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Measurement Error Partially Explains Slow Growth in Service-Sector Productivity

Between 1950 and 1972, labor productivity (measured by output per hour) grew by a hefty average annual rate of 2.3 percent. Then, from 1972 to 1987, average annual growth in productivity fell to only 1 percent per year. In **Problems in the Measurement and Performance of Service-Sector Productivity in the United States** (*NBER Working Paper No. 5519*), NBER Research Associate **Robert Gordon** shows that this slowdown has not been uniform across industries, and that some of the differences among industries are attributable to measurement error.

Manufacturing on the whole has done well while many service industries have lagged behind. Between 1987 and 1992, Gordon writes, productivity in durable goods manufacturing increased annually by an average of 2.8 percent, while productivity in nondurable goods averaged an annual increase of only 0.9 percent. During those same years, productivity in transportation varied widely, from 7.2 percent in railroads to only 1.4 percent annually for airlines. Strikingly, the officially measured annual output per person of personal, business, automotive, and health services actually declined between 1972 and 1992. Within the retail trade sector, productivity growth also ranged widely, from electronics and computer stores that increased their output per hour by an average of 5.9 percent per year from 1973 to 1992 to restaurants and drinking establishments in which productivity shrank by 0.3 percent annually.

Further, from an international perspective, the United States has been a leader in productivity growth in mining, communications, and agriculture, but growth has been at or near the bottom of the G-7 countries in such sectors as construction, utilities, and insurance. Between 1979 and 1992, productivity in the miscellaneous U.S. service industries that make up 22 percent of the U.S. private sector decreased by an average of 0.7 percent annually, while those same industries in France and Germany increased their productivity by an average of almost 2.5 percent. Why this mixed and sluggish growth in U.S. productivity? According to Gordon, this puzzle is explained partly by measurement error.

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How could measurement methods have deteriorated just when funds for measuring, and the methodology of measuring, have improved? Gordon does not believe that the government agencies that do the measuring have become less capable, but that the economy has become more difficult to measure. Sectors that NBER Research Associate Zvi Griliches has labeled "hard to measure" increased from 51 percent of the economy in 1947 to 69 percent in 1990. Hard-to-measure industries include construction, retail trade, and insurance; those that are relatively easy to measure include mining and manufacturing.

Flaws in the Consumer Price Index (CPI) lead to an understatement of productivity growth in certain manufacturing, retail trade, and service industries, Gordon notes. First, the CPI fails to recog-

nize the traditional substitution effect (neglecting the fact that people buy more chicken, say, when the price of beef rises). This effect biases the CPI upward by about 0.3 percentage points per year, and productivity growth downward by roughly the same amount.

Second, the CPI does not adjust adequately for increases in quality. For example, by treating them as separate products, it ignores the benefit to the consumer when old, expensive goods, such as clunky rotary calculators, are replaced with newer, cheaper, and faster versions, such as the $10 pocket calculators that came on the market in the 1980s. Also, the CPI misses quality improvements in goods that already exist. For example, the sound quality of stereos and the visual quality of television sets are undeniably better than when the products were first sold, but the CPI disregards the value of such improvements. Finally, the CPI is slow to introduce new products. For example, room air conditioners were sold widely in 1952, but did not appear in the CPI until 1964. Gordon estimates that these different types of "quality bias" overstate increases in the CPI by about 0.6 percentage points per year.

Another inadequacy of the CPI is that it misses the "Walmart Phenomenon." Consumers now can purchase goods at lower prices at large chains than at their local "mom-and-pop" stores. The CPI assumes that separate stores sell separate sets of goods and services, and therefore ignores such price decreases. This "outlet substitution bias" adds about 0.4 percentage points per year to the CPI. The bottom line is that the CPI overstates inflation by about 1.2 percentage points per year, and thus understates productivity by roughly the same amount.

These problems with the CPI have existed for a long time. In themselves, therefore, they do not explain the productivity slowdown. However, Gordon points out, the problems are more acute with the "hard-to-measure" sectors, which also have been expanding and apparently experiencing low productivity growth.

Gordon notes two other causes of low productivity. First, certain industries have reached technological frontiers beyond which increased productivity is difficult to attain. For example, electric utilities and air travel both have reached the point technologically where becoming "more productive" would be far too costly. Second, there is a feedback from low real wages to slow productivity growth. Weak labor unions, high immigration, and a declining real minimum wage have combined to reduce the relative wages of low-skilled labor. The low cost of hiring these laborers in turn has led to low productivity in such "trades" as grocery stores and restaurants. DRH

Don't Bet on a Borderless World Just Yet

Globalization is one of the buzzwords of the 1990s. According to popular belief, national boundaries are losing their economic importance as corporations move operations at will from one country to another, weakening the authority of governments and the bargaining power of workers while augmenting the leverage of corporate management. This story, however, is much exaggerated, according to research by **Robert Lipsey, Magnus Blömstrom,** and **Eric Ramstetter.** While cross-border ownership of production is becoming more important, they find, it is still a small part of world production, especially outside manufacturing and mining.

In **Internationalized Production in World Output** (*NBER Working Paper No. 5385*), Lipsey, Blömstrom, and Ramstetter examine internationalized production from the viewpoint of both multinational corporations' home countries and their host countries. The foreign output of firms based in the United States, they find, has been diminishing in importance relative to both the United States and the world economy. At their peak in 1977, U.S. companies' foreign operations accounted for about 3 percent of world economic output outside the United States. By 1993, U.S. companies' share of non-U.S. output had dropped to around 2 percent.

