

Taking the High Road: New Data Show Higher Wages May Increase Productivity, Among Other Benefits

Introduction

There is a wealth of evidence that manufacturing jobs are good jobs.¹ But not all manufacturing jobs are created equal. Published data highlight the considerable variation in pay and productivity across manufacturing industries. For example, workers in the computer and electronic product manufacturing industry earn an average of \$34 per hour (as of May 2015), while those in apparel manufacturing earn an average of \$17 per hour. Now, thanks to a special tabulation of data from the 2012 Economic Census by the Census Bureau, we can also begin examining differences in the highest- and lowest-paying establishments *within* the same industry.²

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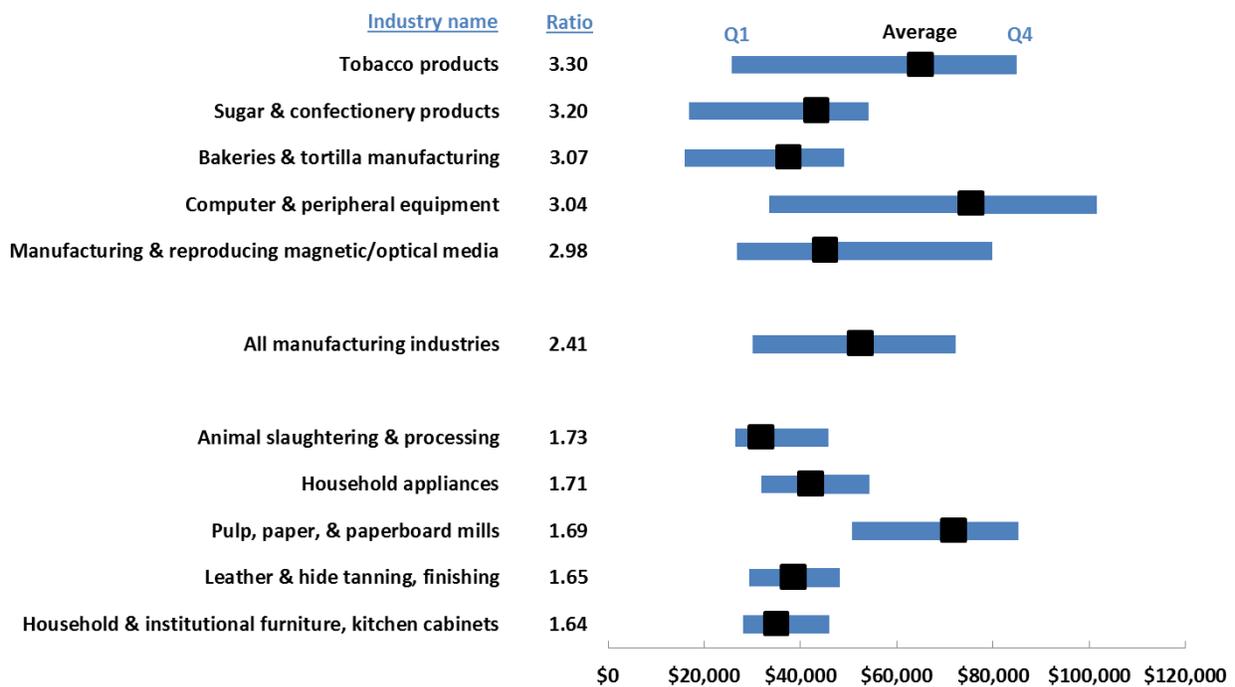
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Our special tabulation of Economic Census data divides manufacturing establishments in two ways. Industries are first categorized at a detailed level (using 4-digit NAICS codes), and then they are divided into four equally sized groups (or quartiles) by payroll per employee.³ The resulting tabulations show payroll per employee, value-added per employee and other output and cost measures for each of the quartiles. This division allows us to see how much wage variation there is between the top- and lowest-paying establishments. The payroll data tells us how much, on average, an establishment is paying all of its employees (including line workers, engineers, and administrators).

The variation in pay across manufacturing establishments is quite high. Across all of manufacturing, the lowest-paying establishments are in the bottom quartile of cut-and-sew apparel manufacturing (NAICS 3152), with an average annual payroll per employee of \$15,972. At the opposite end of the spectrum is the top quartile of communications equipment manufacturing (NAICS 3342), with an average annual payroll of \$113,070—a variation of over 600 percent. As a point of comparison, average payrolls in communications equipment manufacturing are \$97,765, or just 170 percent higher than the overall average for cut-and-sew apparel (\$36,085).



