source: ISM, FRED.

Productivity Gains Benefit Companies

- During and after the Great Recession, companies maintained or improved productivity with investments in processes or capital projects (gray bars). Productivity gains allowed companies to strengthen their bottom line.

- Since Q2 2010 Unit Labor Costs (blue line) have risen as investments in labor have increased.



Source: BLS, Major Sector Productivity and Costs Index Manufacturing.

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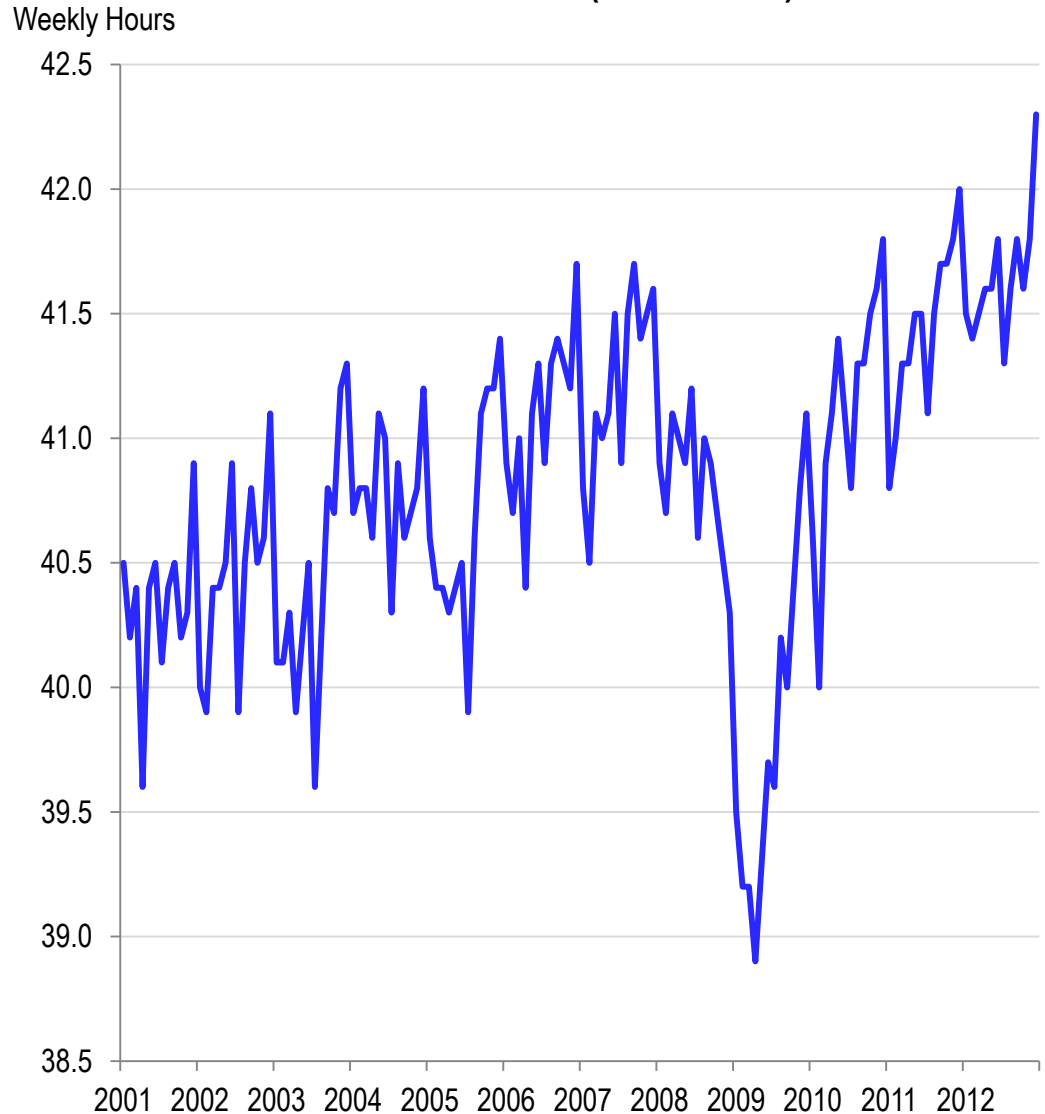


U.S. Hours Worked (Production Workers)

The average number of hours worked in a week is an indicator of the health of the industry.

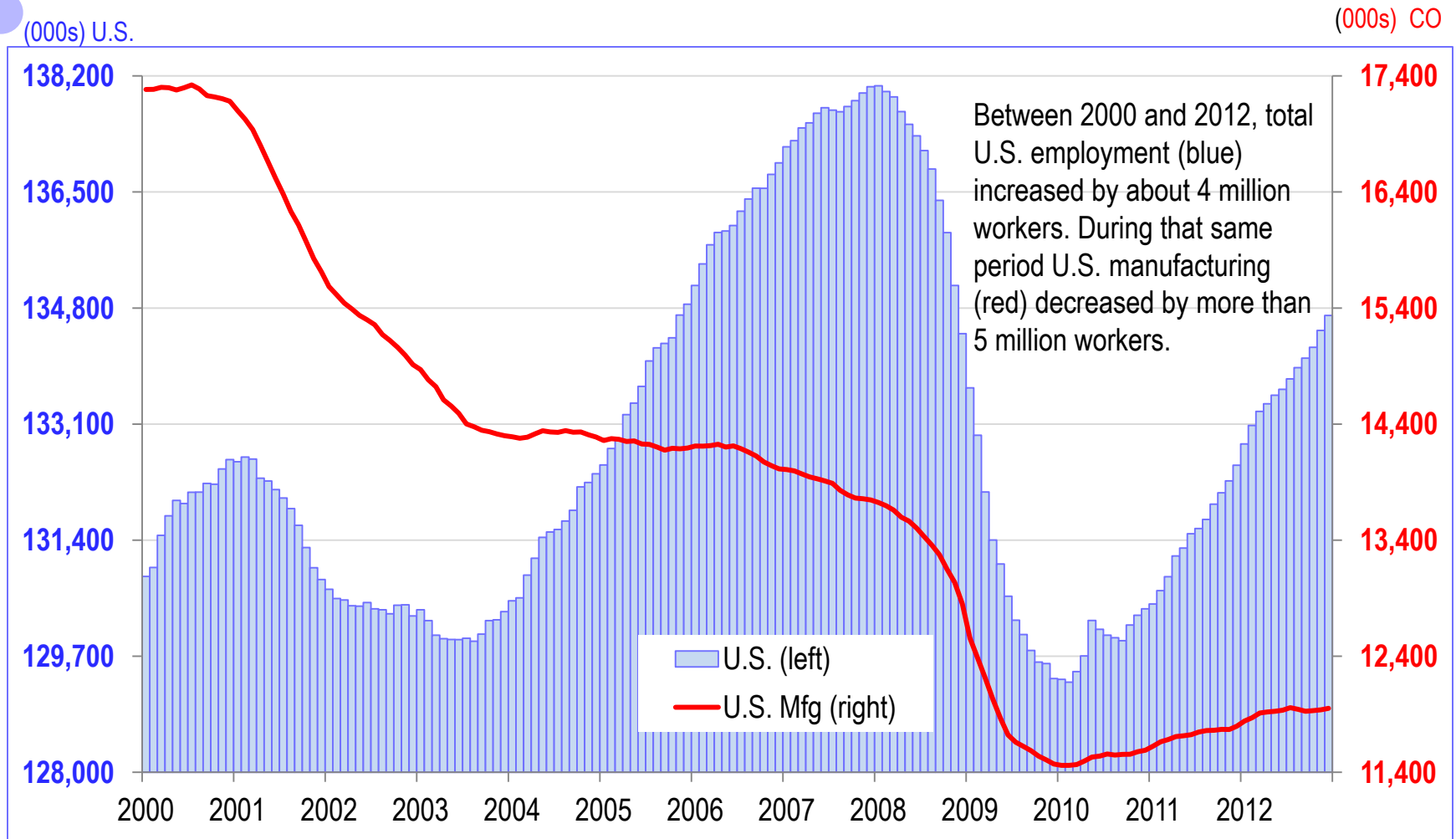
From 2001 through mid-2008 the hours worked by U.S. manufacturing production workers increased. The hours worked declined from mid-2008 through 2009, but has risen since. The increase is a sign of stronger manufacturing.

U.S. Hours Worked (Production)



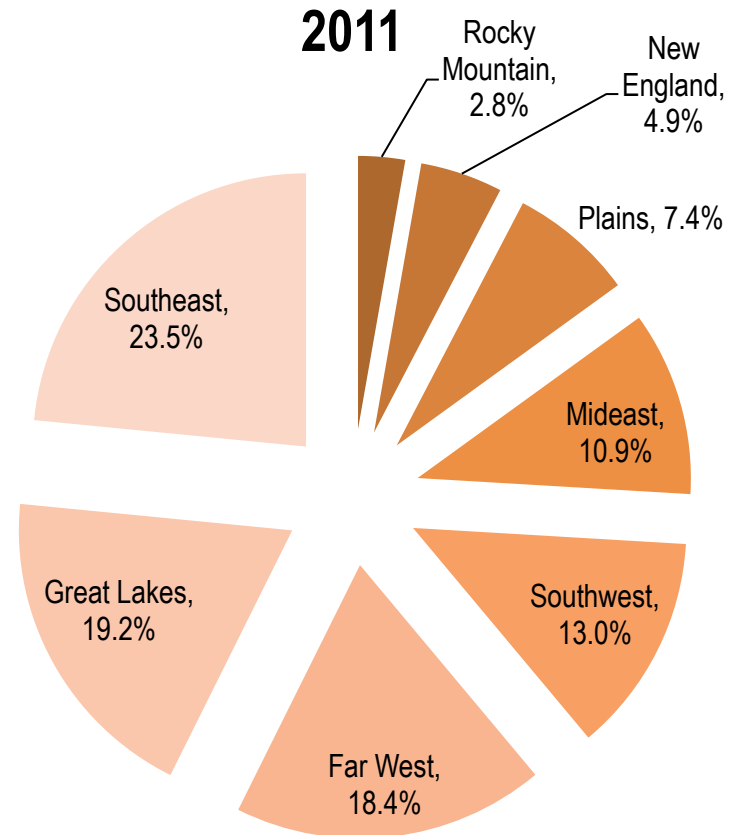
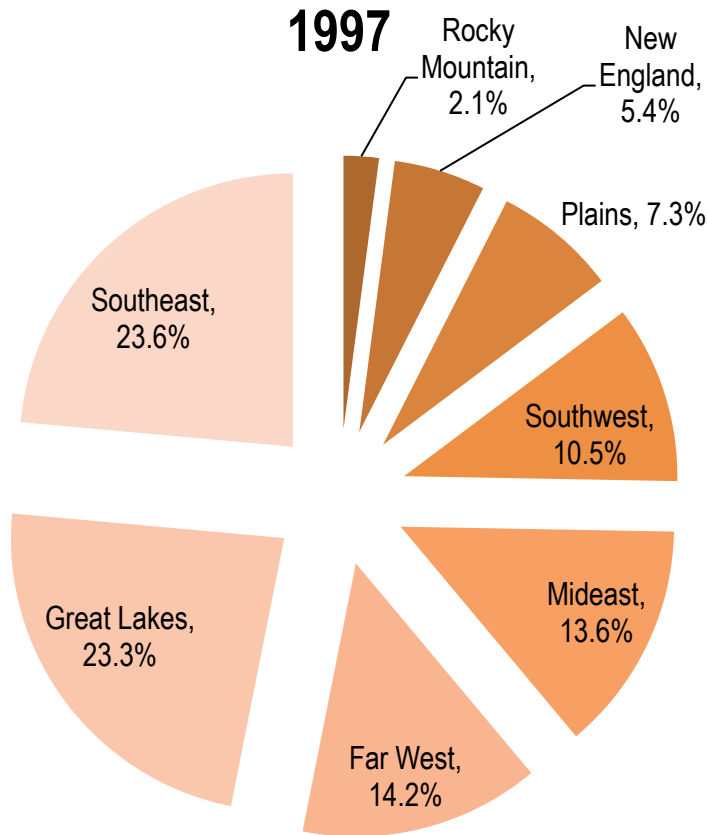
Source: Bureau of Labor Statistics, NSA.

