Chapter 9: Productivity in the Health Sector

By:
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Chapter 1

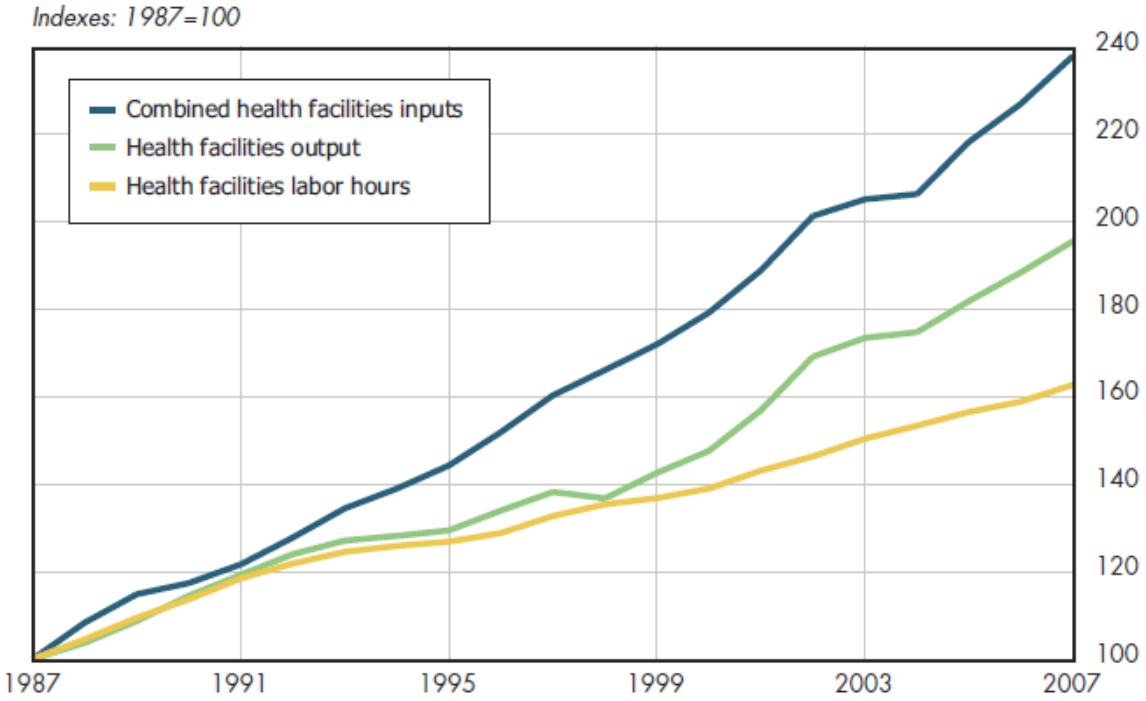
9.1 Recent Increase in Health Services Productivity[1]

In 2007, the output of real health services in American health facilities was approximately double its level 20 years earlier. What was behind this production increase? To what extent did it reflect the use of more factors of production or inputs—the number of persons employed and the amount of capital they had to work with—and to what extent did it reflect greater efficiency in the use of inputs, that is, increased productivity? Measuring productivity growth is important because if productivity declines, the nation will require ever-increasing amounts of labor and capital to produce the same level of health output. This either will slow down or might even reverse the rise in general living standards.

The basic facts about the growth of output and input are compiled by the Bureau of Labor Statistics (BLS). Unfortunately, these facts are limited both in scope — covering only health services — and time — going back to only 1987. Typically, the growth of output is compared with the growth of labor input, which is measured in simplest terms by changes in employment and annual hours worked. Labor hours for health facilities rose just over 60 percent during these 20 years, approximately 2.5 percent annually (figure 9.1a). Output grew 3.4 percent a year. These numbers suggest a rise in labor productivity of 0.9 percent annually (3.4 minus 2.5).

[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10122/1.2/>.

