



## Women in Manufacturing

The manufacturing sector is vital to the overall health of the U.S. economy. Manufacturing provides jobs with good wages and solid benefits and helps to spur growth in other sectors of the economy. Despite its importance to the economy, employment in the sector has shrunk considerably since its peak in the late 1970s. There are, however, signs of recovery. Over the past several years the manufacturing industry has consistently added jobs—between February 2010 and April 2013, employment in the sector grew by 530,000 jobs.<sup>1</sup> (See Figure 1.) However, women, who make up nearly one-third of employees in the sector, have largely been excluded from the expansion, losing 28,000 manufacturing jobs during that period.<sup>2</sup>

With U.S. manufacturing making a comeback, this study highlights the role of women in the industry, including recent trends in women’s employment. It also explores barriers to employment and advancement that women face and actions that can be taken to eliminate those obstructions.

Manufacturers report having difficulty finding and retaining skilled labor, and that the resulting shortage is severe enough that it can impede production and innovation.<sup>3</sup> In fact, if manufacturing jobs were being filled at the same rate as they were before the recession, the unemployment rate in the industry would be about 1.5 percentage points lower than it is today.<sup>4</sup> Furthermore, the manufacturing workforce is aging faster than other segments of the economy; more than half of all manufacturing employees are 45 years or older.<sup>5</sup> The looming retirement of so many employees in the sector means that the demand for new talent to fill skilled production jobs will only grow.<sup>6</sup> Since women now make up nearly half the

total labor force, employers should look towards this underutilized pool of talent to meet their future manufacturing workforce demands. The economy and the nation can benefit from the skills, knowledge and leadership women can provide.

### The Importance of a Strong Manufacturing Sector

A robust manufacturing sector is crucial for economic growth. U.S manufacturing accounts for 12% of Gross Domestic Product (GDP) and, by itself, would rank as the tenth largest economy in the world.<sup>7</sup> Manufacturing is also vital to America’s competitiveness. Manufacturing accounts for 70% of research and development (R&D) carried out by



U.S. industry<sup>8</sup> and generates 90% of patents.<sup>9</sup> The National Association of Manufacturers estimates that “every \$1.00 in manufactured goods generates an additional \$1.48 worth of additional economic activity – more than any other economic sector.”<sup>10</sup>

Manufacturing also supports jobs in other segments of the economy. Research has shown that the employment multiplier is higher in manufacturing than in other sectors of the economy—each manufacturing job supports an additional 2.9 jobs in other industries, a much higher multiplier than for employment in retail trade or business services.<sup>11</sup> The larger manufacturing multiplier is partly explained by the large number of supplier jobs supported through manufacturing. For example, manufacturing jobs support more than four times as many supplier jobs as retail trade employment does.

Additionally, manufacturing jobs pay well—on average, hourly compensation is 17% higher than in other industries.<sup>12</sup> Higher earnings help explain the larger multiplier for manufacturing jobs than for jobs in other sectors that do not pay as well. Manufacturing jobs are more likely to come with benefits, including medical and retirement benefits, than service-sector jobs. They also are more likely to require on-the-job training than jobs in other segments of the economy.<sup>13</sup>

Despite the vital role manufacturing plays in economic growth by providing good-paying jobs and spurring growth in other sectors of the economy that support manufacturing, until recently, employment in the sector was declining. Manufacturing employment peaked at 19.6 million employees in June 1979, when 21.7% of the labor force was employed in this sector. The decline in manufacturing employment accelerated in the 2000s, and by the start of the recession in December 2007, only 10% of the labor force was employed in the manufacturing sector. Manufacturing was one of the hardest-hit industries during the recession, losing 15% of an already reduced workforce.

Even with the recent gains in manufacturing employment, the most recent data show that less than 9% of the total workforce is employed in

manufacturing.<sup>14</sup> But the growth over the past three years is a promising sign that this sector will continue to add jobs as the economy expands.

