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Productivity in the US and Japan: A Reexamination

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US-Japan productivity comparisons published by the US Bureau of Labor Statistics are misleading. In the US, growth is understated because the BLS is unable to measure productivity for more than half of the labor force. Productivity growth is assumed to be zero for all of these people. In Japan, growth is exaggerated because small business output is counted, while small business employment is not. The BLS also assumes that work hours per person are about the same in the US and in Japan. We present corrected statistics showing that American output per hour is roughly double that of Japan. During the last 10 years, the Japanese have made little progress in closing the productivity gap.

According to the US Bureau of Labor Statistics (BLS), the US had the lowest overall rate of annual productivity growth from 1960 to 1990 among all nations in the Organization for Economic Cooperation and Development (OECD) [BLS 1992]. US output per employed person, economy-wide, grew at the rate of about 1.1 percent per year, compared to 5.2 per-

cent in Japan. In the manufacturing sector, growth in output per hour rather than per person is usually reported. US growth in manufacturing output per hour was about three percent, again the worst in the OECD and well below Japan's growth of seven percent [Neef and Kask 1991].

Similar growth-rate comparisons have been published by the BLS for many years.

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These comparisons have contributed to the pervasive belief that America is in a state of competitive decline. For example, John Greenwald [1992], writing in *Time* magazine, concludes, "The harsh truth underlying US economic woes is that America has lost its economic edge to such hard-charging rivals as Germany and Japan." Lester Thurow [1992] states that, "By world standards, the American service sector is simply inefficient." Furthermore, "while manufacturing is doing better than the rest of the economy, its performance is not world-class either." Edward Luttwack [1992], of the Center For Strategic and International Studies in Washington, DC, is even more despairing, claiming that America is rapidly becoming a third-world nation.

Our aim in this article is to show that BLS comparisons of US-Japan productivity growth are misleading for three reasons. First, alternative sources of productivity growth rates reach different conclusions. Second, US growth rates are understated because of productivity measurement problems in the service sector of the economy. Third, Japanese growth rates are overstated. Total Japanese output includes the small-business sector, but small-business employment is ignored in total employment. There is also evidence that Japanese work hours are underestimated by the BLS.

There are so many doubts about growth-rate comparisons that we believe it is more reasonable to compare absolute *levels* of productivity in the US and Japan. Our data show that the level of US economy-wide output per hour is roughly double that of Japan. During the last 10 years, the Japanese have made little progress in closing

this productivity gap. If America is actually in a state of competitive decline relative to Japan, productivity performance is not the reason.

Most of the data used in this article is currently under revision by the US Departments of Commerce and Labor. The revision changes base years and weights assigned to various components of gross domestic product (GDP) and generally makes US manufacturing performance look far worse than originally thought [Nasar 1992]. Revisions have been released on a piecemeal basis and the project is far from complete. In hopes of preventing confusion, we labeled US data either "original" or "revised." We do not believe that the revisions will affect any conclusions.

Why Sources of Productivity Data Disagree

There is considerable disagreement about just what growth rates have been in the past. The problem is that numerous international organizations maintain statistics relevant to productivity. Examples include the World Bank, the OECD, and the International Labor Organization. To further confound the analyst, within each OECD nation different government agencies are responsible for the statistics needed to analyze productivity. In the US, agencies within both the Departments of Commerce and Labor as well as the Federal Reserve System maintain statistics related to productivity. Various private organizations also publish productivity data. These sources maintain data in overlapping categories, using different base years, collected under different assumptions, based on different sampling procedures, assuming different price weights, manipulated with dif-

ferent currency exchange rates, published for different time periods, and revised at different times.

To illustrate the data problems, suppose that we wish to know total US civilian employment in, say, 1986. The best we can do is place the number within a range of seven million people. The BLS reports employment of 111.8 million, the International Labor Organization reports 109.6 million, and the OECD reports 104.8 million. With this kind of disagreement on the number of people at work, it is not surprising that a wide range of productivity growth estimates are available.

