



Susan Houseman, a senior economist at the Upjohn Institute

## Susan Houseman on measuring manufacturing productivity

*Editor's note: American manufacturing continues to get leaner and meaner, booking strong productivity gains every year and allowing production of more goods with fewer people. But wages for manufacturing workers haven't kept pace, as economics suggests they should if workers are more productive. What gives?*

*Some research indicates that productivity growth may be overstated. The fedgazette interviewed Susan Houseman, a senior economist at the Upjohn Institute in Kalamazoo, Mich. Houseman and three Federal Reserve System economists authored a 2010 study that identified biases in the way manufacturing productivity is measured.*

*Houseman holds a Ph.D. in economics from Harvard University, has taught at the University of Maryland School of Public Affairs and worked as a visiting scholar at the Brookings Institution.*

**fedgazette:** Your research, which takes a close look at how productivity in manufacturing is measured, was a collaboration with three Federal Reserve economists. How did you come to work with them?

**Houseman:** I had the idea that some key manufacturing output and productivity statistics were biased because of offshoring and was looking for a way to estimate the size of the bias. My co-authors had documented the growth of offshore outsourcing by American manufacturers, and we were able to estimate that bias using their detailed data and models of the manufacturing sector.

We intentionally ended our analysis in 2007, because we did not want to incorporate the recession into the paper. Things got pretty quirky then. Imports were tanking along with the rest of the economy, and we wanted to focus on longer trends.

**fedgazette:** We've been hearing about impressive productivity gains in manufacturing for a while. Is your research essentially saying they aren't really there?

**Houseman:** I would like to make two points. First, a very important fact, but one I find most people don't know—including some people who write a lot about the manufacturing sector—is that manufacturing growth in real [price-adjusted] value added and productivity wasn't that strong without the computer

and electronics industry. The computer industry is small—it only accounts for about 12 percent of manufacturing's value added. But it has an outsized effect on manufacturing statistics.

We make that point, I think, pretty clearly in our 2010 paper. But I still see a lot of analysts who say, "Look at how fast manufacturing is growing; manufacturing output is growing faster than GDP. There's nothing wrong; manufacturing is doing great." But we find that without the computer industry, growth in manufacturing real value added falls by two-thirds and productivity growth falls by almost half. It doesn't look like a strong sector without computers. That's the first point.

The second point, which was the focus of the 2010 paper, is that there's been a lot of growth in manufacturers' use of foreign intermediate inputs since the 1990s, and most of those inputs come from developing and low-wage countries where costs are lower. We point out that those lower costs aren't being captured by statistical agencies, and so, as a result, the growth of those imported inputs is being undercounted.

**fedgazette:** How is it that lower-cost manufacturing in other countries influences U.S. productivity statistics and results in incorrect measurements?

**Houseman:** It is hard to get your teeth into the problem, which fundamentally has to do with price index theory and

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how things are deflated. But let me illustrate with a hypothetical example.

Suppose an auto manufacturer used to buy tires from a domestic tire manufacturer. Then it outsources the purchase of its tires to, say, Mexico, and the Mexicans sell the tires for half the price. That price drop—when the auto manufacturer switches to the low-cost Mexican supplier—isn't caught in our statistics. And if you don't capture that price drop, it's going to look like, in some statistical sense, the manufacturer can make the same car but only needs two tires.

**fedgazette:** So the important part is to measure the changing value of inputs better.



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**Houseman:** Yes, exactly. We have pretty good measures of the value of inputs. But if, say, the dollar value of inputs falls, that could be because manufacturers are using fewer inputs or because the price of the inputs dropped. Our statistical agencies try to measure price changes, but they miss them when the price drops because companies have shifted to a low-cost supplier. So because we don't catch the price drop associated with offshoring, it looks like we can produce the same thing with fewer inputs—productivity growth. It also looks like we are creating more value here in the United States than we really are.

**fedgazette:** You said that the growth in productivity in manufacturing is not



that large if you take out computers. The corollary is that productivity growth in the computer and electronics industry has been pretty strong. Are you suggesting that it is also mismeasured? Does the logic you've spelled out in the example with automobile tires also apply to the computer and electronics industry?