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These declines continued through the early 1990s, even as the U.S. share of total world output was holding steady. U.S.-based multinationals' worldwide production, including production in the United States, also has declined relative to the U.S. economy. Within the United States, domestic production by nonmultinational companies has grown by more than production by U.S. multinational parents or by foreign multinationals operating in the United States.

International production by Japanese, German, and Swedish com-

panies, in contrast, has been growing faster than world output in recent years. Overall, however, "the decline for U.S. firms, because of the much larger initial importance of U.S. internationalized production, pretty well offset the increases in the other countries over the last decade and a half," Lipsey, Blömstrom, and Ramstetter report. Since these four countries account for more than half of all international investment, the figures do not point to a surge of "globalization."

The picture is also mixed when examined from the host country side. Foreign firms' share of total U.S. output has grown steadily since 1974, and now accounts for about 4 percent of total Gross Domestic Product and 14 percent of output in manufacturing. Among the other six developed host countries, the foreign share rose in Sweden and fell in Canada and Norway, and it is hard to discern a clear trend in Japan, Australia, or the United Kingdom. Among developing countries, foreign shares in production rose most rapidly in China, but also by smaller amounts in most, but not all, other Asian developing countries. In Latin America, the foreign share was stable in Brazil but increased in Uruguay and probably in Mexico, although the data for Mexico are very sketchy.

For the world as a whole, the authors estimate, internationalized production amounted to almost 7 percent of global economic output in 1990. That represents a substantial increase from an estimated 4.5 percent in 1970, but is still a small proportion of total economic activity. The trend in "globalization" is weakened, Lipsey, Blömstrom, and Ramstetter say, because the industry sector (manufacturing, mining, construction, transportation, communication, public utilities, and trade), the location of most internationalized production, is of declining importance in the world economy. While internationalized production amounts to about 15 percent of industry output, it accounts for only about 0.25 percent in the rapidly expanding service sector. Furthermore, even multinational firms do most of their production at home: more than three-quarters of it for both U.S. and Japanese multinationals. "Internationalization of production is clearly growing in importance, but the vast majority of production is still carried out by national producers within their own borders," the authors conclude.

ML

A Century of Rising Education Costs

Elementary and secondary school education in the United States has become steadily more expensive. Real (that is, after deducting inflation) expenditures per student increased at 3.5 percent per year on average over the entire century from 1890 to 1990. Real public expenditures on primary and secondary education rose from $2 billion to more than $187 billion (in constant 1990 dollars).

In **Understanding the 20th Century Growth in U.S. School Spending** (*NBER Working Paper No. 5547*), **Eric Hanushek** and **Steven Rivkin** examine the underlying causes of the long-term growth in spending as "a preliminary step to establishing rational spending policies." They find that while specific factors have had relatively greater impacts at different points in time, three stand out as being of primary importance throughout the period: 1) the rising real wages of teachers, driven largely by the substantial growth in real wages in general over the last 100 years; 2) the decline in the number of pupils per teacher, and the increase in the number of staff per teacher; and 3) the disproportionate rise in spending on things other than teacher salaries.

> "During the 1980s, most of the growth in education expenditure came from the drop in the ratio of pupils to instructional staff, from about 21 in 1970 to around 15 in 1990."

Teacher wages have increased from $34 per day in 1890 (in 1990 dollars) to more than $177 per day in 1990, which accounts for more than 40 percent of the increase in total spending on instructional staff over the century. Teachers and other instructional staff (principals, guidance counselors, psychologists, and librarians, but excluding aides) have won pay hikes as school systems attempt to keep qualified instructors. For female teachers in particular, competitive pressures have increased as barriers to women entering other occupations have fallen. Particularly since World War II, teaching has moved from one of the most attractive occupations for women to a much lower position in terms of both status and pecuniary rewards. These pressures are likely to be felt increasingly in the future, Hanushek and Rivkin note.

During the 1980s, most of the growth in education expenditure came from the drop in the ratio of pupils to instructional staff, from about 21 in 1970 to around 15 in 1990. This in itself explains 85 per-

cent of the aggregate increase in expenditures on instructional staff salaries of almost $25 billion between 1970 and 1990, the authors find.

Spending outside of instructional staff salaries has gone from one-fourth of total current expenditures in 1890, to one-third in 1940, to 54 percent in 1990. Unfortunately, the factors underlying this growth cannot be ascertained because the data are poor and incomplete.

The expansion of special education programs has had a disproportionate effect on spending since the 1975 enactment of the Education for All Handicapped Children Act, but the impact has not been as large as many suggest. This act prescribed a series of diagnostics, counseling activities, and services to be provided for handicapped students. The number of students classified as disabled increased from 4 million in 1980 to 4.7 million in 1990, despite an overall decline in public school enrollment. Moreover, the number of special education teachers increased much more rapidly than the number of children classified as disabled, and special education students cost approximately 2.3 times what regular education students cost. Still, special education can account for at most one-quarter of spending growth in the 1980s. Special education, Hanushek and Rivkin add, does become more important in times of fiscal stringency, because the legal status of such spending dictates that it takes precedent over regular education spending.

Finally, the authors note that the central administrative costs of education have remained at roughly 5 percent of total expenditure throughout the time period covered. DRF

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