U.S. Employment vs. U.S. Manufacturing Employment



Source: Bureau of Labor Statistics, SA.

Percentage of U.S. Manufacturing GDP by Region



Annualized Rate of Growth 1997 to 2011

Rocky Mountain	4.8%	Plains	2.7%	New England	1.9%
Far West	4.6%	Southeast	2.6%	Great Lakes	1.2%
Southwest	4.2%	United States	2.6%	Mideast	1.0%

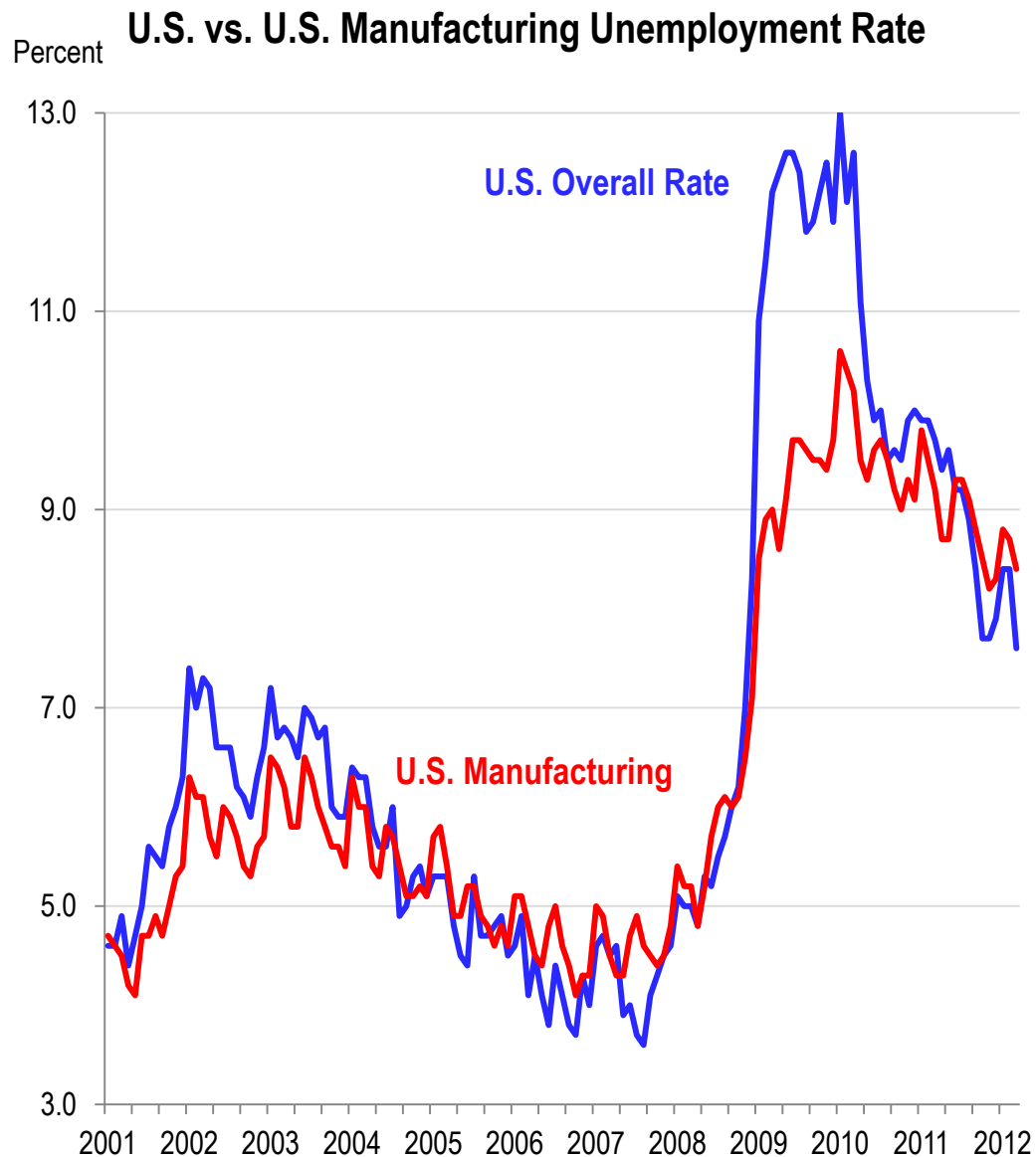
Source: Bureau of Economic Analysis.

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- U.S. Manufacturing Unemployment Rate Higher than Overall Rate

Throughout both recessions the unemployment rate for the Manufacturing sector was lower than the overall unemployment rate.

With the recent improvement in the economy, the U.S. unemployment rate dropped below the rate for the manufacturing sector.



Source: Bureau of Labor Statistics, NSA.



Summary of U.S. Manufacturing Data

The Good News

- Manufacturers have increased shipments and output.
- Manufacturing output has grown in all regions of the country. It has grown the fastest in the Rocky Mountain Region, Plains, Southwest, and Far West.
- Manufacturers have maintained their competitiveness by improving processes and increasing productivity.
- There has been an increase in the average number of hours worked by production workers.
- Manufacturers have begun to add workers – slowly.

The Challenges

- Manufacturing was hit harder during the Great Recession than in the 2001 recession.
- Increased productivity has come as a result of investments in capital and processes rather than labor.
- High unemployment rates and lack of wage increases suggest there may not be sufficient demand for sustainable strength.
- At the end of 2012, unemployment in the manufacturing sector was higher than overall unemployment.
- Manufacturing purchasing managers became less optimistic about their industry as 2012 progressed.
- Producer prices increased in key sectors.

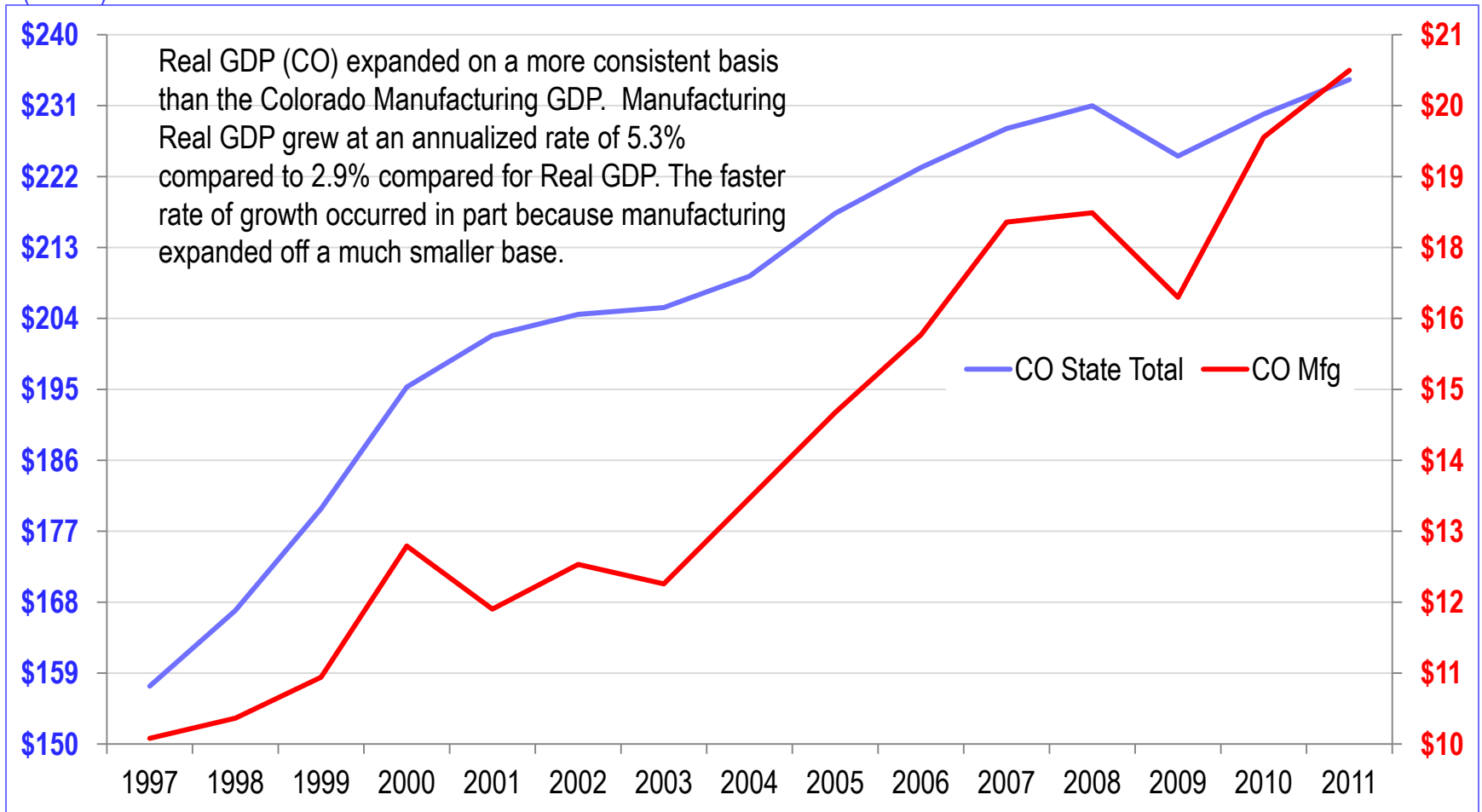


Colorado Manufacturing

CO Manufacturing Real GDP vs. CO Real GDP (State Totals Chained 2005 Dollars)

(Billions) CO GDP

(Billions) Manufacturing GDP



Source: Bureau of Economic Analysis.