### Signs of Revival in American Manufacturing

Recent trends suggest that the current expansion in manufacturing may continue in the coming years. A handful of companies have already announced plans to move production operations back to the United States from overseas, including Caterpillar, GE and Ford. Lenovo, a computer manufacturer based in Beijing, opened a manufacturing plant in North Carolina in January of this year,<sup>15</sup> and BASF, a German-based chemical company, is also expanding operations in the U.S.<sup>16</sup>

Several factors have made locating or relocating production in the United States more attractive for companies. First, worker productivity in the U.S. continues to rise across all sectors, and it has risen faster than average in manufacturing. Between 1987 and 2008, U.S. manufacturing productivity grew at an annual rate of 3.4%, compared to 2.2% for all nonfarm business. At this rate of productivity growth, the amount a worker produced doubled in 20 years.<sup>17</sup> Since then, productivity gains in manufacturing have continued to exceed gains in the overall nonfarm business sector.<sup>18</sup>

Strong productivity performance in the United States is occurring at the same time as recent wage increases among key competitors, such as China. The shrinking gap in labor costs between workers in China and the United States has made the potential savings from employing Chinese workers smaller than in the past. In fact, by one estimate, the savings is on track to shrink from roughly \$17 per hour per worker in 2006 to about \$7 per hour per worker by 2015.<sup>19</sup> According to a survey of U.S. companies operating in China, 47% of respondents cited rising labor costs in China as the top threat to their business.<sup>20</sup>

The comparatively lower cost of available fuel that has resulted from the recent shale boom may also lure some manufacturing companies back to the

U.S., particularly those that use natural gas in their production activities.<sup>21</sup> Shale gas prices in the U.S. are less than a quarter of European and Asian prices, and manufacturing companies are expanding to take advantage of the lower costs.<sup>22</sup> Chemical manufacturing is particularly energy-intensive, and it is estimated that the industry will invest \$30 billion in the coming years to build chemical plants in the U.S. due to the availability and low price of natural gas.<sup>23</sup>

### Women's Role in Manufacturing

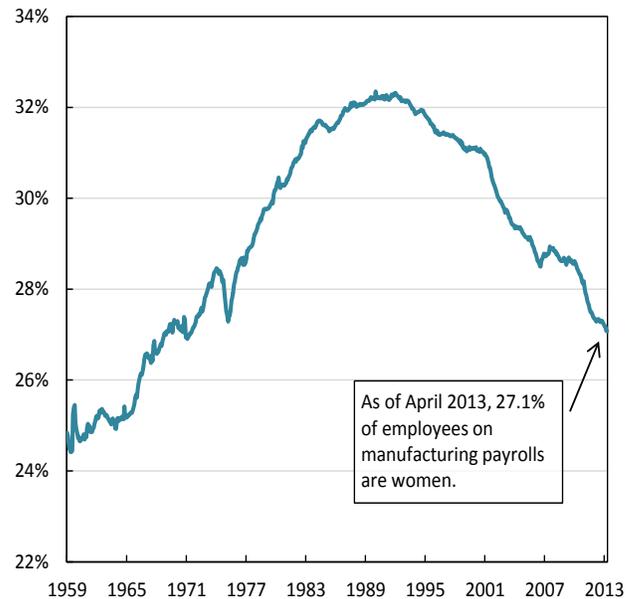
Amidst all the promising signs in U.S. manufacturing, one disparity continues to make headlines—the recent job gains in manufacturing have been largely among men.<sup>24</sup> While overall the sector has added 530,000 jobs since February 2010, men have gained 558,000 jobs during that time, and women have lost 28,000.<sup>25</sup>

Historically, men have held the majority of jobs in manufacturing. At its peak in 1990, women's share of employment in the sector was only about 32%. Since then, the share of female employees has steadily fallen, and it has continued to fall even as the sector has added jobs over the last three years. According to the National Women's Law Center, the job losses that occurred during the recession were borne proportionately by men and women, so the recent disproportionate gains by men "are not just a correction for men's recession losses."<sup>26</sup> Women's share of manufacturing employment is now 27%, the lowest it has been since 1971.<sup>27</sup> (See Figure 2.)

