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# The Changing Nature of Manufacturing

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CENTER FOR BUSINESS AND ECONOMIC RESEARCH

ISSUE BRIEF

on topics affecting Kentucky's economy

March 2014 No. 10

Manufacturing is Kentucky's 4th largest economic sector.

Employment in manufacturing has been declining for decades.

Employment is down, but output is up.

The Changing Nature of Manufacturing

By Christopher R. Bollinger (crboll@uky.edu)<sup>1</sup>

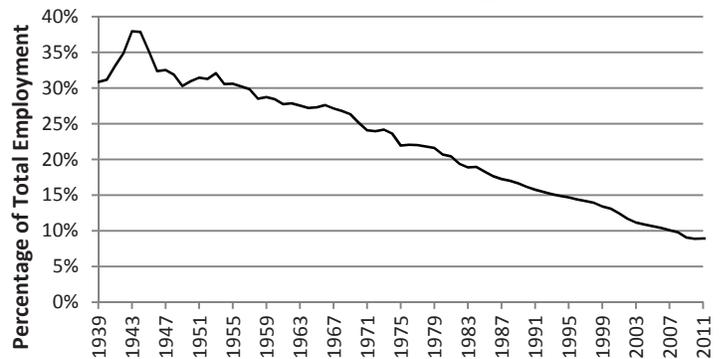
There has been a renewed sense of enthusiasm about Kentucky's manufacturing sector in the last few years, as evidenced by the Bluegrass Economic Advancement Movement (BEAM)<sup>2</sup> and the National Network of Manufacturing Innovation initiative.<sup>3</sup> However, while manufacturing is the state's fourth largest economic sector, it is employing a declining share of workers and requiring a more demanding skill set from them. This is not your grandfather's assembly line job—advanced manufacturing places a premium on brains over brawn and our education and training systems need to reflect this.

Total employment in manufacturing nationally (measured annually) peaked at 19.4 million workers in 1979. Over the past 35 years employment in manufacturing has fallen, although there have been periods of stability and even short-term gains. In 2011, approximately 12 million workers were employed in manufacturing. However, a more relevant measure of manufacturing employment is the percentage of the labor force in manufacturing. Figure 1 shows that the decline in manufacturing employment—as a percentage of total employment—began in the early 1950's and has been declining steadily throughout the entire post-war period. Currently an estimated 12.3 percent of Kentucky's employment is in manufacturing—down from nearly 19 percent in 1990. Thus the decline in manufacturing is not so much a recent phenomenon, but rather a long-term and persistent change in the economy.

While manufacturing employment may be declining, manufacturing output has been growing. Figure 2 presents both the total gross value of final goods produced in the United States (measured in trillions of constant 2005 dollars to account for inflation) and the per capita value of goods produced (measured in constant 2005 dollars on the right hand side axis). While the most recent recession (and other recessions) can be seen clearly, the overall trend in production—both in total and per person—is persistently up. Far from a decline in manufacturing, Figure 2 demonstrates an increase in manufacturing in the U.S. over the last 40 years.

FIGURE 1

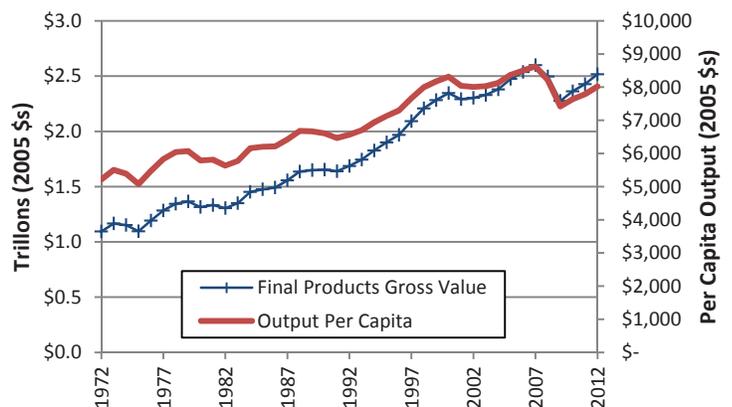
U.S. Employment in Manufacturing, 1939-2012



Source: Current Employment Survey, U.S. Bureau of Labor Statistics and author's calculations

FIGURE 2

Gross Value of Final Products, U.S., 1972-2012



Source: Bureau of Economic Analysis, U.S. Census Bureau, and author's calculations



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*Capital stock, another phrase for automation, has been increasing for decades.*

*The dollar value of manufacturing goods per worker has nearly quadrupled in the last 40 years.*

*Modern manufacturing is alive and well, but relies more on technology than manpower.*

While to some, the increase in production coupled with a decrease in employment may seem like a puzzle, but the answer is apparent in Figure 3. The value of U.S. capital stock, measured on the left axis of Figure 3, has been increasing steadily since 1950. The strong upward trend is strikingly apparent—firms are purchasing and constructing physical capital at high rate, far beyond simply replacing old factories. Consequently, workers are able to produce more goods when they have more capital. The right hand side axis shows the capital-labor ratio in the U.S. over the last 60 years. This ratio measures the dollar value of capital to the total employment in the economy. Even though total employment has grown dramatically through this period, capital has grown even faster. Indeed there is double the amount of capital, per worker, in our economy in 2011 as there was in 1950.