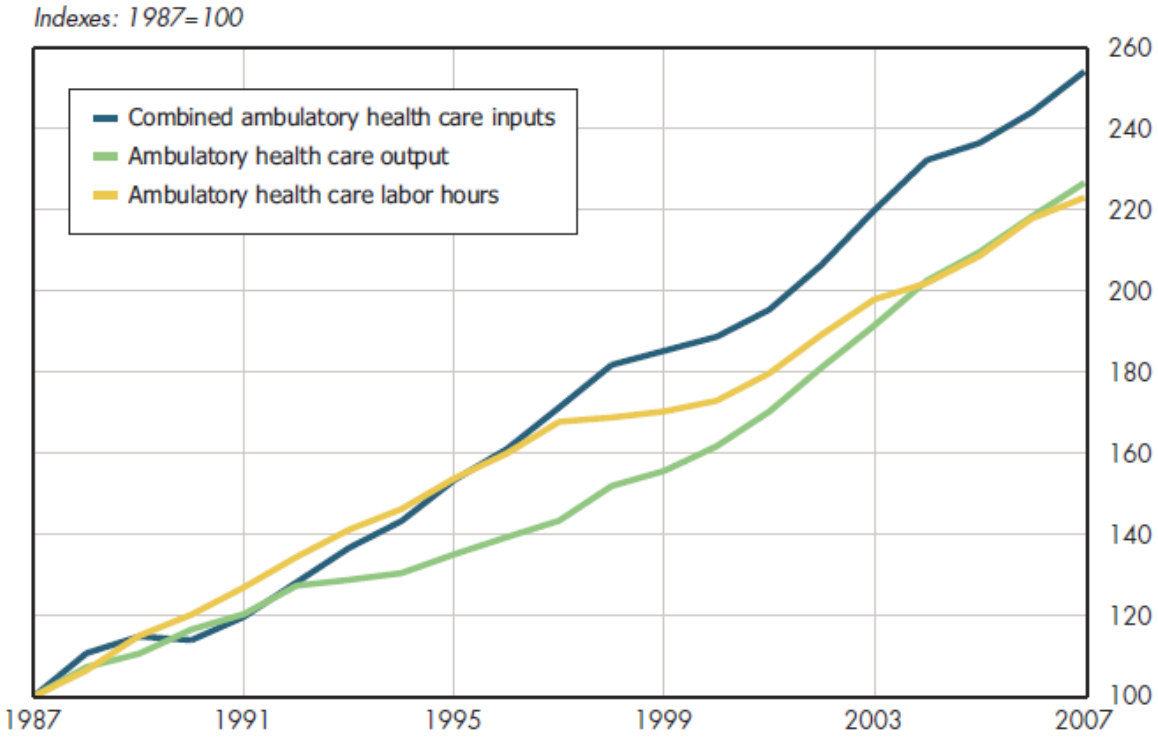
9.1a In hospitals and nursing homes, real output increased faster than labor hours over the past decade but more slowly than all inputs combined



However, this particular measure ignores other important factors that contribute to production, including the physical facilities themselves, equipment, inventories, and land. With these taken into account, combined inputs for health facilities rose 140 percent during these 20 years, approximately 4.4 percent annually. This growth implies a *decline* in productivity more broadly measured.

A similar result, though less extreme, occurred in the ambulatory health services industry. Over the entire period since 1987, output rose at almost the identical rate as labor input, although declining labor productivity occurred during the entire 1990s (figure 9.1b). Output grew somewhat faster than among health facilities, but combined inputs grew faster still, again implying declining productivity.

9.1b Over the past 20 years, total inputs for ambulatory health care outpaced growth in output even as growth in labor hours slowed



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- Table 9.1. Total Output, Labor Hours, and Combined Inputs for Health Sector, 1987-2009

1.2 References

A. Author's calculations.
B. Department of Commerce. Bureau of Economic Analysis.
C. Department of Labor. Bureau of Labor Statistics.