Detailed industries. Women are employed throughout the manufacturing industry.<sup>28</sup> Unlike men, whose employment is heavily weighted towards durable goods jobs, women's employment is more evenly split between durable and nondurable goods. In fact, of the 3.3 million women in manufacturing, roughly 1 in 6 (16%) work in

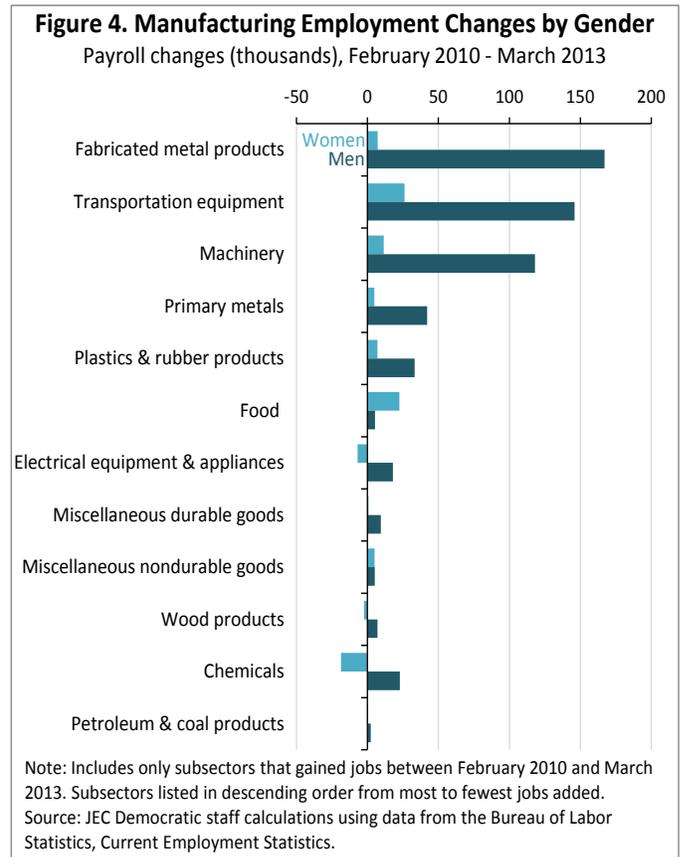
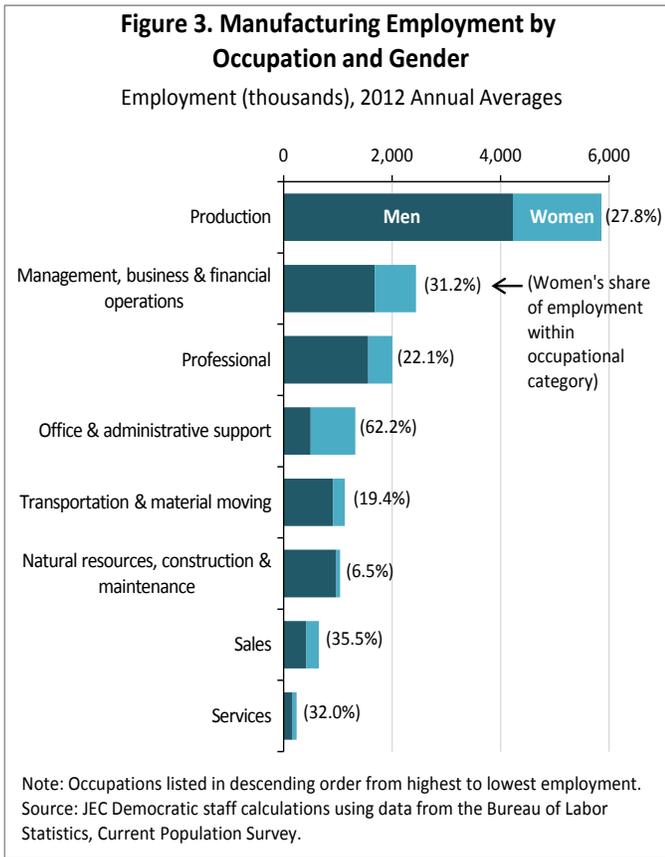
food manufacturing, a subsector of nondurable goods manufacturing. Manufacturing of transportation equipment and computer and electronics employ 11% and 10%, respectively, of women in the sector.

**Figure 2. Women's Share of Manufacturing Employment**  
Percent of total manufacturing payrolls, January 1959 - April 2013



Source: JEC Democratic staff calculations using data from the Bureau of Labor Statistics, Current Employment Statistics.

Occupations. Overall, fewer than 30% of manufacturing employees are women,<sup>29</sup> but women comprise larger shares of workers in some occupations within the manufacturing sector. Women make up over 62% of workers in office and administrative positions, and about 35% of sales employees. (See Figure 3.) They make up smaller shares of employment in production occupations; transportation and material moving; and natural resources, construction and maintenance. However, production is the largest category of employment within the industry, comprised of jobs ranging from first-line supervisors to welders to sewing machine operators, so more women work in production occupations than in any other category within manufacturing.