Colorado Hours Worked (Production Workers)

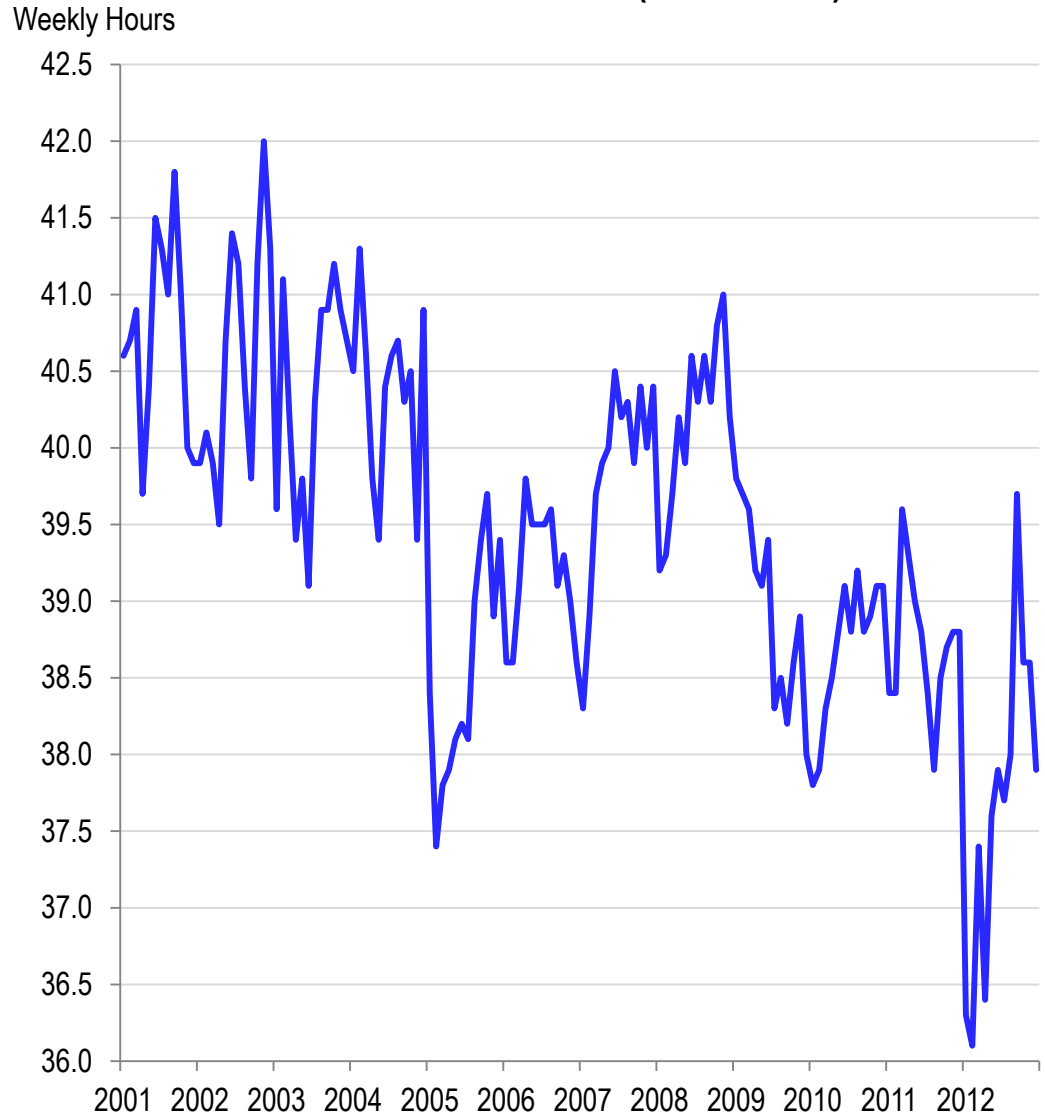
The number of hours worked is an indicator of the health of the industry.

In late 2011, the number of hours worked by Colorado production workers has declined.

During 2012, the number of hours worked by Colorado production workers was in the range of 36.1 to 39.7. Nationally the hours worked ranged between 41.3 to 42.3.

This suggests that Colorado manufacturers have not recovered from the Great Recession as rapidly as the U.S. manufacturers.

Colorado Hours Worked (Production)



Source: Bureau of Labor Statistics.

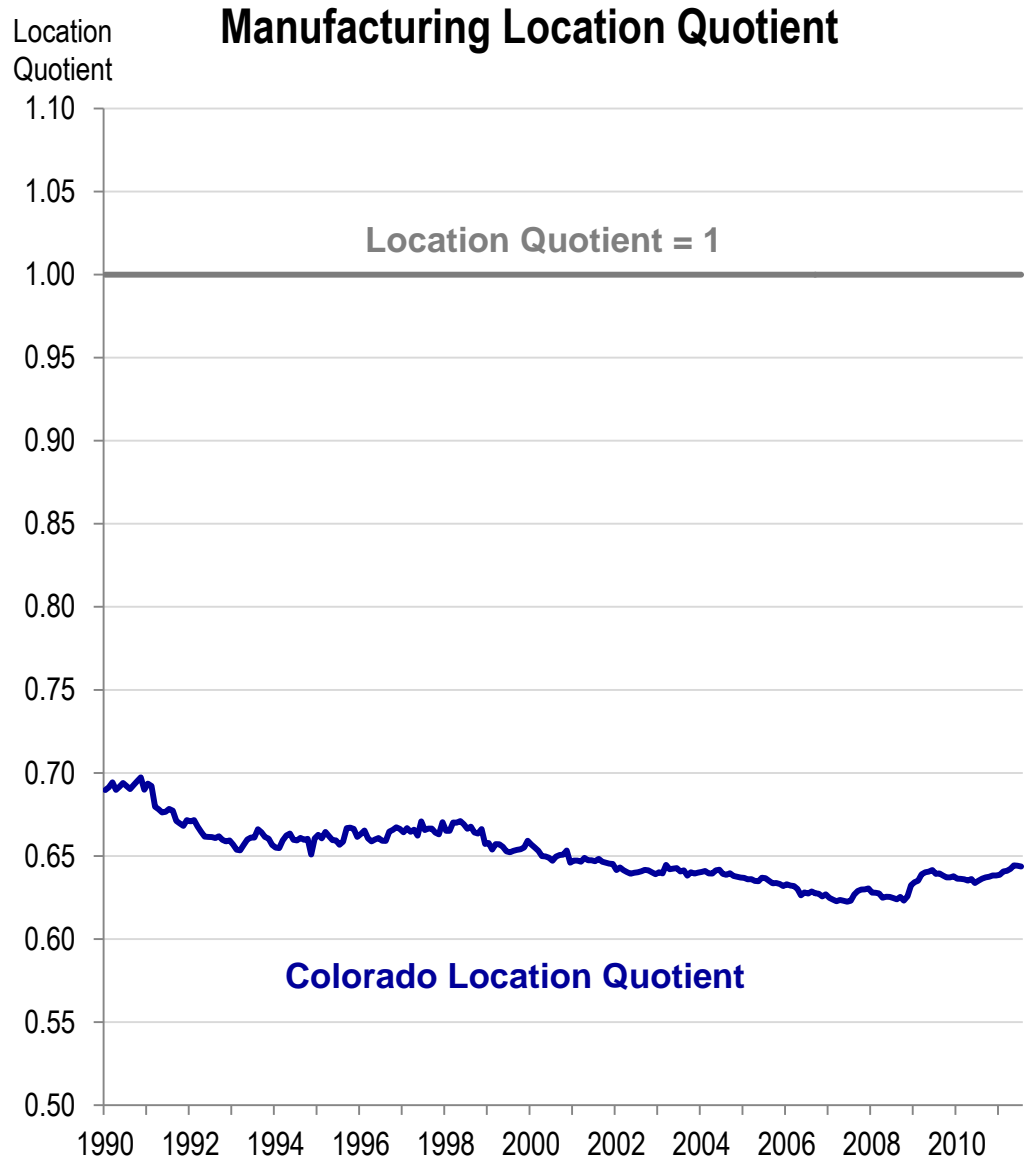
Concentration of State Manufacturing Workers Declining

A location quotient (LQ) is the local concentration of workers in a particular sector relative to the concentration in another area (typically the other area is the United States). If the local concentration is the same as the national concentration, the LQ=1.

The Colorado LQ for manufacturing is .645. In December 2012:

- 5.72% of Colorado employment was manufacturing
- 8.87% of U.S. employment is manufacturing.
- $5.72\% / 8.87\% = .645$

Colorado has a lower concentration of manufacturing than the U.S.



Note: Location quotient based on all wage and salary workers.

Source: Bureau of Labor Statistics, SA.

Manufacturing Competencies by Metro Areas

2011 Location Quotients (Concentration Relative to the US) > 1.17

Larimer County
312 Beverage 5.48
333 Machinery 2.11
334 Computers 3.79

Boulder County
312 Beverage 1.52
315 Apparel 1.22
325 Chemical 1.68
334 Computers 5.59
339 Miscellaneous 1.25

Mesa County
312 Beverage 1.63
314 Textile Products 3.51
327 Non-Metallic 2.21

Denver and Surrounding Counties
312 Beverage Denver 2.48, Jefferson (not disclosed)
324 Petroleum Adams 4.59
327 Non-Metallic Adams 1.83, Douglas 1.24, Jefferson 2.06
334 Computers Adams 1.66, Broomfield 5.34
336 Transportation Jefferson (not disclosed)
337 Furniture Adams 1.36, Broomfield 9.31
339 Miscellaneous Broomfield 2.30, Douglas 2.08, Jefferson 3.07
Note: Arapahoe does not have manufacturing competencies.

Weld County
311 Food 5.43
321 Wood Products 1.36
325 Chemical 1.18
327 Non-Metallic 2.62
332 Fabricated Metal 1.35
337 Furniture 2.28

El Paso County
334 Computers 2.40
339 Miscellaneous 1.52

Pueblo County
327 Non-Metallic 2.81
332 Fabricated Metal 1.42

Many of the manufacturing sectors with LQs > 1.17 are located in multiple metro areas, for example Boulder, Denver, Jefferson, Larimer, and Mesa have competencies in the 312 Beverage sector.

Note: Metro Areas/Counties may be different from MSAs.

Location Quotients not calculated with data is not disclosed.

LQs greater than 1.2 are considered "export industries", 1.17 was used to include the 325 Chemicals in Weld County.

Source: Bureau of Labor Statistics, QCEW.

Manufacturing Competencies by NAICS

Sectors with Competencies (LQ>1.17) in Multiple Counties

312 Beverage
 Larimer 5.48
 Denver 2.48
 Mesa 1.63
 Boulder 1.52
 Jefferson (not disclosed)

325 Chemical
 Boulder 1.68
 Weld 1.18

337 Furniture
 Broomfield 9.31
 Weld 2.28
 Adams 1.36

327 Non-Metallic
 Pueblo 2.81
 Weld 2.62
 Mesa 2.21
 Jefferson 2.06
 Adams 1.83
 Douglas 1.24

339 Miscellaneous
 Jefferson 3.07
 Broomfield 2.30
 Douglas 2.08
 El Paso 1.52
 Boulder 1.25

332 Fabricated Metal
 Pueblo 1.42
 Weld County 1.35

334 Computers
 Boulder 5.59
 Broomfield 5.34
 Larimer 3.79
 El Paso 2.40
 Adams 1.66

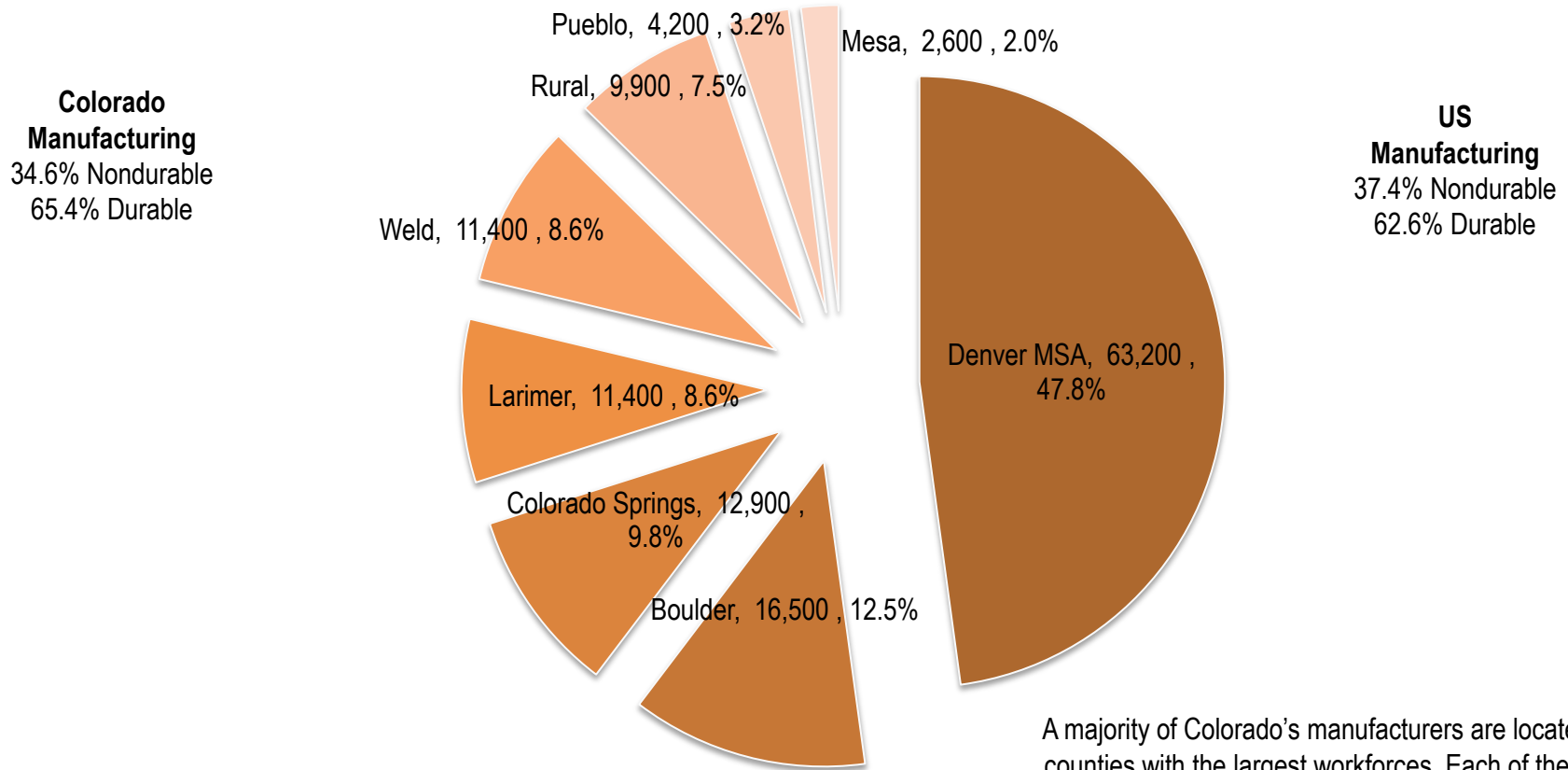
This table includes the NAICS sectors with LQs>1.17 that have competencies in multiple counties.