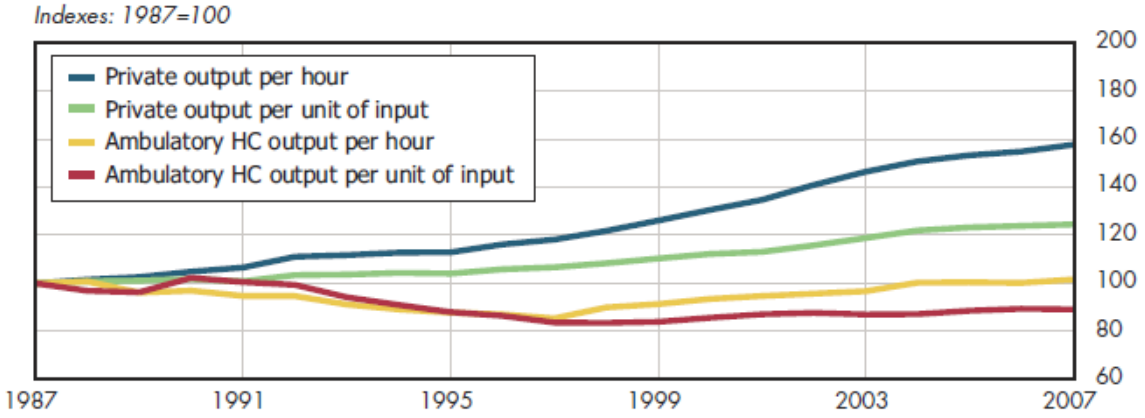
[2]https://hub.mili.csom.umn.edu/content/m10122/latest/9.1aIMG.ppt
[3]https://hub.mili.csom.umn.edu/content/m10122/latest/9.1aDATA.ppt
[4]https://hub.mili.csom.umn.edu/content/m10122/latest/9.1bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10122/latest/9.1bDATA.ppt
[6]https://hub.mili.csom.umn.edu/content/m10122/latest/9.1TAB.xls

Chapter 2

9.2 Health Productivity Has Grown Less among Private Businesses[1]

Ambulatory care output per unit of input was less in 2007 than it had been 20 years earlier (figure 9.2a). This is only one way of measuring productivity. Even in terms of output per hour, productivity in the ambulatory health care industry generally declined into the 1990s and generally rose thereafter. Even so, hourly productivity in 2007 was almost identical to its 1987 level. In contrast, productivity grew much more steadily in the private sector overall during the same period. Hourly productivity climbed by approximately 60 percent while output per unit of input increased approximately 25 percent.

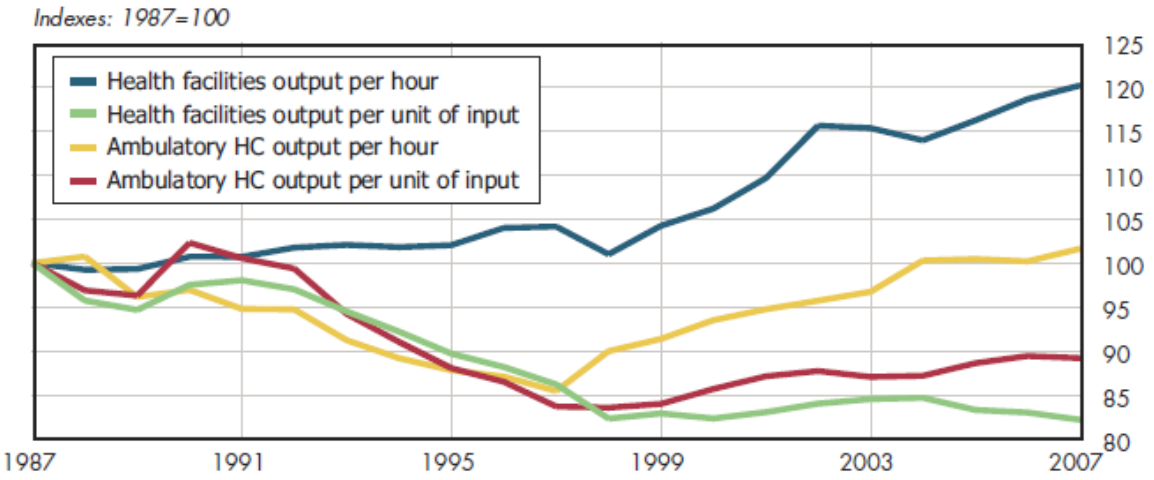
9.2a Since 1987, low or negative productivity growth in ambulatory health care contrasts with steadier private-sector productivity gains



In health facilities, hourly productivity has tended to increase, especially since 1998. However, when capital inputs are taken into account, output per unit of input actually had fallen more by 2007 in health facilities than in ambulatory health care services (figure 9.2b).

[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10123/1.2/>.