**The Shortage of Women in Manufacturing**

The decline in women’s manufacturing employment even as the sector is growing raises the question: why have women not shared in the recent job gains? Most of the overall job gains were concentrated in durable goods manufacturing, specifically in fabricated metals, transportation equipment and machinery. Smaller net gains were posted in primary metals, plastics and rubber products and food manufacturing. In all of these subsectors, as well as in food manufacturing, women saw small employment increases. (See Figure 4.) However, in most of the remaining subsectors, women’s employment fell regardless of whether men experienced small increases or decreases in employment. Clearly, the resurgence in manufacturing has not yet taken hold for women.

Research highlighting the shortage of women in manufacturing has focused on several issues that may be holding women back from playing a more prominent role in the industry. The first is the perception that manufacturing is a stagnant

industry. While some areas of U.S. manufacturing have shrunk as production has moved offshore, the sector is still about one-eighth of the economy, and has added over a half-million jobs since February 2010.

Additionally, the long-standing stigma that jobs in manufacturing require difficult physical labor and are only for men no longer holds true. Advances in technology have changed the way goods are produced, and many manufacturing jobs now require highly specialized technical skills and little physical labor. By one estimate, there are 600,000 openings for manufacturing jobs that require advanced skills.<sup>30</sup> Still, only 56% of Americans believe that manufacturing jobs are clean and safe, and 27% of Americans still do not view manufacturing as a high-tech industry.<sup>31</sup> Furthermore, only 35% of Americans would encourage their children to pursue a manufacturing career.<sup>32</sup> A recent survey of more than 600 women currently working in the manufacturing industry found that 70% of those women would encourage

their sons to pursue a manufacturing career, but only 55% would encourage their daughters to do the same.<sup>33</sup>

## Solutions

Among women already working in the industry, there is agreement that the factor contributing most to women's underrepresentation in manufacturing is the perception of a "male-favored culture."<sup>34</sup> Dispelling the myths about U.S. manufacturing is critical to attract more women to the sector. In addition, solutions should focus on:

- Increasing STEM (Science, Technology, Engineering and Mathematics) education participation and proficiency for girls beginning as early as elementary school;
- Equipping women with the skills and knowledge desired by employers to prepare them for careers in the growing segments of manufacturing through vocational and community college programs;
- Increasing the ranks of women in leadership roles, which has been proven to boost bottom lines and will show women that there is a path for growth in the sector; and
- Encouraging employers to develop mentoring programs so women in all areas of manufacturing have role models to provide guidance, which can help improve retention rates.

STEM Education. Assessments of elementary school students show that girls score above boys in reading but lower in math, and the disparity continues through high school.<sup>35</sup> Closing the achievement gap in math and science from the beginning will ensure that young women have the confidence and ability to choose to pursue a degree or training in areas such as math, science and engineering. Although women today earn a greater share of bachelor's degrees than men, they earn less than half of those awarded in math and physical

sciences and less than one-fifth of those awarded in engineering and computer sciences.<sup>36</sup> Increasing the number of women who move through the STEM pipeline will expand the pool of women prepared for careers in advanced manufacturing.

### Community Colleges and Vocational Programs.

Initiatives that focus on changing the perception that technical training is inferior to a formal degree from a 2- or 4-year college can attract more individuals, both men and women, to enroll in training that will prepare them for manufacturing careers. Specifically, employers can work with community colleges to integrate trade-specific credentials into formal degree programs, which would provide a pathway from training to employment. Schools should also work with employers to recruit women for such programs.

Women in Leadership Roles. Increasing the number of women in leadership roles within the industry is one way to attract and retain women throughout the ranks in manufacturing. Across manufacturing firms, women hold only 17% of board seats, are only 12% of executive officers and are just 6% of CEOs—despite making up nearly 30% of the sector's labor force.<sup>37</sup> Research has shown that a higher share of women at the top translates into a higher return on equity and higher returns to stockholders; increasing gender diversity among leadership roles makes good business sense.<sup>38</sup>

Mentoring Programs. Encouraging employers to implement formal mentoring programs and support informal mentor-mentee relationships will help those employers retain talented female employees. With relatively fewer women working in the industry, role models and mentors from across the ranks—from the assembly line to leadership—can provide women with the support and guidance they need to navigate a career in the manufacturing sector. Mentors can also boost the visibility of women in the field, showing that women often are successful in manufacturing.