Average Annual Payroll per Employee in Select Manufacturing Industries, 2012
 (high, low, and average, overall dispersion ratio, top five and bottom five industries)



Note: Average annual payroll per employee presented for first (Q1) and fourth (Q4) quartiles. Ratio is average for Q4 divided by average for Q1.
 Source: Department of Commerce, Office of the Chief Economist analysis using special tabulation data from the Census Bureau, Economic Census

Even when we control for industry, significant variation remains. The gap between the highest- and lowest-paying quartiles within industries varies from a low of around 63 percent in household, institutional furniture, and kitchen cabinet manufacturing (NAICS 3371) to a high of more than 220 percent in tobacco products (NAICS 3122).

Why Are Some Establishments Different?

Understanding why this dispersion exists and what is different about high- and low-paying establishments within an industry is complicated.⁴ There is, however, a fairly high degree of correlation between certain establishment characteristics. The chart on the following page compares payroll per employee to value added per employee, using the same

quartile tabulation as above. The top quartile of each industry is represented by a purple dot, with lower quartiles in green, red, and blue.

Overall, we can see that payroll and value added are related—as one variable increases, so does the other. In statistical terms, they have a correlation coefficient of nearly 0.7. There appears to be a stronger correlation for establishments in the bottom quartile (greater than 0.75) than for establishments in the top quartile (about 0.55), indicating a closer link between productivity and wages among lower-paying establishments than higher-paying ones.

We also observe a relationship between capital expenditures and payroll. Overall, the correlation between an establishment’s capital expenditures per employee and its payroll is about 0.6. Unlike the relationship between payroll and value added, however, this

Payroll per Employee vs. Value Added per Employee, 2012

(average by quartile of payroll per employee, select manufacturing industries)



Note: Most industries shown here. Some outliers and industries from which data is not available have been omitted.

Source: Department of Commerce, Office of the Chief Economist analysis using special tabulation data from the Census Bureau, Economic Census

relationship is looser at both the top and bottom (around 0.45) than in the middle (about 0.6 for the second and third quartiles).

The quartile data provides interesting summary statistics and complements existing academic literature exploring the wide variation in business practices—as measured by pay, capital intensity, productivity, and other measures—even within the same industry⁵. The research underscores how some firms, to follow the old adage, may take the high road while others take a lower road.

Taking the High Road

How can establishments with such different labor costs compete in the same market? One possibility is product and process differentiation. Manufacturing establishments

within the same industry may produce fairly different products—for example, athletic socks and designer wool overcoats are both manufactured by industries classified in NAICS code 3151.

Still, the persistence of establishments paying very different wages in the same industry suggests that more than one “production recipe” is viable.⁶ Research suggests that firms with higher payroll per employee have more skilled workers who also work harder, and the companies adopt other practices to take advantage of this talented, dedicated workforce and further boost its productivity. In this “high-road” recipe, firms harness the knowledge of all their workers to create innovative products and processes; the higher wages paid to these workers are offset by their higher productivity. Three factors generate this higher productivity.

First, paying higher wages allows firms to attract workers with more and better skills.

Second, firms that pay their employees more are effectively able to “buy” increased morale, lower turnover, and higher productivity from employees who are committed to keeping a good job.⁷

Third, high-road firms adopt other practices that increase the return to having skilled and motivated workers. One example is the greater capital intensity of high-wage firms mentioned above.⁸ Other practices are important as well. For example, a study of automotive stampers (NAICS 33637) found that high-wage firms were more likely to design their own products and have “quality circles” where a diverse group of workers discuss incremental ways of improving operations. Adopting one practice often increases the productivity impact of other practices. Thus, a firm’s product designs will be better if it takes into account suggestions from workers about how to change aspects of the design that frequently lead to defects. These suggestions are likely to be better if workers are more skilled and experienced. In the end, product design, quality circles, and high pay are most effective if adopted together.⁹

Zeynep Ton at MIT has observed similar results in the retail sector.¹⁰ According to Ton, many highly successful retail chains—such as QuikTrip, , Trader Joe’s, Costco, and Spain’s Mercadona—are able to combine investment in their employees with low prices, financial success, and industry-leading customer service. Ton argues that companies benefit from having well-trained, flexible workers who can shift between sales, customer service, and operations. At the successful retailers Ton has studied, employees are able to run a cash register, sweep floors, restock items, order new merchandise, and offer product recommendations to customers—switching between these tasks as time and circumstances require. Ultimately, companies create a virtuous cycle, paying higher wages and benefits, which

in turn increases loyalty and productivity, increasing revenue and making up for higher compensation costs.