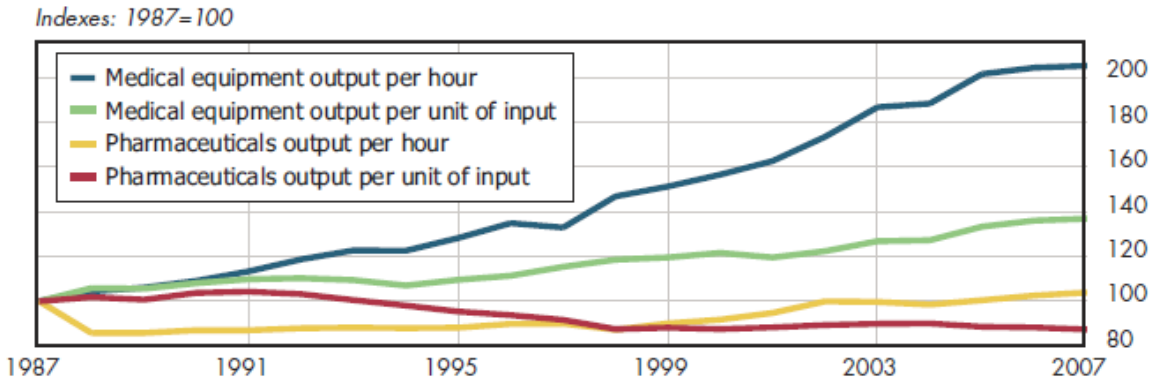
9.2b Over 20 years, hourly output of health facilities increased even as productivity per unit of input declined, and then remained relatively flat



Note: Health facilities = hospitals and nursing and residential care facilities; outpatient = ambulatory health care services.

In the goods-manufacturing portion of the health industry, productivity trends are somewhat like those in the private economy overall. For manufacturers of medical equipment, the growth in hourly productivity and output per unit of input has easily exceeded the average levels experienced in the private sector (figure 9.2c).

9.2c Productivity has increased much faster in the medical device industry than in the pharmaceutical industry, where output per unit of input is decreasing



In pharmaceuticals, 2007 output per hour was approximately at the same level as in 1987. However, this combines a sharp drop in productivity in the late 1980s followed by rather steady annual increases thereafter. Pharmaceutical manufacturers saw a slight increase in output per unit of input at the start of this period, with generally falling productivity levels thereafter.

Falling productivity does not connote falling output. Output was increasing in all these health subsectors during this time. Because inputs into production also were increasing either more quickly or at approximately the same rate, productivity growth generally was more anemic in health care than elsewhere in the private economy. However, readers are cautioned that estimates of productivity are highly dependent on accurate price measurement. Accurate estimates of price changes are more challenging for health care than for most other goods and services because for the latter, it is easier to account for changes in quality.

2.1 Downloads

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- Table 9.1. Total Output, Labor Hours, and Combined Inputs for Health Sector, 1987-2009

2.2 References

A. Author's calculations.
B. Department of Labor. Bureau of Labor Statistics.

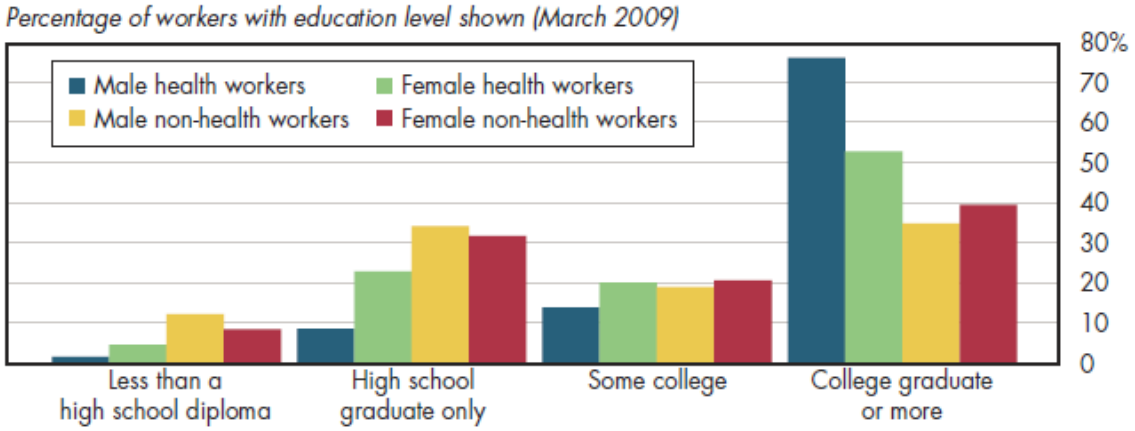
[2]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2aIMG.ppt
[3]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2aDATA.ppt
[4]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2bDATA.ppt
[6]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2cIMG.ppt
[7]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2cDATA.ppt
[8]https://hub.mili.csom.umn.edu/content/m10123/latest/9.2TAB.xls