Note: Metro Areas/Counties may be different from MSAs.
 Location Quotients not calculated with data is not disclosed.
 LQs greater than 1.2 are considered "export industries", 1.17 was used to include the 325 Chemicals in Weld County.

Source: Bureau of Labor Statistics, QCEW.

Manufacturing by Colorado MSA - 2012

Colorado Manufacturing Employment by Region (MSA) – 132,100 Workers



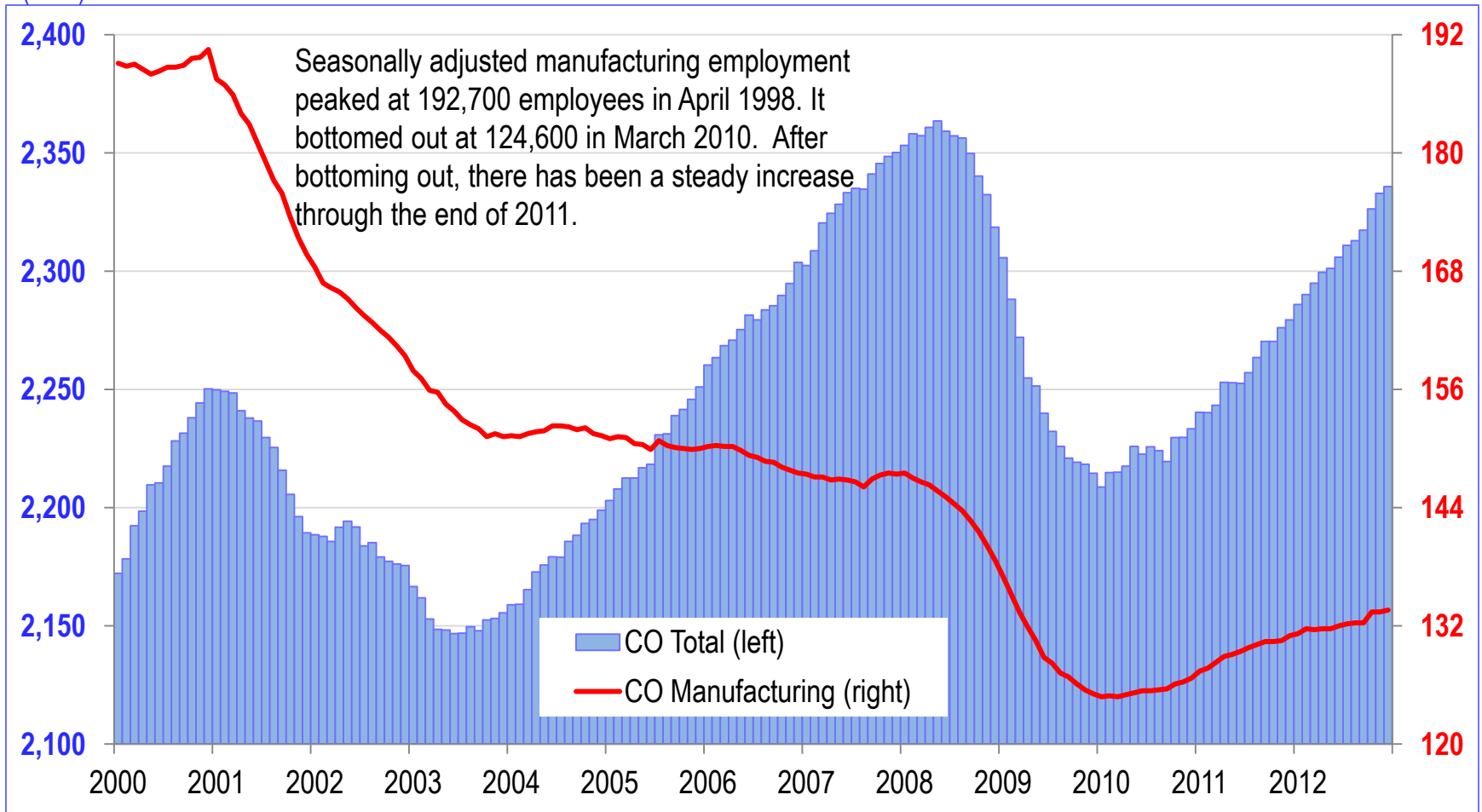
A majority of Colorado's manufacturers are located in the counties with the largest workforces. Each of the regions have distinct competencies, yet there are industries and clusters that are spread across multiple counties.

Source: Bureau of Labor Statistics - CES.

Colorado Employment vs. Manufacturing Employment

(000s) Colorado

(000s) Manufacturing

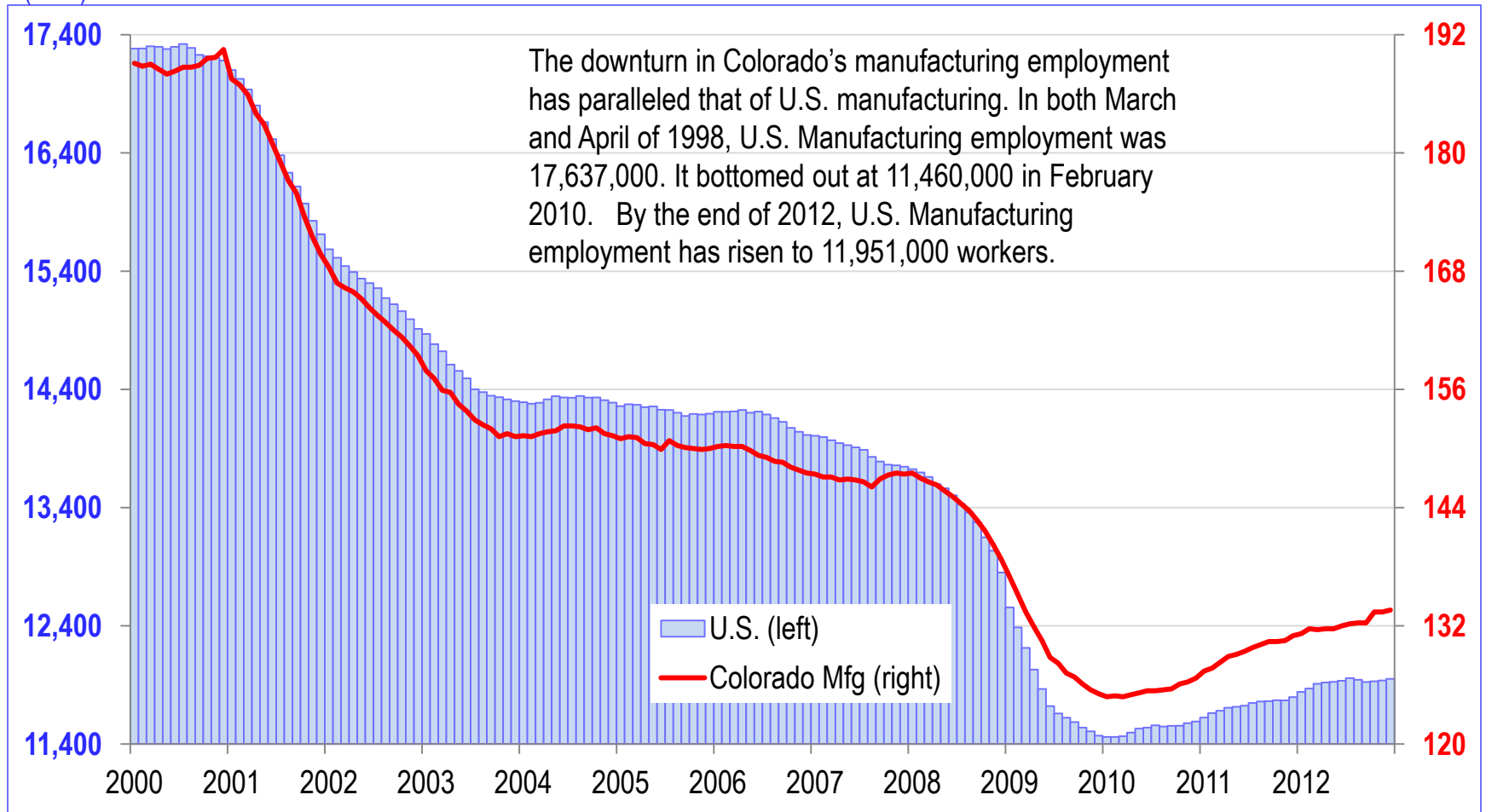


Source: Bureau of Labor Statistics, SA.

Colorado Manufacturing Employment vs. U.S. Manufacturing Employment

(000s) U.S.