To illustrate how such estimates can vary, consider published figures for the average annual growth in manufacturing output per hour for the US and for Japan during the years 1980 to 1989. According to original estimates from the BLS, average growth was 3.2 percent in the US versus 4.2 percent in Japan. Revised statistics lowered US growth to 2.5 percent but left Japan alone [Nasar 1992]. In Thurow's [1992] study of competitiveness, a Japanese source is quoted for growth of four percent in the US versus 5.7 percent in Japan. However, another Japanese source overlooked by Thurow, the Japan External Trade Organization [JETRO 1991b], puts growth at 3.9 percent in the US versus 3.8 percent in Japan. *The Economist* magazine's [1992] interpretation of OECD data is that growth was 3.4 percent in America versus 2.9 percent in Japan. Many other examples could be cited but these should be sufficient to show that statistics are available to support radically different arguments about comparative growth rates.

The media often add to the confusion by

misinterpreting growth rates, believing that they represent absolute levels of output. For example, *Business Week* [1991] presented a graph labeled "output per hour in manufacturing" when the data were really growth indexes. The headline on this graph was "Japan's productivity has pulled ahead," a misinterpretation later repeated in many other publications.

Why US Economy-wide Productivity Growth is Understated

US economy-wide productivity growth is consistently understated by the BLS and most other sources. The reason is that the BLS is unable to measure productivity in most of the service sector of the economy and simply assumes that growth is zero. More than 75 percent of the US labor force are employed in services, and more than 70 percent of these people work in fields for which productivity growth is assumed to be zero [Malabre and Clark 1992]. Thus about 53 percent of the entire US labor force (70 percent times 75 percent) get no credit for productivity improvement. The productivity measurement problems in services are apparently little known. For example, Thurow [1992] does not acknowledge the measurement problems although he castigates overall US productivity, and the service sector in particular, on the basis of BLS data.

For the industries in which the BLS attempts to measure productivity, the results are often strange. In retailing, recent BLS reports show declining productivity despite increasing use of electronic systems to provide point-of-sale information and speed up customer check-out. In commercial banking, the BLS determines output by counting activities such as the number of

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checks handled and the number of new loans. But no weight is given to dollar volumes, which have risen consistently over the years. Perhaps the most bizarre results are in construction. The BLS has reported substantial losses in construction productivity over the last 20 years despite major improvements in equipment and management techniques.

Why Japanese Productivity Growth Is Exaggerated

Japanese productivity growth, both economy wide and in the manufacturing sector, is consistently overstated by the BLS and most other sources. To compute growth in output per hour in the US, the BLS counts employment and output from all businesses, regardless of ownership or size. However, the BLS excludes millions of small businesses in computing Japanese output per hour. This omission is obvious from a comparison of the Japanese employment figures used by the BLS [1992] and the larger figures reported by Japanese sources. This is an important source of bias because work hours are typically much longer in small businesses. Small businesses also tend to be less capital intensive and thus less productive regardless of hours worked. Specifically, the BLS excludes from Japanese output-per-hour calculations the self-employed, family members working for the self-employed, and small businesses with less than five employees. One Japanese source [JETRO 1991a] reports that there were nine million self-employed people and 5.3 million home employed in 1989. The total of 14.3 million people is more than 23 percent of the entire Japanese labor force.

Understated work hours for the Japanese

who do get counted in productivity estimates are another source of bias. Like the Japanese government, the BLS assumes that the workweek is 41 hours, despite evidence that the true workweek is longer. Surveys disclose workweeks ranging from 47 to 54 hours. Most surveys are vague about whether they cover actual work hours or merely hours paid. However, the 54-hour figure is based on a survey [Inoki 1992] that deals unequivocally with actual time spent on the job. This survey, by the Japanese Trade Union Confederation, found that total daily Japanese work-related time, including commuting and taking a variety of different work breaks, was over 12 hours. Actual working time each day was found to be a little over nine hours. Now, how many days per week do the Japanese work? Despite government urging that Japan adopt a five-day week, the Japanese Ministry of Labor reported that only 10 percent of the nation's companies have done so [Kyodo News Service 1992]. Thus the average workweek in Japan must be about nine hours times six days, or 54 total hours. If this estimate is correct, more than 40.6 billion work hours per year are not considered by the BLS in computing Japanese productivity growth. This is the product of 50 workweeks per year times 13 hours per week times the 1990 total employed labor force of 62.5 million people.