Chapter 3

9.3 Health Sector Has Better-Educated Workers among Industries[1]

Of those who work in the health industry, 75 percent of men and 50 percent of women have at least a college degree (figure 9.3a). Conversely, compared with the work force in general, a much lower share of health sector workers have less than a high school diploma or have graduated only from high school without any additional schooling. In the general economy, increased education of the work force has been an important source of growth in output. That is, higher levels of education have tended to contribute to productivity growth. Thus, low productivity growth in health care exists despite high levels of worker education.

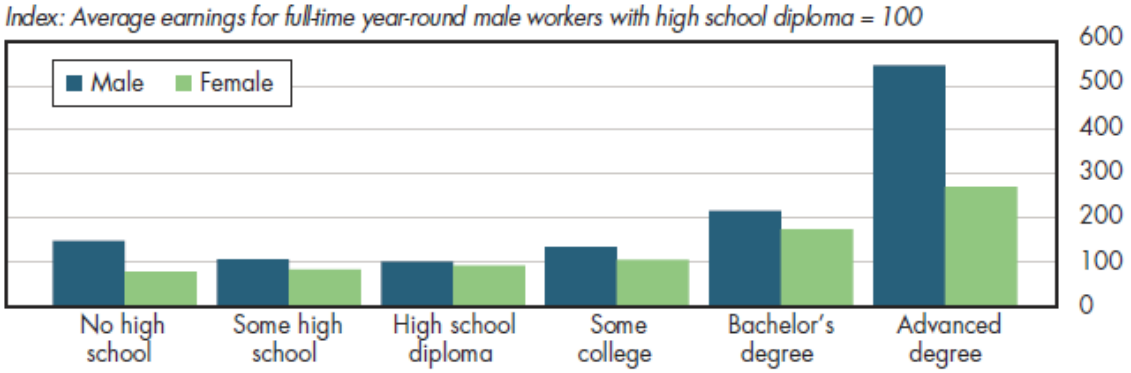
9.3a For both men and women, education levels are much higher in health services than among employees in other industries



Earnings tend to rise with educational attainment. Compared with males whose highest level of education is a high school diploma, male health workers who have a bachelor's degree have average annual incomes that are twice as high. Males who have advanced degrees earn five times as much as high school graduates (figure 9.3b).

[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10124/1.2/>.

9.3b Average earnings for full-time, year-round employees in the health industry generally increase with education

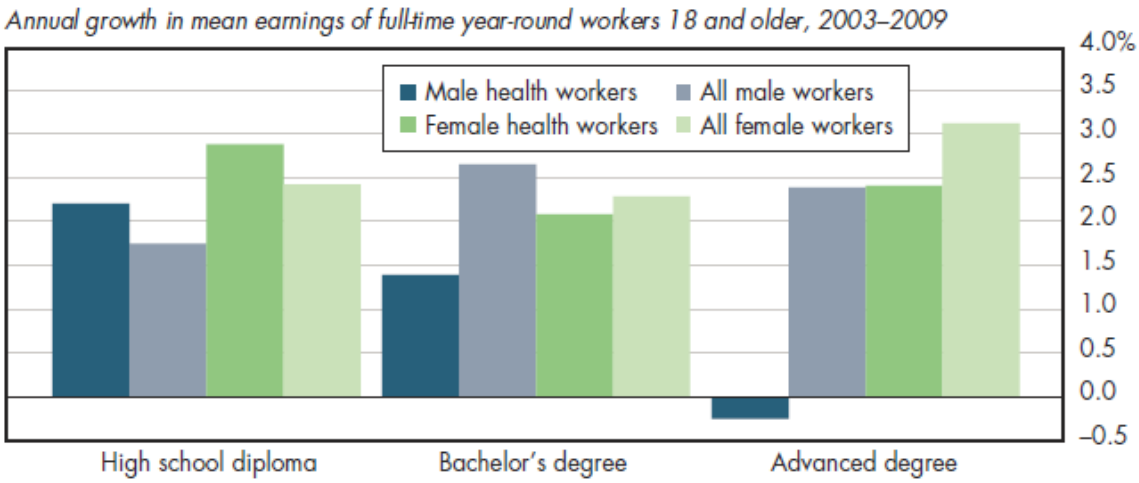


Note: Earnings are for 2008.