(000s) CO

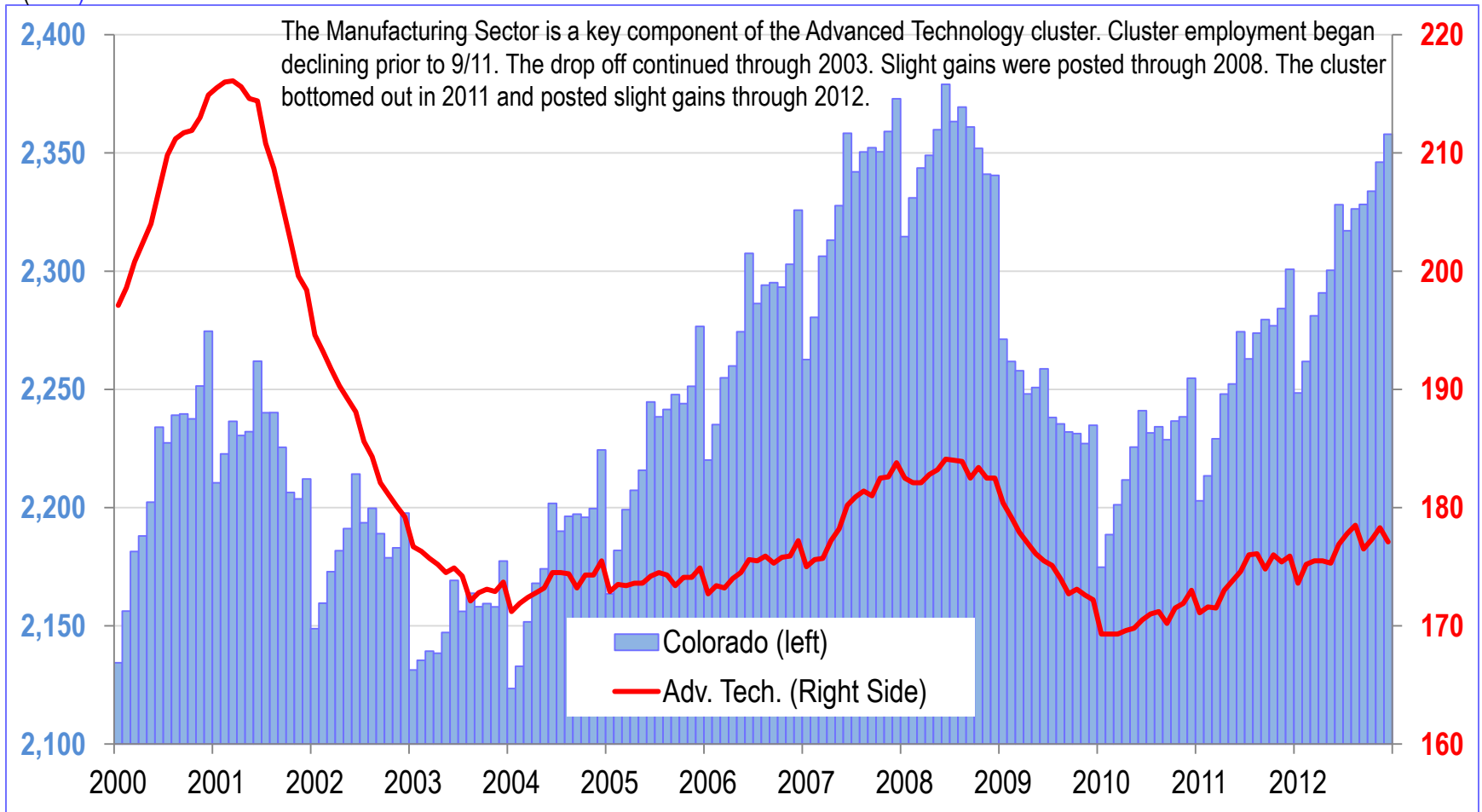


Source: Bureau of Labor Statistics, SA.

Colorado Employment vs. High Tech Employment

(000s) Colorado

(000s) Adv. Tech.

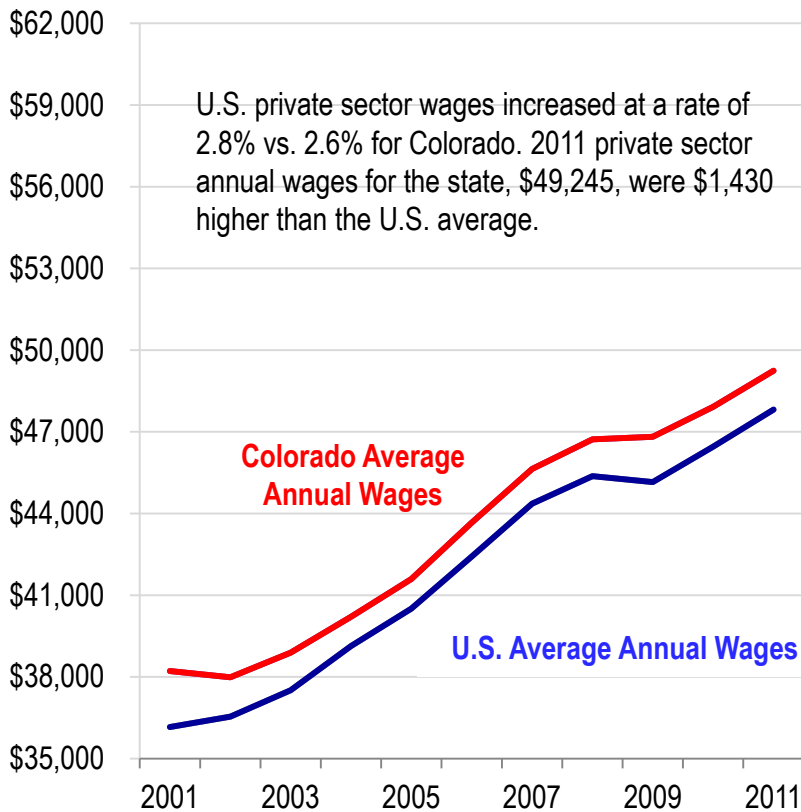


Source: Bureau of Labor Statistics, CDLE, NSA.

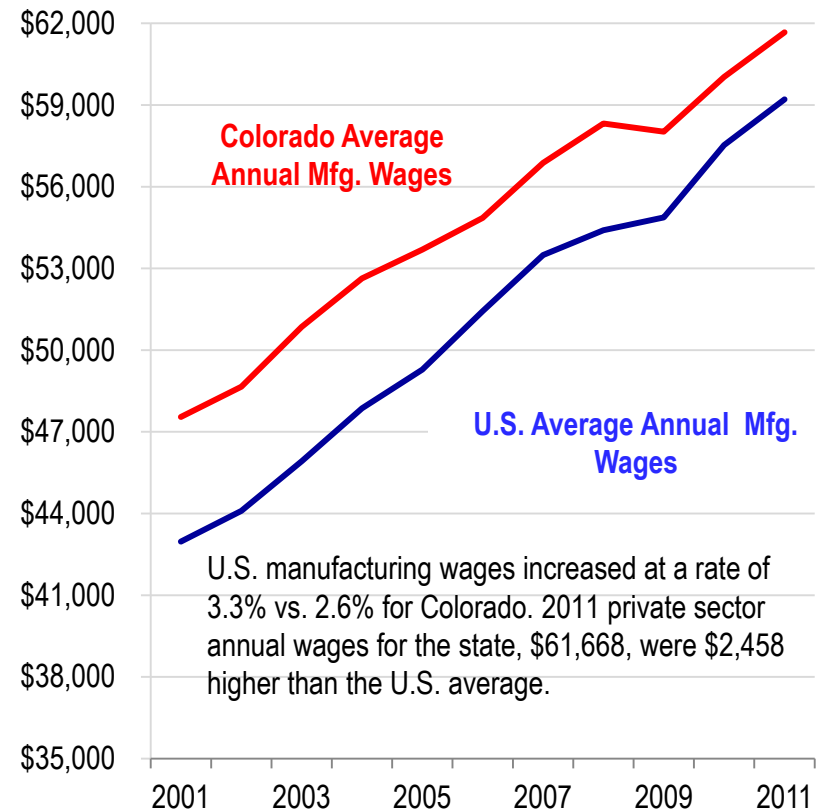
U.S. and Colorado Average Annual Wages

Private Sector vs. Manufacturing

**US vs Colorado Average Annual Wages
Private Sector**



**US vs Colorado Average Annual Wages
Manufacturing Sector**



Source: Bureau of Labor Statistics.

Examples of Products in Durable and Nondurable Goods NAICS Categories

Durable Goods

- **321 Wood products**- lumber, plywood, veneers, wood containers, wood flooring, wood trusses, manufactured homes, and prefabricated wood buildings
- **327 Nonmetallic mineral products**-bricks, ceramics, glass, cement, cut stone products, and mineral wool.
- **331 Primary metals**-smelt and/or refine metals; metal alloys and super alloys.
- **332 Fabricated metals**-forging, stamping, bending, forming, and machining, welding and assembling, machine shops.
- **333 Machinery**-agricultural, construction, mining, industrial and mining equipment: HVAC systems; engines, turbines, and power transmission equipment.
- **334 Computers**-computers, computer peripherals, communications equipment, and components.
- **335 Electrical equipment**-products that generate, distribute and use electrical power (lamp bulbs, lighting fixtures, appliances, parts, electric motors, generators, transformers, and switchgear apparatus).
- **336 Transportation equipment**- equipment and parts for each mode of transport -road, rail, air, and water.
- **337 Furniture** – Furniture made of any material, especially wood and metal.
- **339 Miscellaneous**-medical equipment and supplies, jewelry, sporting goods, toys, and office supplies.

Nondurable Goods

- **311 Food**-Animal food, grain and oilseed milling, sugar, chocolate, fruit and vegetable preserving, dairy products, animal slaughtering, seafood preparation, bakeries, and tortillas.
- **312 Beverage**-Soft drink, ice, breweries, wineries, distilleries, tobacco.
- **313 Textile mills**-Fiber, yarn, thread, fabric, textiles, fabric finishing, fabric coating.
- **314 Textile products**-Carpet, rugs, curtains, linen, textile bags, canvas, rope, cordage, twine, tire cord, and tire fabrics.
- **315 Apparel**- Hosiery, socks, cut and sew contractors, apparel accessories.
- **316 Leather goods** – Hide tanning, footwear, luggage, and handbags.
- **322 Paper** - Pulp, paper, and paperboard mills; boxes, bags, stationery, sanitary paper products.
- **323 Printing** –Commercial printing, screen printing, book printing.
- **324 Petroleum** - Refineries; asphalt paving, roofing, and saturated materials; petroleum, lubricating, oil, and grease manufacturing.
- **325 Chemicals** - Resin, synthetic rubber, pesticides, fertilizer, pharmaceuticals, paint, coatings, adhesives, soap, ink, explosives.
- **326 Plastics** - Plastics products such as bags, pipes, foam, bottles. Rubber products such as tires, hose, and belting.

Nondurable Goods Employment Food Products Leads Job Gains

Sectors adding jobs in 2011 less 2009 (blue)

- Food (+1,064)
- Plastics (+610)
- Beverage (+174)

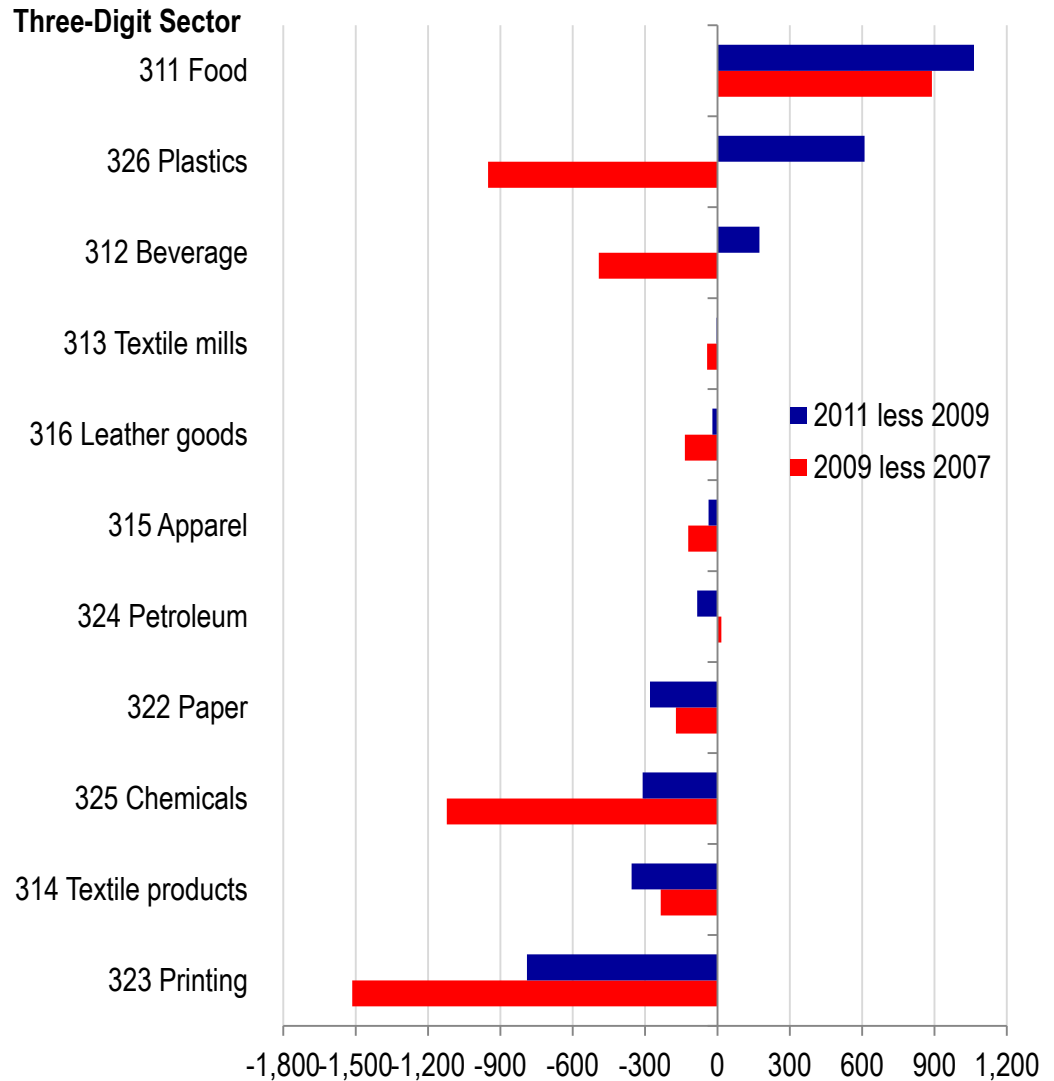
Sectors adding jobs in 2009 less 2007 (red)