**Houseman:** Yes, it applies to the computer industry too, and we include estimates of the bias to productivity growth in the computer industry in our paper. But because actual productivity growth is so high in that industry, these [bias] corrections account for a relatively small percent of the growth in that industry.

The standard argument is that the rapid productivity growth in computers is coming from product innovation. This year's computers and semiconductors are faster and do more than last year's models. And that product innovation essentially gets captured in the price indexes the government uses to

deflate computer and semiconductor shipments. The price indexes for most products increase over time—that's inflation. But, for example, the price indexes used to deflate computer shipments have actually fallen by a whopping 21 percent per year since the late 1990s. Those rapid price declines largely reflect adjustments for the growing power of computers. And that extraordinary decline in computer price indexes translates into extraordinary growth in real value added and productivity in the computer industry as measured in government statistics.

So, in some statistical sense, today's computer may be the equivalent of, say, 13 computers in 1998. But that doesn't by itself mean fewer workers are needed to manufacture a computer today than in the past. Product innovation doesn't displace workers; we're not buying fewer computers because they're more powerful. If anything we're buying more of them.

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Could there be other measurement issues in the computer industry? Sure. It's a really hard sector to measure for various reasons. Global supply chains are complex and rapidly changing, and there's a big lag in the collection of data the government needs to get the industry structure right. It's also really important that imported IT products are deflated the same way domestic ones are.

So there could be a lot of errors, but it's hard to say how big they might be or even the direction of any bias. The point is that when you have an industry where [the government is] aggressively adjusting prices for quality changes, an error can really swing the numbers not only in that industry, but also in the manufacturing sector and even in GDP. So we have to be, in my view, very cautious in interpreting aggregate numbers when one industry is dominating the data.

**fedgazette:** It has been considered something of a puzzle that as productivity in manufacturing has grown, employment in factories has declined and wages for existing workers haven't kept pace. Does your research suggest a resolution to this puzzle?

**Houseman:** We do argue that productivity is overstated. So that's one piece, but it's not the only piece of the puzzle.

Another piece of it is that the rapid growth in manufacturing productivity is being driven by one industry—computers—and what's driving productivity growth in computers is improvements in quality of the product, which doesn't have any implications per se for jobs or workers' wages. The reason jobs in computers have been lost is not because productivity growth has crowded them out; not at all. It's because much of the production has gone overseas.

So there's that. And then another standard story has to do with automation. Basically, capital is substituting for labor. Automation can lead to job losses. And the returns from automation, or

higher capital use, won't necessarily be shared with workers.

Then, finally, there's probably been some shifting in the sorts of production that occur here. In particular, less of the labor-intensive production is done in the United States, and that would result in job losses and higher labor productivity. Again, the gains from that productivity growth aren't necessarily going to be shared with remaining workers. So part of the answer to the puzzle is that even if productivity gains are real, there's really nothing that guarantees those gains will be broadly shared by workers. Certainly some people have done very well in the economy, but those individuals typically haven't been production workers.

**fedgazette:** So what is the "right" way to measure manufacturing productivity, if that's even possible? You wrote your paper in 2010. Has any progress been made since then?

**Houseman:** For a start, it's important to catch the kind of price drops that we talked about in our paper—price drops associated with rapid shifts from high- to low-cost—often foreign—suppliers. It's fair to say that for the most part, the way price indexes are constructed in the United States, the "law of one price" is assumed to hold all the time. That is, it's assumed there are no price differences among stores or suppliers to businesses once differences in quality of the products they sell are taken into account.

But a point we try to make clearly in our 2010 paper is that a lot of the price changes occur because new suppliers enter the market, offer lower prices for similar products and drive out old suppliers. There's a lot of evidence both domestically and internationally to suggest that this is an important piece of price dynamics that just isn't captured in the way we collect price statistics.

So the Bureau of Labor Statistics is considering whether it would be worthwhile to change the way price data are collected to better capture price movements. The idea that the BLS has is to collect price data from the purchaser rather than the seller.

There's a bigger question, though, about how to think about productivity in a national sense given the extensive global operations of multinational companies. Where do you "book" their value added? The more value added booked in a country, the higher its measured productivity.

That's a really big question, and something that the measurement community is just beginning to grapple with.

**fedgazette:** Thank you.

—Joe Mahon