Many labor economists believe that individuals who have higher education levels earn more because they produce more. Education brings more skill and knowledge to the individual. A more educated person can perform several different tasks and has greater awareness of other job opportunities. A contrary view maintains that high school diplomas and college degrees are credentials, useful for hiring but not necessarily for measures of what people actually produce on the job, when hired. To an employer, a person who has a degree might seem well motivated and reliable, that is, likelier to have characteristics considered desirable in an employee than an equivalent individual who has no degree. In a heavily regulated industry such as health care, credentialing might have as much to do with professional rent-seeking behavior as it does with higher productivity. It is difficult to isolate a pure "education effect" on output because of the difficulty of measuring personal characteristics and because other attributes, such as experience, are closely related to education.

Whether it reflects lagging productivity or something else, recent growth in health sector earnings has been slower than for other workers (figure 9.3c).

9.3c Recent growth in health sector earnings has been slower than for other employees, except those who have the least education



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- Fig. 9.3a: Table 9.3.1. Percentage of Civilian Labor Force Aged Twenty-Five to Sixty-Four, by Educational Attainment, 2009
- Fig. 9.3b: Table 9.3.2. Mean Incomes of Workers 18 and Older Who Work Full-Time Year-Round in Health Industry, by Educational Attainment, 2009
- Fig. 9.3c: Table 9.3.3. Annual Growth in the Mean Income of Men 18 and Older Who Work Full-time Year-Round in Health Industry, by Educational Attainment, 2003-2009

3.2 References

A. Department of Commerce. Bureau of the Census.

[2]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3aIMG.ppt
[3]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3aDATA.ppt
[4]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3bDATA.ppt
[6]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3cIMG.ppt
[7]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3cDATA.ppt
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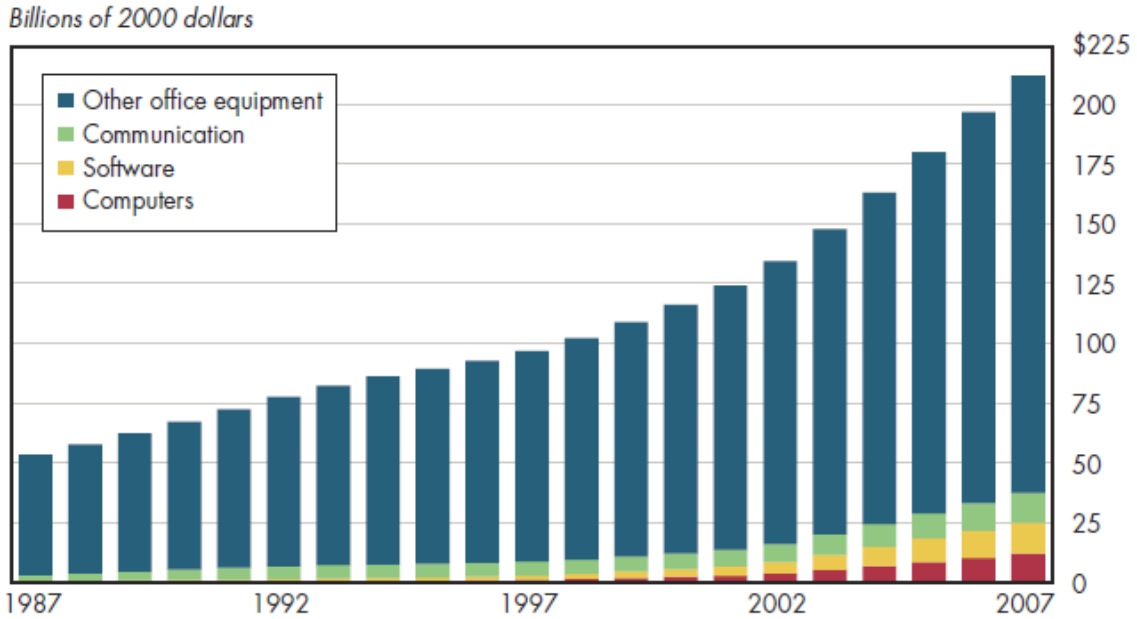
[9]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3bTAB.xls
[10]https://hub.mili.csom.umn.edu/content/m10124/latest/9.3cTAB.xls