- Food (+889)
- Petroleum (+16)

Only the Food sector added jobs during both periods.

Printing and Chemicals posted the greatest losses (combined) for both years.

Change in Nondurable Goods Employment
2009 less 2007 and 2011 less 2009 (sorted by 2011 less 2009)



Source: Bureau of Labor Statistics, QCEW.

Few Sectors Report Gains Durable Goods Employment

Sectors adding jobs in 2011 v 2009 (blue)

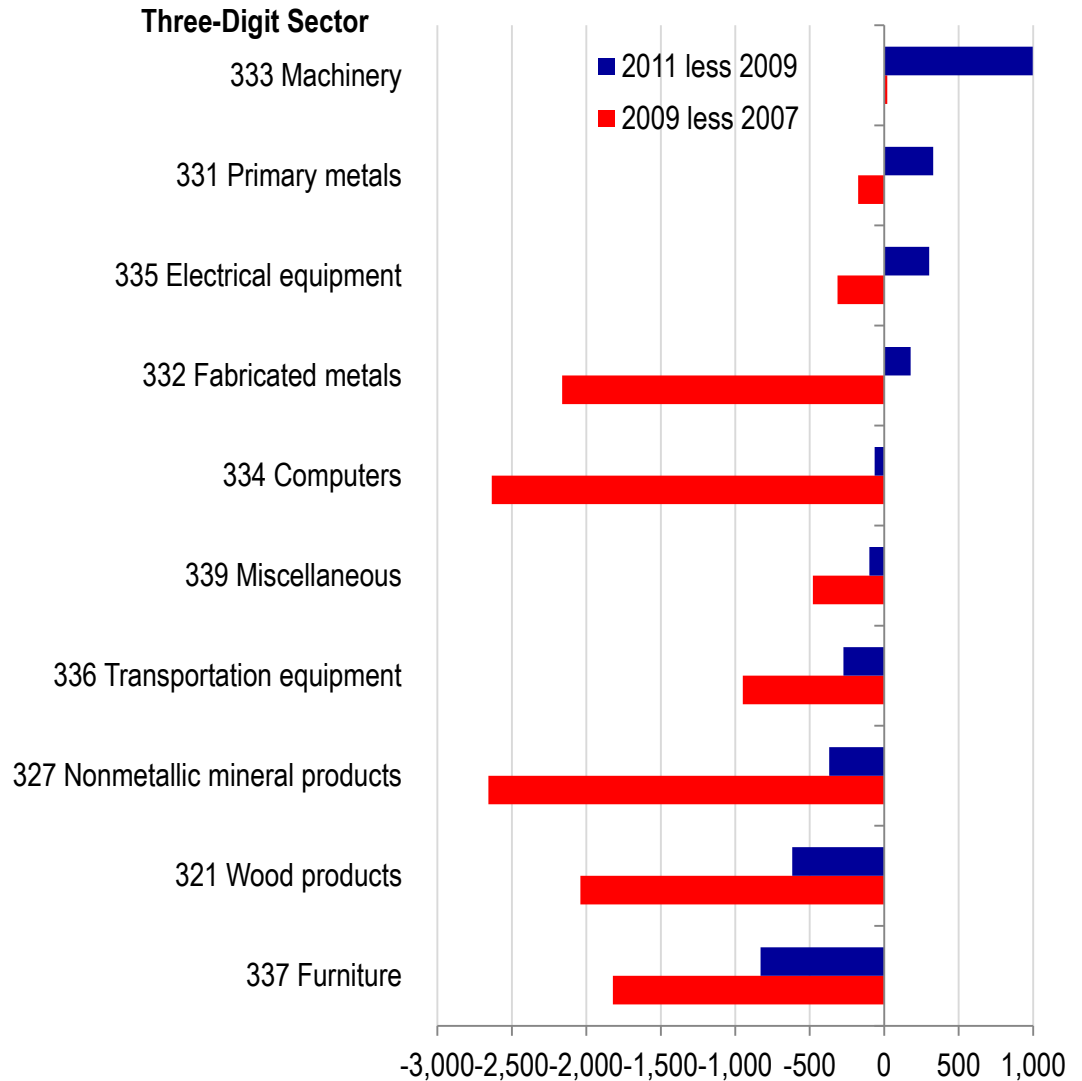
- Machinery (+997)
- Primary metals (+329)
- Electrical equipment (+302)
- Fabricated metals (+177)

Sectors adding jobs in 2009 v 2007 (red)

- Machinery (+21)

Nonmetallic Mineral Products and
Computers incurred the greatest job losses
(combined).

Change in Durable Goods Employment
2009 less 2007 and 2011 less 2009 (sorted by 2011 less 2009)



Source: Bureau of Labor Statistics, QCEW.

2011 Employment in Manufacturing Three-Digit Sectors

In 2011, there were 129,159 employees in the 21 manufacturing sectors.

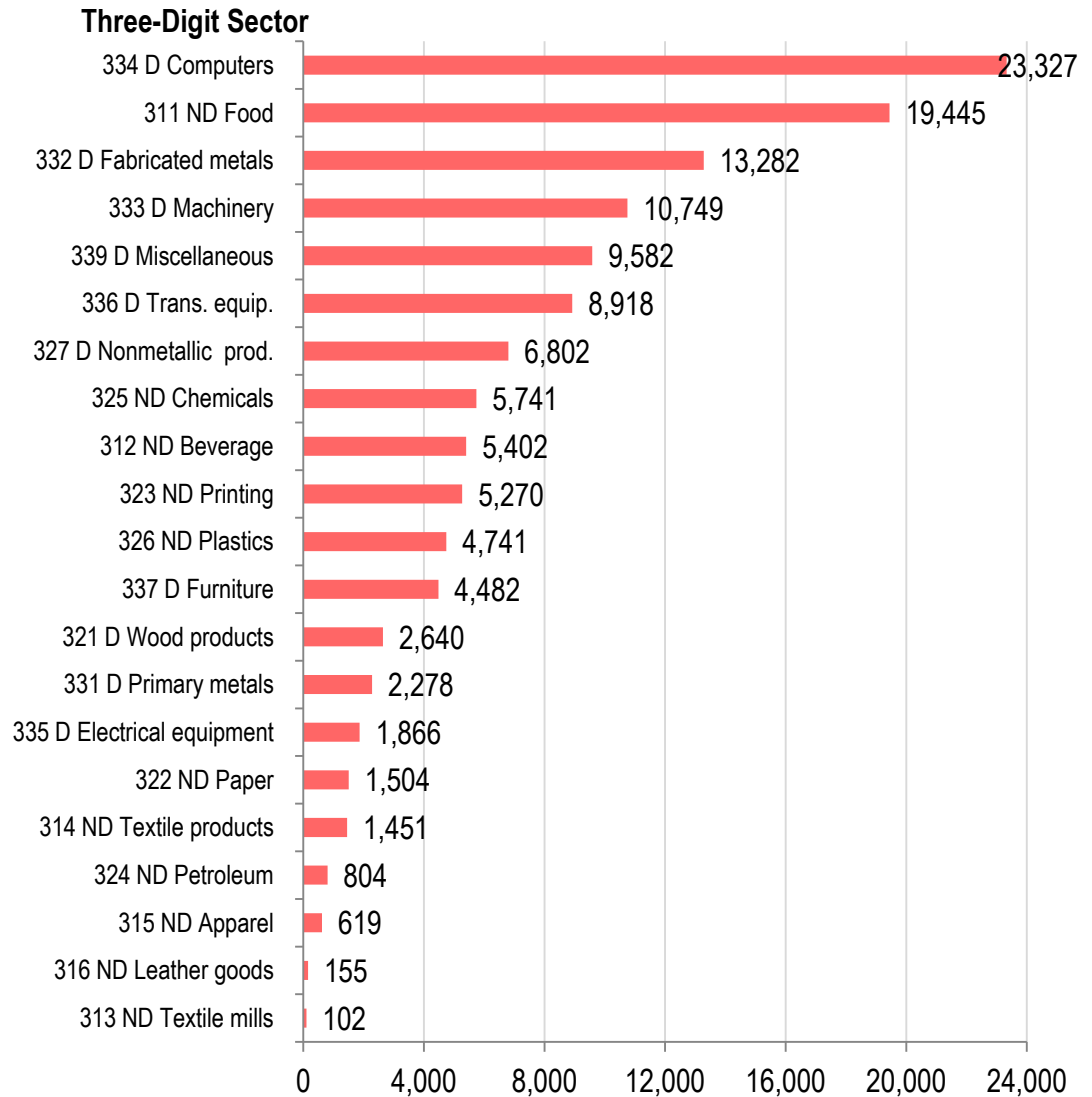
The Durable Goods sectors with the greatest number of workers were:

- 334 Computers
- 332 Fabricated metals
- 333 Machinery
- 339 Miscellaneous
- 336 Transportation

The Nondurable Goods sectors with the greatest number of employees were:

- 311 Food
- 325 Chemicals
- 312 Beverage
- 323 Printing
- 326 Plastics

Number of Employees in Manufacturing Sectors 2011



Note: D = Durable Goods and ND = Nondurable Goods.

Source: Bureau of Labor Statistics.

2011 Number of Establishments in Manufacturing Three-Digit Sectors

In 2011, there were 5,278 establishments in the 21 manufacturing sectors.