To put this number in perspective, suppose that Japan decided to reduce the actual workweek from 54 to 41 hours. To compensate for the loss of 40.6 billion work hours, Japan would have to increase the labor force by 32 percent or 19.8 million people to maintain current levels of

output. Now suppose that the true Japanese workweek is only 47 hours, the low end of the survey scale. Japan would still need to increase the labor force by 15 percent or 9.3 million people to maintain current levels of output. It does not appear that Japan has enough workers available to bring the workweek down to US standards.

US-Japan Comparisons of Productivity Levels

Given the data problems and biases in productivity growth rates, we believe that it is more reasonable to make a simple comparison of absolute levels of output per hour over time (Figure 1). We assumed a US workweek of 40 hours, a figure supported by various official sources, and a workweek of 54 hours in Japan. Both OECD and International Labor Organization statistics show that the workweek did not change appreciably during these years, so we held it constant for both countries.

We converted the yen to the dollar using OECD purchasing-power-parity (PPP) exchange rates for each year. PPP exchange rates are the number of currency units required to buy goods and services in Japan equivalent to what can be bought with the dollar in the US. Although the media often use market exchange rates in comparing Japan and the US, this practice is misleading because market exchange rates do not reflect the relative purchasing powers of different currencies. At best, market exchange rates reflect the relative values of currencies for goods and services traded in world markets. The domestic output of any country is heavily weighted toward goods and, especially, services that are not traded in world markets.

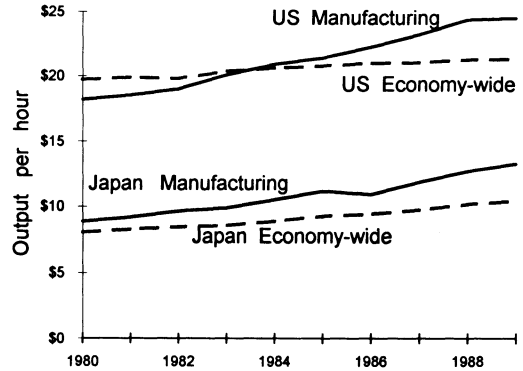


Figure 1: US and Japanese productivity are given in 1987 dollars for the decade of the 1980s. US gross domestic product (GDP) is based on revised Department of Commerce data, while Japanese GDP is from the OECD, also the source of employment statistics for both countries. In 1989, in the US total economy, the average worker produced goods and services worth \$21.32 in one hour's time. In Japan, the average worker was only 49 percent as productive. Manufacturing comparisons are similar. Sources: US and Japanese employment and Japanese GDP are from OECD national accounts data, while US GDP values are revised US Department of Commerce estimates. OECD purchasing-power-parity (PPP) exchange rates were used. PPP exchange rates are the number of currency units required to buy goods and services in Japan equivalent to what can be bought with the dollar in the US.

In 1989, the average American worker produced goods and services worth \$21.32 in one hour's time, while the average Japanese worker produced goods and services worth \$10.45. Thus the average Japanese worker was only 49 percent as productive as the American worker. In both countries, manufacturing productivity was better than the economy-wide average. In 1989, American manufacturing output per hour was \$24.52 compared to Japanese output of \$13.27, 54 percent of the US value.

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There is substantial room for error in these calculations without changing the basic conclusions. To illustrate, suppose the workweek in Japan is only 45 hours. This brings Japanese economy-wide productivity up to only 59 percent of the US value.

Industry Productivity Comparisons

Table 1 shows industry productivity comparisons using 1987 OECD data [OECD 1991]. It is unfortunate that more recent OECD industry data are not available due to the revision of US economic statistics. The categories could be more informative but they do show that the industry group of chemicals, rubber, and plastics is the only one in which Japan leads. The US has a clear productivity advantage in

Total economy	47
All manufacturing	52
Food and beverages	51
Textiles and apparel	32
Paper products	59
Chemicals, rubber, plastics	122
Nonmetallic mineral products	48
Basic metal industries	83
Machinery, fabricated metals	50
Electricity, gas, water	72
Construction	54
Wholesale and retail trade	45
Transport, storage, communication	39
Finance, insurance, real estate	93
Community, social, personal services	55
Agriculture, forestry, fishing	18
Mining	25

Table 1: Industry comparisons show Japan's output per hour relative to the US in 1987 with the US equal to 100. The only industry group in which the Japanese led is chemicals, rubber, and plastics. The US had a strong lead in logistics and distribution operations, such as wholesale and retail trade and transport, storage, and communication. (Source: OECD national accounts [1991].)

many categories, particularly in logistics and distribution. The Japanese productivity ratio relative to the US is only 45 percent in wholesale and retail trade and 39 percent in transport, storage, and communication. As one of the referees for this paper pointed out, the efficient US distribution system is a mixed blessing. It vastly improves our standard of living but allows easier access to our markets by foreign manufacturers.