Chapter 4

9.4 Information Capital Stock in Health Services, 1987-2007[1]

Information capital stock in the health services sector has approximately quadrupled in the 20 years since 1987 (figure 9.4a). Such capital stock includes computers, software, and communications equipment. It also includes traditional office equipment. As with many other data series presented up to this point, this one is restricted to ambulatory health services and health facilities. The picture might well be different were parallel numbers available for pharmaceutical and medical device manufacturing.

9.4a Information capital stock in the health services sector has quadrupled during the past 20 years



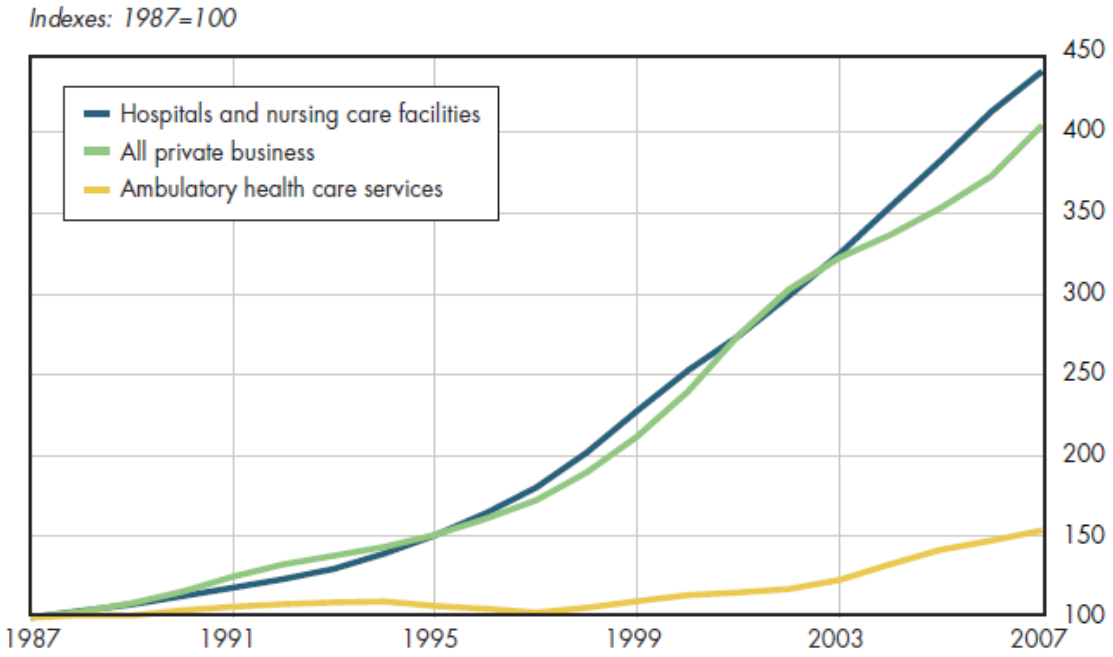
Note: All growth rates calculated through the end of the last year shown in each interval. Health services includes private sector ambulatory health services, hospitals, nursing and residential care facilities. It does not include pharmaceuticals, medical devices, health insurance, or government hospital workers. However, *other office equipment* includes medical and non-medical instruments used in the health services subsector.

[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10125/1.3/>.

More important, in the health sector, the BLS also includes medical instruments, whether as small as a pair of surgical clamps or as large as a PET scanner. With the huge growth in medical equipment (the industry's output more than doubled from 1987-2008), this large increase in information capital for medical services might not be that surprising. Indeed, excluding the "other office equipment" category, the total amount of information stock held in the form of computers, software, and communications equipment is less than $40 billion. This is 10 times the inflation-adjusted level of spending reported in 1987 but amounts to less than four cents per dollar of annual health services industry output.