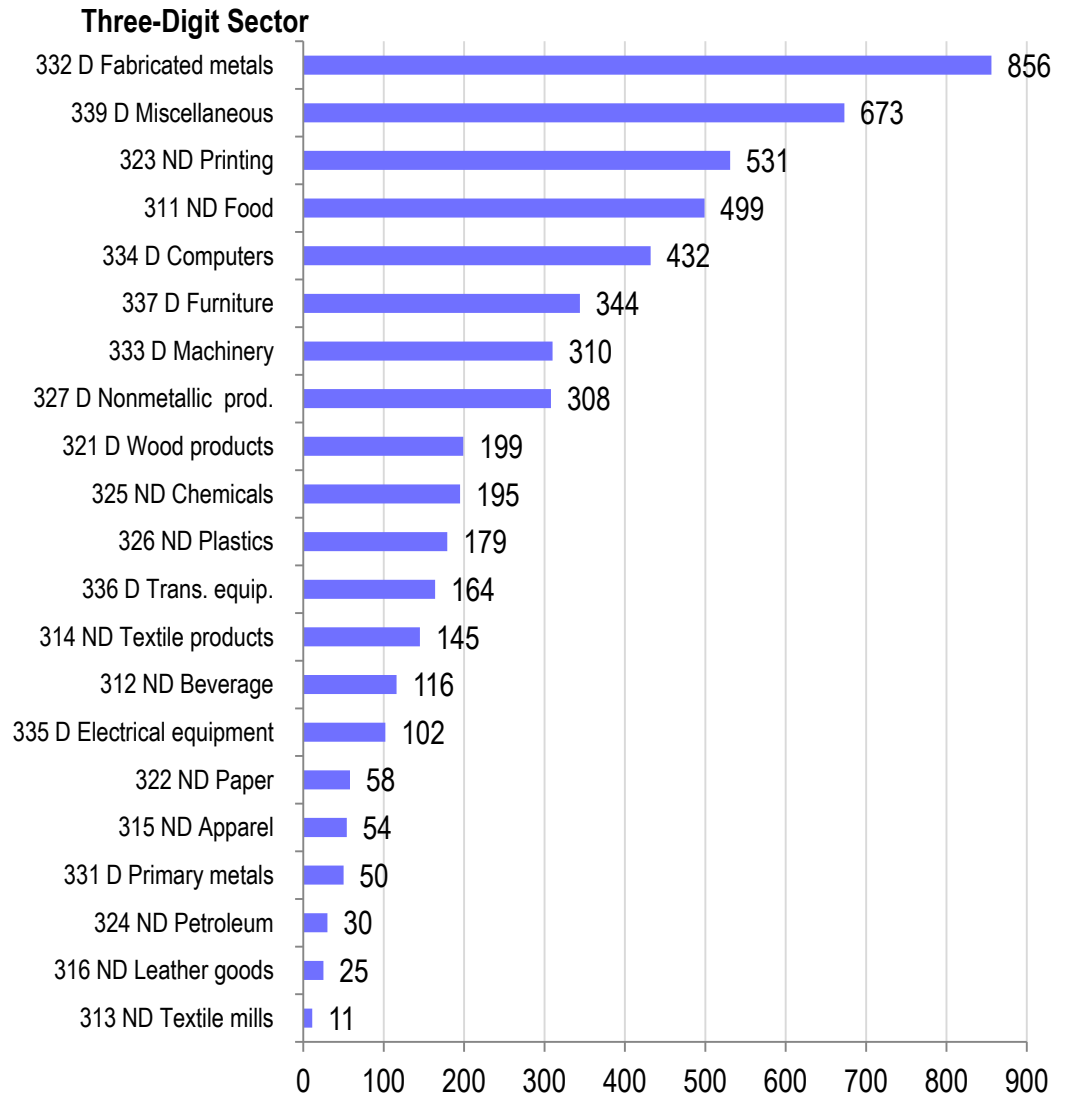
The Durable Goods sectors with the greatest number of establishments were:

- 332 Fabricated metals
- 339 Miscellaneous
- 334 Computers
- 337 Furniture
- 333 Machinery

The Nondurable Goods sectors with the greatest number of establishments were:

- 323 Printing
- 311 Food
- 327 Nonmetallic mineral products
- 325 Chemicals
- 326 Plastics

Number of Establishments in Manufacturing Sectors 2011



Note: D = Durable Goods and ND = Nondurable Goods.

Source: Bureau of Labor Statistics.

2011 Average Number of Workers per Manufacturing Establishment in 2011 by Three-Digit Sector

In 2011, the average number of workers per manufacturing establishment for Colorado was 24.

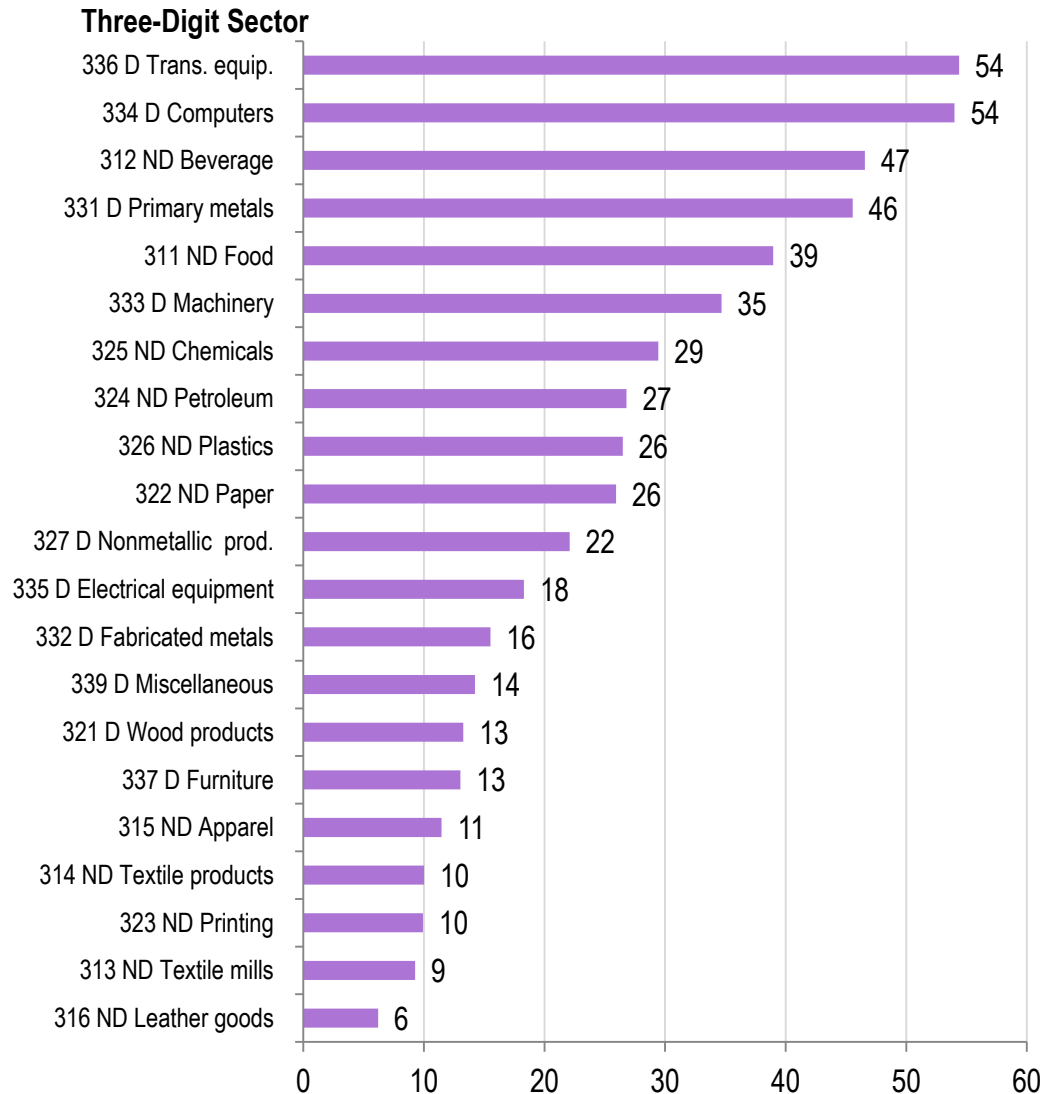
The Durable Goods sectors with the largest average size were:

- 336 Transportation equipment
- 334 Computers
- 331 Primary metals
- 333 Machinery

The Nondurable Goods sectors with the largest average size were:

- 312 Beverage
- 311 Food
- 325 Chemicals
- 324 Petroleum

Average Workers per Manufacturing Establishment



Note: D = Durable Goods and ND = Nondurable Goods.

Source: Bureau of Labor Statistics.

2011 Average Annual Wages per Manufacturing Three-Digit Sector

In 2011, the average annual wages per three-digit manufacturing sector was \$61,668.

Of the 21 sectors, 5 have average annual wages above the Manufacturing average:

- 324 ND Petroleum \$106,413.
- 334 D Computers \$94,452
- 336 D Transportation equipment \$91,340
- 325 ND Chemicals \$75,217
- 312 ND Beverage \$62,099

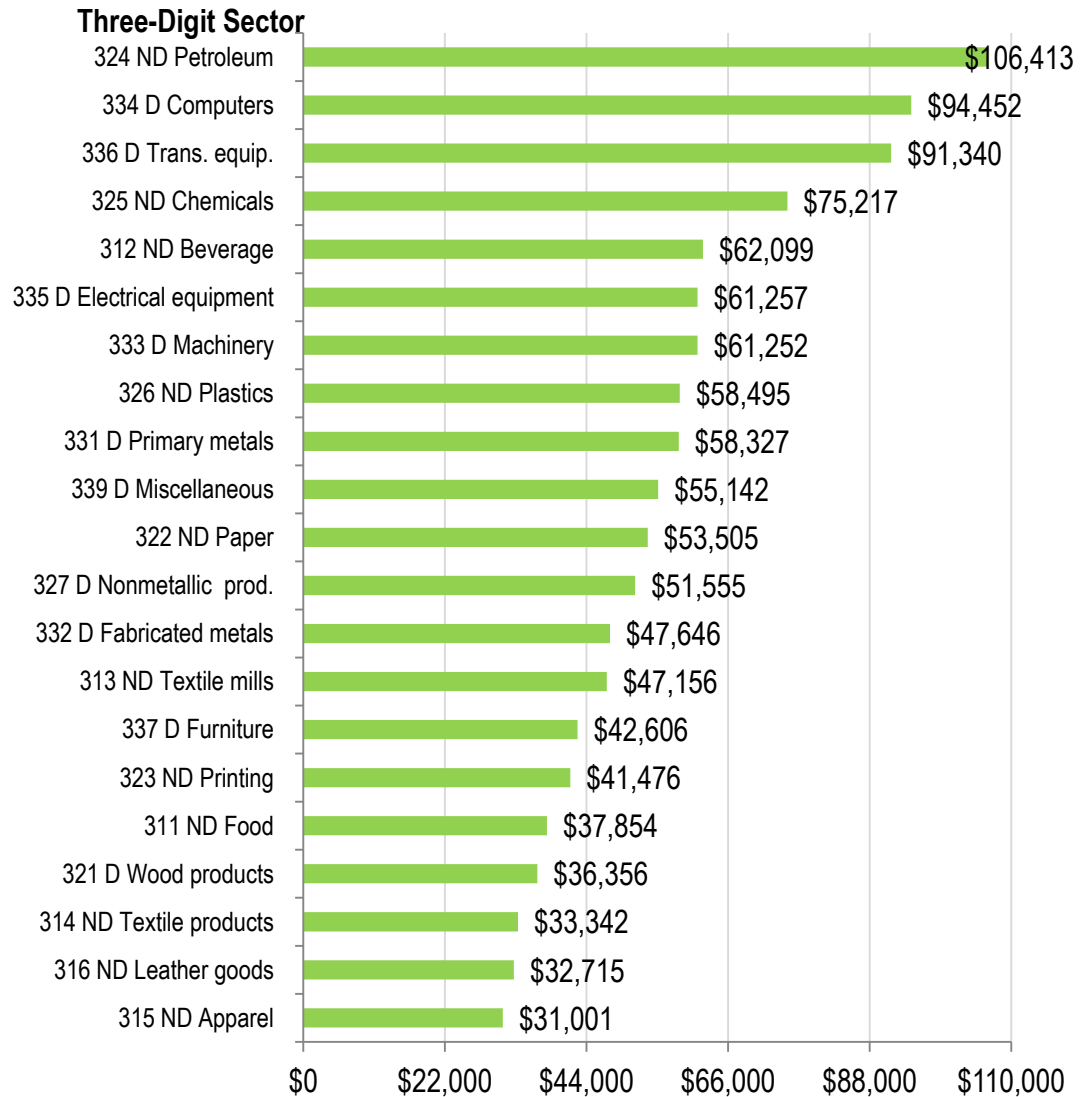
The following two sectors have wages similar to the Manufacturing average:

- 333 D Machinery \$61,252
- 335 D Electrical equipment \$61,257

The top companies are a mix of durable and nondurable goods manufacturers.