Taken together, these results imply that higher wages often lead to improvements in skills, motivation, and workforce stability, especially when combined with changed strategies in areas such as product design and cross-training. Thus, employers can often adjust to higher wages without significant reductions in employment or profits.

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¹ ESA economists have written several reports about the existence and persistence of the manufacturing wage premium. According to [The Benefits of Manufacturing Jobs](#), wages and salaries in manufacturing were higher than non-manufacturing jobs, even when controlling for demographic, geographic, and job characteristics. [The Earnings of New Hires in Manufacturing](#) finds new hires in manufacturing jobs earned 38 percent more at the end of 2011 than other new hires in other industries.

² Another recent paper has used data from the Current Population Survey, the Longitudinal Business Database, and the Longitudinal Employer-Household Dynamics program to show that much of the increase in inequality observed during the 1970s-2000s is driven by a widening distribution of establishment-level earnings. The paper shows that these results are seen across the economy and are not limited to the manufacturing sector. See Erling Barth, Alex Bryson, James C. Davis, and Richard B. Freeman, "It's Where You Work: Increases in Earnings Dispersion Across Establishments and Individuals in the U.S." (NBER Working Paper 20447), National Bureau of Economic Research, September 2014, available at: <http://www.nber.org/papers/w20447> (last accessed July 2015).

³ In the case of the Economic Census, payroll refers to all forms of direct compensation, including salaries, wages, commissions, bonuses, vacation and sick leave pay. It does not include pensions, Social Security contributions, group insurance premiums, or workers' compensation. For more information, please consult the Census Bureau at: <http://www.census.gov/econ/census/help/sector/definitions.html>.

⁴ Additional related research on the cause of productivity differences across firms (which are likely closely related to payroll differences) can be found in Chad Syverson, "What Determines Productivity?", *Journal of Economic Literature*, 2011, vol. 49:2, pp. 326-365, available at: <http://home.uchicago.edu/syverson/productivitysurvey.pdf> (last accessed July 2015).

⁵ See Barth, et.al (2014) and Syverson (2011).

⁶ Daniel Luria, "Why Markets Tolerate Mediocre Manufacturing," *Challenge*, July-August 1996, vol. 39:4, pp. 11-16, available at: <http://www.jstor.org/stable/40721689> (last accessed July 2015).

⁷ Paul Krugman, "Liberals and Wages," *New York Times*, July 17, 2015, available at: http://www.nytimes.com/2015/07/17/opinion/paul-krugman-liberals-and-wages.html?_r=0 (last accessed July 2015). Krugman's column also relies on research originally presented in David Card and Alan B. Krueger, "Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania" (NBER Working Paper 4509), National Bureau of Economic Research, October 1993, available at: <http://www.nber.org/papers/w4509> (last accessed July 2015).

⁸ Having more capital generally increases a firm's productivity. However, having more capital also increases the costs of downtime. To obtain qualified, motivated workers who will work to avoid this downtime, capital-intensive employers pay higher wages.

⁹ Susan Helper, Timothy Krueger, and Howard Wial, "Why Does Manufacturing Matter? Which Manufacturing Matters?" Brookings Institution, February 2012, available at: http://www.brookings.edu/~media/Research/Files/Papers/2012/2/22%20manufacturing%20helper%20krueger%20wial/0222_manufacturing_helper_krueger_wial.pdf (last accessed July 2015). For a summary of the "high road" literature, see Thomas A. Kochan, Eileen Applebaum, Jody Hoffer Gittel, and Carrie R. Leana, "The Human Capital Dimensions of Sustainable Investment: What Investment Analysts Need to Know," February 22, 2013, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2222657 (last accessed July 2015).

¹⁰ Zeynep Ton, "Why 'Good Jobs' Are Good for Retailers," *Harvard Business Review*, January-February 2012, available at: <https://hbr.org/2012/01/why-good-jobs-are-good-for-retailers> (last accessed July 2015).