The result of the high capital-labor ratio in the economy can be seen in Figure 4: the dollar value of manufacturing goods per worker has nearly quadrupled in the last 40 years. What is apparent is that while the U.S. may be employing fewer manufacturing workers, these workers are highly productive and contribute tremendous value to our economy. Rather than decry the “loss of manufacturing jobs” we need to understand that production is constantly changing as technology evolves. We do not build cars today the same way we built them in 1950. We use robots, computers, and automated production control.

Any proposed policy for promoting manufacturing and manufacturing employment, whether at the national, state, or local level, must address the facts presented above. The Bureau of Labor statistics (BLS) predicts that employment in manufacturing in the U.S. will fall by 4.6 percent during the 2012-2022 decade.<sup>4</sup> In contrast, the BLS predicts an overall 11 percent increase in non-agricultural wage and salary employment during the same period. Estimates by this author show that for the Lexington-Louisville corridor, similar patterns will prevail.<sup>5</sup> Modern manufacturing is alive and well, but relies more on technology than manpower. That trend is likely to continue. Tomorrow’s manufacturing workers will need to be able to work with the ever-changing technology, and public policy needs to focus on preparing workers to meet these challenges.

**Notes**

<sup>1</sup>Benjamin Childress, an Experienced-Based Career Education (EBCE) student from Tates Creek High School, Fayette County Public School District, provided research assistance for this project.

<sup>2</sup>Christopher Bollinger and Kenneth Troske, *Industry and Labor Characteristics and Projections: The BEAM and WIA Regions*, Center for Business and Economic Research, January 2012 <<http://cber.uky.edu/Downloads/BEAMFinalReportJan2012.pdf>>.

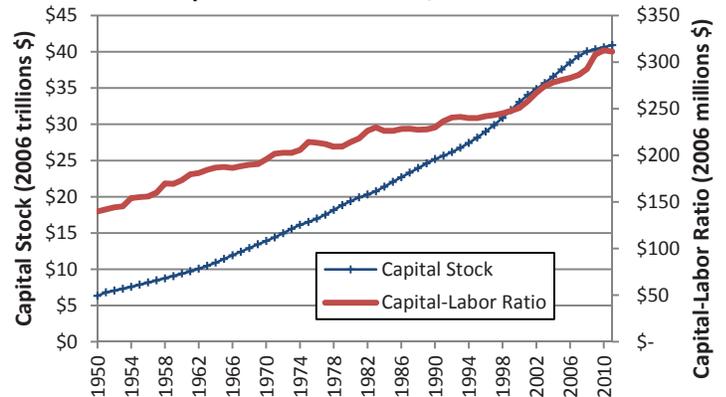
<sup>3</sup>Federal Grants Put Kentucky on Cutting Edge of Manufacturing Research (Press Release), Feb. 27, 2014 <<http://uknow.uky.edu/content/federal-grants-put-kentucky-cutting-edge-manufacturing-research>>.

<sup>4</sup>Bureau of Labor Statistics, *Employment Projections 2012-2022*, December 19, 2013 <<http://www.bls.gov/news.release/pdf/ecopro.pdf>>.

<sup>5</sup>Bollinger and Troske, *op. cit.*

**FIGURE 3**

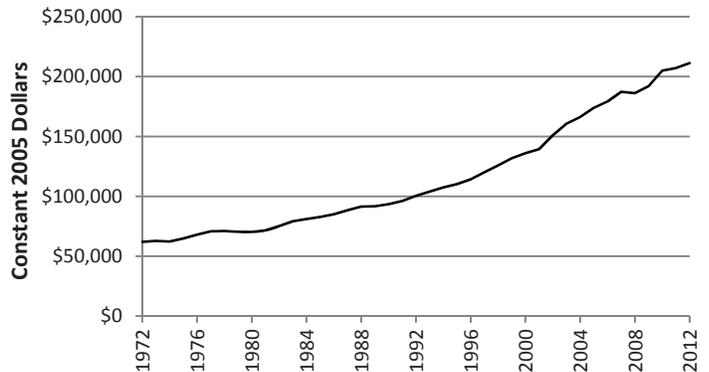
**Capital Stock in the U.S., 1950-2011**



Source: St. Louis Federal Reserve "FRED," Bureau of Labor Statistics, and author's calculations

**FIGURE 4**

**Manufacturing Output per Worker, U.S., 1972-2012**



Source: Bureau of Economic Analysis, Bureau of Labor Statistics and author's calculations