Two recent productivity studies involving the US and Japan, by the McKinsey Global Institute [1991, 1992], are relevant here. In a study of service-sector productivity, it reviewed airlines, banks, restaurants, retailing, and telecommunications. McKinsey's findings generally agree with those shown in Table 1, and it concludes that the US has a significantly higher level of overall service productivity. McKinsey also studied manufacturing productivity in nine industries. In five (steel, car parts, cars, metal-working, and consumer electronics), Japan was more productive. In the others (computers, soap and detergent, beer, and food processing), the US led.

Overall, Japan was 83 percent as productive as the US, a much greater percentage than the 52 percent index shown in Table 1. The differences may be due to the study's scope and methods of measurement. McKinsey's study applies to only about 15 percent of manufacturing employment in the US and measures output per person rather than output per hour.

Are the Japanese Catching Up?

Japan is closing the productivity gap at a negligible rate. This observation contradicts that of the American Productivity and Quality Center [Thor 1992], which warns

that Japan will pass the US in economy-wide output per hour within 10 years. It bases this projection on annual growth rates containing the biases and distortions we have discussed above. We believe that a more reasonable way to make such a projection is to use the rate of change in Japanese output per hour as a percentage of US output. In Figure 1, Japanese economy-wide output per hour in 1980 was 41 percent of the US value. At current rates of change in this ratio, the Japanese will take more than 50 years to catch up. In manufacturing output per hour, the Japanese are gaining at a much slower rate, and it will take more than 100 years to catch up with the US. These forecasts are probably optimistic since Japan's population is aging rapidly and companies will find it more difficult to enforce oppressive working hours. By the year 2010, more than 27 percent of Japan's population will be age 65 years or greater compared to 18 percent in the US.

Conclusions

In defense of the BLS, it is aware of the measurement problems in the service sector [Sherwood 1993], Japanese economic statistics are ambiguous, and there are technical objections to comparisons of productivity levels rather than growth indexes [Neef and Kask 1991]. The principal problem is that industry-specific PPP exchange rates have not been developed. Thus it may not be accurate to apply economy-wide PPP exchange rates to the manufacturing sector.

Nevertheless, we believe that our productivity comparisons are more accurate than BLS comparisons. Our results are corroborated by an independent, OECD-sponsored study [Maddison 1989]. Using

different sources and data, Maddison put 1986 economy-wide hourly output in Japan at 51 percent of the US level, citing a variety of references to substantiate at least a 50-hour week in Japan. Japanese sources also support our findings. As mentioned above, JETRO [1991b] puts growth in US manufacturing output per hour slightly ahead of Japan's for the years 1980 to 1989. In a study by the Japan Productivity Center, manufacturing productivity per hour was 61 percent of the US level [Morimoto 1991]. Morimoto also found virtually identical growth rates in manufacturing productivity in the two countries, on a man-year basis, for the years 1979 to 1988. Further support is provided by the Bank of Japan [JETRO 1991a], which found virtually identical growth rates in manufacturing productivity on a man-year basis for the years 1981 to 1990.

One question that we did not address is whether there has been a slowdown in US productivity growth relative to its own past, rather than the growth of other nations. Because of the productivity-measurement problems in the service sector, we find this question difficult to answer. However, in an exhaustive study covering the period 1880 to the present, Baumol, Blackman, and Wolff [1991] found no clear and uniform growth trends in US productivity. Therefore, they conclude that: "... none of the data offer rational grounds for the fears that the economy has suffered a slowdown in its long-term growth rate."

In conclusion, if the US is actually in a state of economic decline relative to Japan, we can find no evidence that productivity is at fault. In reality, American productivity compares quite favorably to that of Japan.

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Given the distortions in official US government data on productivity, we are suspicious of other government data on international economic comparisons. We are currently conducting research to re-examine the data on real wages and living standards in the OECD nations.

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