It is clear that the future of manufacturing will depend on employers' ability to recruit and retain workers. Women should be part of the solution.

**Sources:**

- <sup>1</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, Current Employment Statistics (CES).
- <sup>2</sup> Ibid.
- <sup>3</sup> Deloitte/The Manufacturing Institute. *Boiling point? The skills gap in U.S. manufacturing*. 2011. [www.themanufacturinginstitute.org/~media/A07730B2A798437D98501E798C2E13AA.ashx](http://www.themanufacturinginstitute.org/~media/A07730B2A798437D98501E798C2E13AA.ashx).
- <sup>4</sup> This is based on the change in the relationship between the job openings rate and the unemployment rate from the end of the recession to now. The relationship between job openings and unemployment is known as the Beveridge curve. For example, the current (March) job openings rate for the manufacturing industry is 2.1 percent, the same as it was in January 2008 just after the start of the recession, but the current unemployment rate is about 6.1 percent (seasonally adjusted) compared to 4.6 percent back in January 2008.
- <sup>5</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, Current Population Survey (CPS).
- <sup>6</sup> Ibid.
- <sup>7</sup> National Association of Manufacturers. *Facts About Manufacturing in the United States*. [www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx](http://www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx).
- <sup>8</sup> Wolfe, Raymond M. *Info Brief: Business R&D Performed in the United States Cost \$291 Billion in 2008 and \$282 Billion in 2009*. National Center for Science and Engineering Statistics. March 2012. [www.nsf.gov/statistics/infbrief/nsf12309](http://www.nsf.gov/statistics/infbrief/nsf12309).
- <sup>9</sup> Executive Office of the President. *A Framework for Revitalizing American Manufacturing*. December 2009. p.7. [www.whitehouse.gov/sites/default/files/microsites/20091216-manufacturing-framework.pdf](http://www.whitehouse.gov/sites/default/files/microsites/20091216-manufacturing-framework.pdf).
- <sup>10</sup> National Association of Manufacturers. *Facts About Manufacturing in the United States*. [www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx](http://www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx).
- <sup>11</sup> Bivens, Josh. *Updated Employment Multipliers for the U.S. Economy (2003)*. Working Paper No. 268, Economic Policy Institute. August 2003.
- <sup>12</sup> Langdon, David and Rebecca Lehrman. *The Benefits of Manufacturing Jobs*. Economics and Statistics Administration. May 2012.
- <sup>13</sup> Ibid.
- <sup>14</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES. Data through April 2013.
- <sup>15</sup> Plumer, Brad. "Back to 'Made in America'?" *Washington Post*. May 1, 2013.
- <sup>16</sup> Birnbaum, Michael. "European industry flocks to U.S. to take advantage of cheaper gas." *Washington Post*. April 1, 2013. [http://articles.washingtonpost.com/2013-04-01/world/38182416\\_1\\_natural-gas-shale-gas-basf](http://articles.washingtonpost.com/2013-04-01/world/38182416_1_natural-gas-shale-gas-basf).
- <sup>17</sup> Executive Office of the President. *A Framework for Revitalizing American Manufacturing*. December 2009. p.6. [www.whitehouse.gov/sites/default/files/microsites/20091216-manufacturing-framework.pdf](http://www.whitehouse.gov/sites/default/files/microsites/20091216-manufacturing-framework.pdf).
- <sup>18</sup> JEC Democratic staff calculations based on data from the Bureau of Economic Analysis. Data from 2008-Q4 to 2013-Q1.
- <sup>19</sup> North, Dan (economist at Euler Hermes), quoted in Plumer, Brad. "Back to 'Made in America'?" *Washington Post*. May 1, 2013.
- <sup>20</sup> Bloomberg News. "U.S. firms in China say their No.1 fear is rising labor costs." *Minneapolis Star Tribune*. March 30, 2013. [www.startribune.com/business/200750181.html?refer=y](http://www.startribune.com/business/200750181.html?refer=y).
- <sup>21</sup> Plumer, Brad. "Back to 'Made in America'?" *Washington Post*. May 1, 2013.
- <sup>22</sup> Birnbaum, Michael. "European industry flocks to U.S. to take advantage of cheaper gas." *Washington Post*. April 1, 2013. [http://articles.washingtonpost.com/2013-04-01/world/38182416\\_1\\_natural-gas-shale-gas-basf](http://articles.washingtonpost.com/2013-04-01/world/38182416_1_natural-gas-shale-gas-basf).
- <sup>23</sup> Kaskey, Jack. "Shale May Spur \$30 Billion of Chemical Plants, Lashier Says." *Bloomberg*. March 6, 2012. <http://www.bloomberg.com/news/2012-03-06/shale-gas-may-spur-30-billion-of-chemical-plants-lashier-says.html>.
- <sup>24</sup> For example, see Casselman, Ben. "Women Miss Out on Manufacturing Gains." Real Time Economics, *Wall Street Journal*. March 26, 2013. As discussed later in this report, women's employment has increased in several manufacturing subsectors since February 2010; however, the total number of female manufacturing employees has declined since then. <http://blogs.wsj.com/economics/2013/03/26/women-miss-out-on-manufacturing-gains>.
- <sup>25</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES. Data through March 2013.
- <sup>26</sup> National Women's Law Center. *Still No Recovery for Women in the Manufacturing Sector: Manufacturing Employment Trends for Women and Men, 2008-2013*. March 2013. [www.nwlc.org/sites/default/files/pdfs/manufacturing\\_employment\\_trends\\_2008-2013\\_fs.pdf](http://www.nwlc.org/sites/default/files/pdfs/manufacturing_employment_trends_2008-2013_fs.pdf).
- <sup>27</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES.
- <sup>28</sup> Statistics in this section are from JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES.
- <sup>29</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES and CPS. Calculation results in 27% using data from CES as of April 2013, and 29% over