Of the 21 sectors, 14 have average annual wages below the sector average.

Average Annual Wages per Manufacturing Sector



Note: D = Durable Goods and ND = Nondurable Goods.

Source: Bureau of Labor Statistics.

Annualized Rate of Change
 Employees vs. Establishments,
 2002 vs. 2011, Nondurable
 Sectors

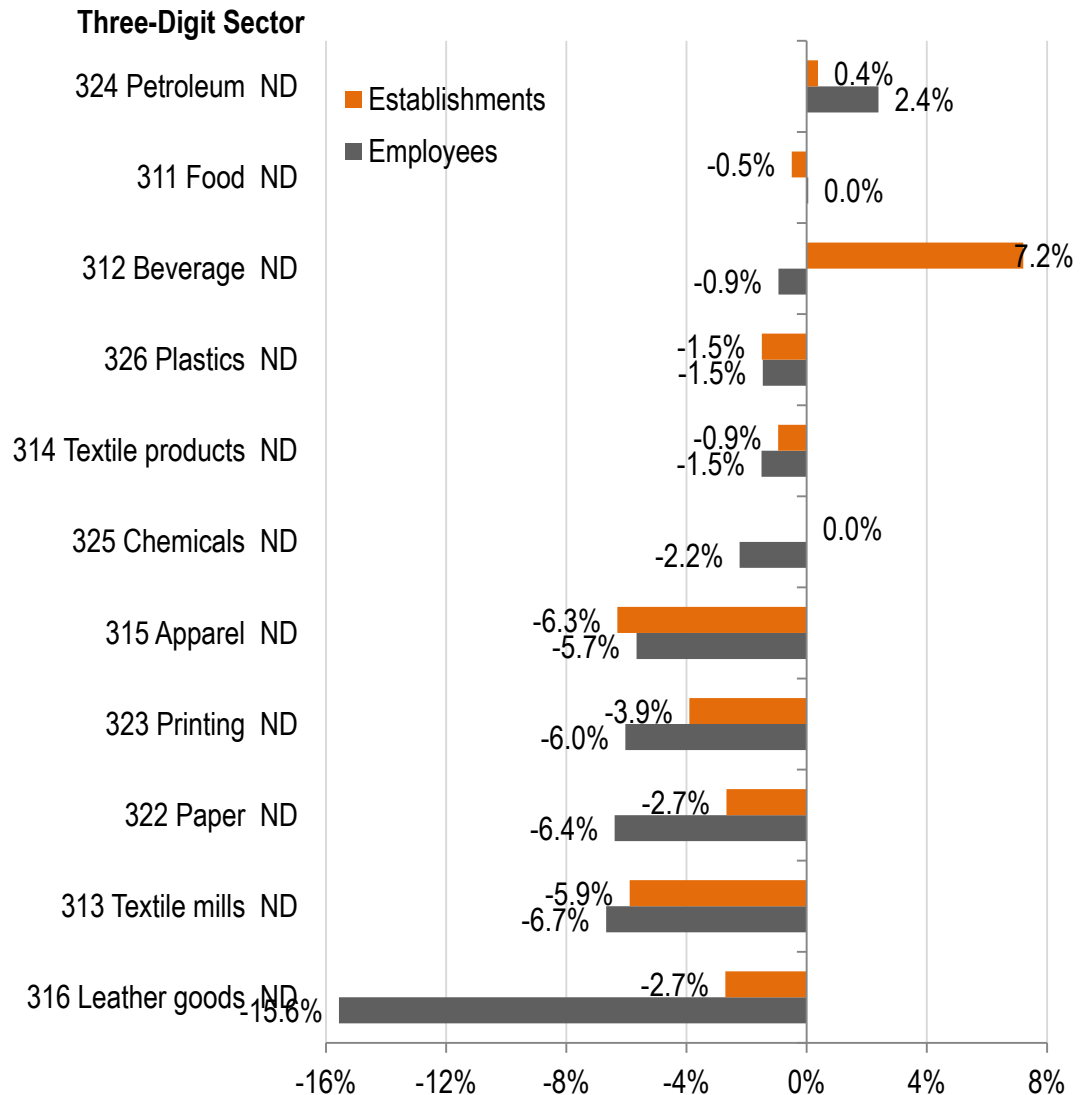
The adjacent chart is sorted by the annualized rate of change in the number of employees (gray) for the period 2002 to 2011.

Only the Petroleum sector showed an increase in both employees and the number of establishments for this period.

The Food sector gained had the same number of establishments in 2011 as in 2002, but fewer workers. The Chemicals sector had the same number of workers, but fewer establishments.

The sectors with the largest losses were typically smaller sectors.

Annualized Change, Employees vs. Establishments



Source: Bureau of Labor Statistics.

Annualized Rate of Change Employees vs. Establishments, 2002 vs. 2011, Durable Sectors

The adjacent chart is sorted by the annualized rate of change in the number of employees (gray) for the period 2002 to 2011.

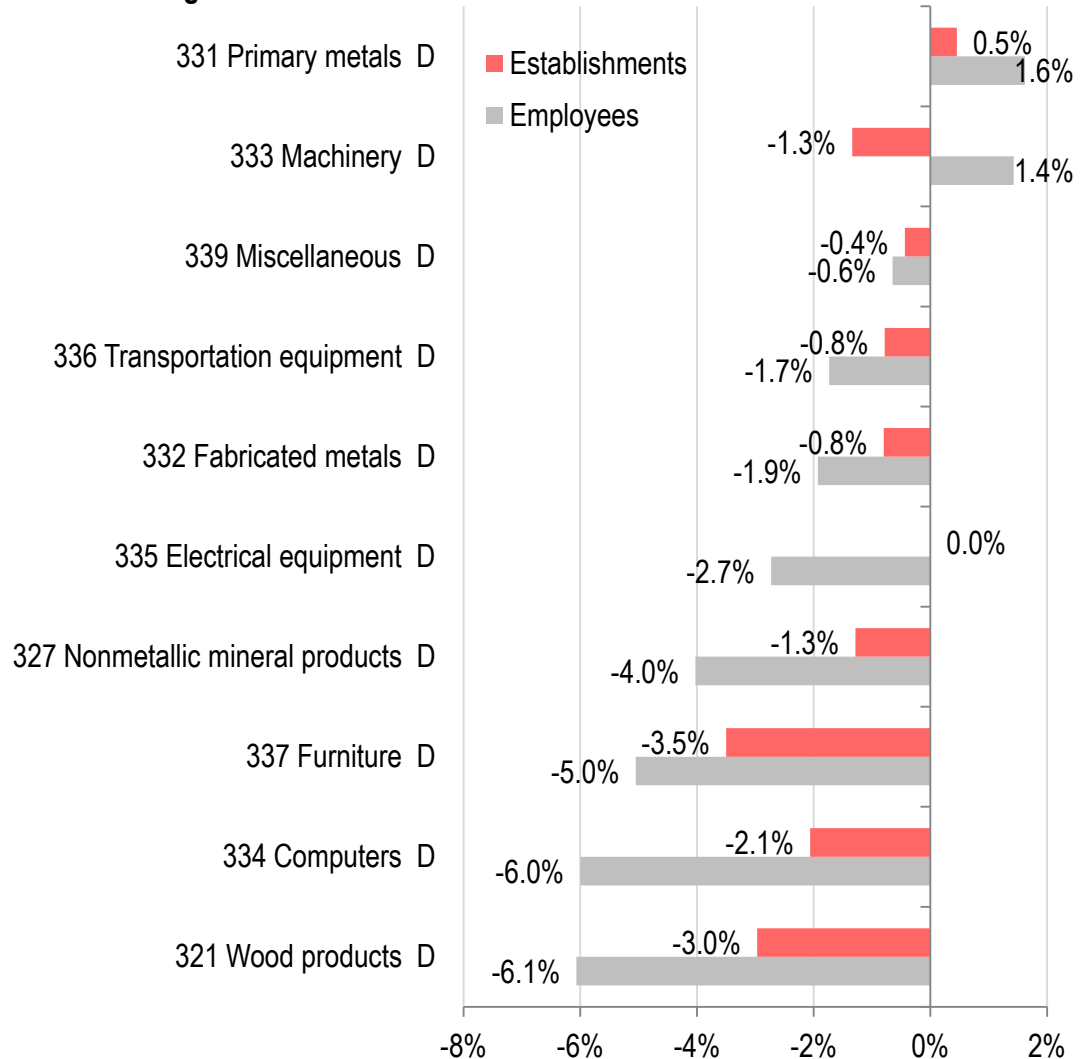
Only the Primary metals sector posted increases in the number of workers and establishments for this period.

The Machinery sector added workers during this period, but saw a decline in establishments.

The number of Electrical equipment establishments was unchanged for the period 2002 to 2011.

Annualized Change, Employees vs. Establishments

Three-Digit Sector



Note: D = Durable Goods and ND = Nondurable Goods.

Source: Bureau of Labor Statistics.



Summary of Colorado Manufacturing Data

The Good News

- Manufacturing output has grown faster than overall output.
- Multiple counties in the state's metro areas have competencies in the following manufacturing areas: beverages, computers, chemicals, nonmetallic minerals, furniture, fabricated metals, and miscellaneous manufacturing.
- Manufacturing is a critical component of Colorado's advanced technology cluster.
- Colorado's average annual manufacturing wages are greater than U.S. average annual manufacturing wages.
- Between 2009 and 2011 the food, plastic, and beverage sectors showed job gains in nondurable manufacturing.
- Between 2009 and 2011 the machinery, primary metals, electrical equipment, and fabricated metals posted gains in durable good manufacturing.
- Overall, manufacturers have begun to add workers – slowly.

The Challenges

- Colorado manufacturers have not recovered from the Great Recession as rapidly as the U.S. manufacturers, as measured by the hours worked for production workers.
- Colorado has a low concentration (location quotient < 1.0) of manufacturers. That concentration is declining.



Challenges for Colorado Manufacturers

Demand

- Given the improvement in the economy, will there be increased demand for manufactured goods?
- Will manufacturers be able to pass on increased input costs to customers and maintain demand?
- How much longer can shipments and output increase without significant increases in the size of the workforce?

Workforce

- What is being done to address the mismatch between the skills that manufacturers need and a differing set of skills in the workforce?
- What is the role of the older worker in the workforce? Are there sufficient workers in the pipeline to replace them when they retire?
- Has Colorado lost its pool of trained workers as a result of the Lost Decade?
- What is being done to educate high school and college students about the importance of learning skills that can be transferred between professions?
- What type of training opportunities are available to meet the changing needs of the manufacturing workforce?

The Industry

- How will changes in the manufacturing sector affect the growth of Colorado's high tech cluster?
- Has Colorado lost its critical mass of manufacturers?
- Has Colorado lost the supply chain associated with the decline in its manufacturers?
- What is being done to retain existing manufacturers and attract new manufacturers?
- How will second and third generation manufacturers transition their businesses into the future?
- Will legislation be "friendly" to manufacturers and their supply chains?



Colorado Manufacturing Update Analysis of Employment Data Through 2012

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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