2012 using CPS data.

<sup>30</sup> Davidson, Adam. "It's the Economy: Skills Don't Pay the Bills." *The New York Times Magazine*. [www.nytimes.com/2012/11/25/magazine/skills-dont-pay-the-bills.html?pagewanted=all&\\_r=1](http://www.nytimes.com/2012/11/25/magazine/skills-dont-pay-the-bills.html?pagewanted=all&_r=1). See also The Manufacturing Institute's press release "Women in Manufacturing STEP Awards Recognize 122 Women for Excellence in Manufacturing." January 15, 2013.

<sup>31</sup> Deloitte/The Manufacturing Institute. *Leadership wanted: U.S public opinions on manufacturing*. 2012 annual index. [www.themanufacturinginstitute.org/~media/5856BC6196764320A6BEFA0D9962BE80.ashx](http://www.themanufacturinginstitute.org/~media/5856BC6196764320A6BEFA0D9962BE80.ashx).

<sup>32</sup> Ibid.

<sup>33</sup> Deloitte/The Manufacturing Institute. *Untapped resource: How manufacturers can attract, retain, and advance talented women*. 2013. <http://www.themanufacturinginstitute.org/~media/D0D064208A994D6A91B0E51CF008BF23.ashx>.

<sup>34</sup> Ibid.

<sup>35</sup> Economics and Statistics Administration, and the Executive Office of the President, Office of Management and Budget. *Women in America: Indicators of Social and Economic Well-Being*. March 2011. p. 15-24. [www.whitehouse.gov/sites/default/files/rss\\_viewer/Women\\_in\\_America.pdf](http://www.whitehouse.gov/sites/default/files/rss_viewer/Women_in_America.pdf).

<sup>36</sup> Ibid.

<sup>37</sup> JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES, and Catalyst. *Catalyst Pyramid: Women in U.S. Manufacturing - Nondurable Goods*; *Catalyst Pyramid: Women in U.S. Manufacturing - Durable Goods*. New York: Catalyst, 2013; *2012 Catalyst Census: Fortune 500 Women Board Directors* (Appendix 8). 2012. [www.catalyst.org/knowledge/2012-catalyst-census-fortune-500-women-board-directors](http://www.catalyst.org/knowledge/2012-catalyst-census-fortune-500-women-board-directors).

<sup>38</sup> Catalyst, *The Bottom Line: Corporate Performance and Women's Representation on Boards (2004-2008)*. 2011. [www.catalyst.org/knowledge/bottom-line-corporate-performance-and-women%20%99s-representation-boards-2004%20%932008](http://www.catalyst.org/knowledge/bottom-line-corporate-performance-and-women%20%99s-representation-boards-2004%20%932008).