A better metric compares real information capital to labor hours, because these too have grown since 1987. In the private sector overall, real information capital per hour quadrupled over the subsequent 20 years (figure 9.4b). For much of this period, the same metric for health facilities grew practically in lockstep with private business. After 2003, real information capital per labor hour grew somewhat faster in health facilities than in the rest of private industry. The growth rate for health facilities was almost triple the increase seen in the ambulatory health services industry.

9.4b Since 1987, real information capital per hour in health facilities grew almost three times as fast as in ambulatory health care services



Selected provisions of health reform are intended to stimulate greater investments in electronic medical records and other forms of health information technology. How much such infusions of new information capital will affect the relative growth trends shown is unclear. That is, this will increase the aggregate amount of information capital. But some of this might be labor-saving. So, the rate of growth in real information capital per hour might be slower or faster than in recent decades, depending on the extent to which capital substitutes for labor.

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- Fig. 9.4a: Table 9.4.1. Information Capital Stock, Private Health Care Services, 1987-2007
- Fig. 9.4b: Table 9.4.2. Information Capital per Labor Hour, Private Health Care Services and All Private Business, 1987-2007

4.2 References

A. Department of Labor. Bureau of Labor Statistics.

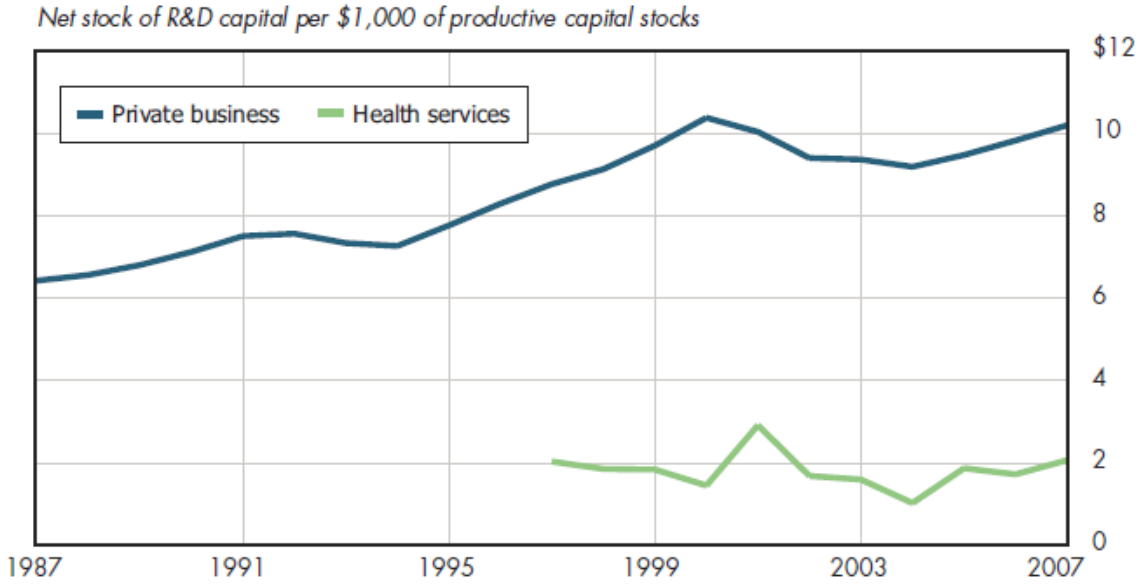
[3]https://hub.mili.csom.umn.edu/content/m10125/latest/9.4aDATA.ppt
[4]https://hub.mili.csom.umn.edu/content/m10125/latest/9.4bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10125/latest/9.4bDATA.ppt
[6]https://hub.mili.csom.umn.edu/content/m10125/latest/9.4aTAB.xls
[7]https://hub.mili.csom.umn.edu/content/m10125/latest/9.4bTAB.xls

Chapter 5

9.5 R&D Has Contributed to Increase in Health Sector Productivity[1]

Relative investments in R&D appear to be less in the health sector than in private business overall. By one traditional measure—the ratio of R&D capital to productive capital stock—R&D investments are approximately five times as large in the private sector as in the health services industry (figure 9.5a). Ignoring details of measurement, productive capital stocks simply are a way of measuring the total amount of capital available at any given time, accounting for the fact that all other things being equal, new capital is more productive than old capital.

9.5a The ratio of R&D capital to productive capital stock is approximately five times as high in private business as in health services



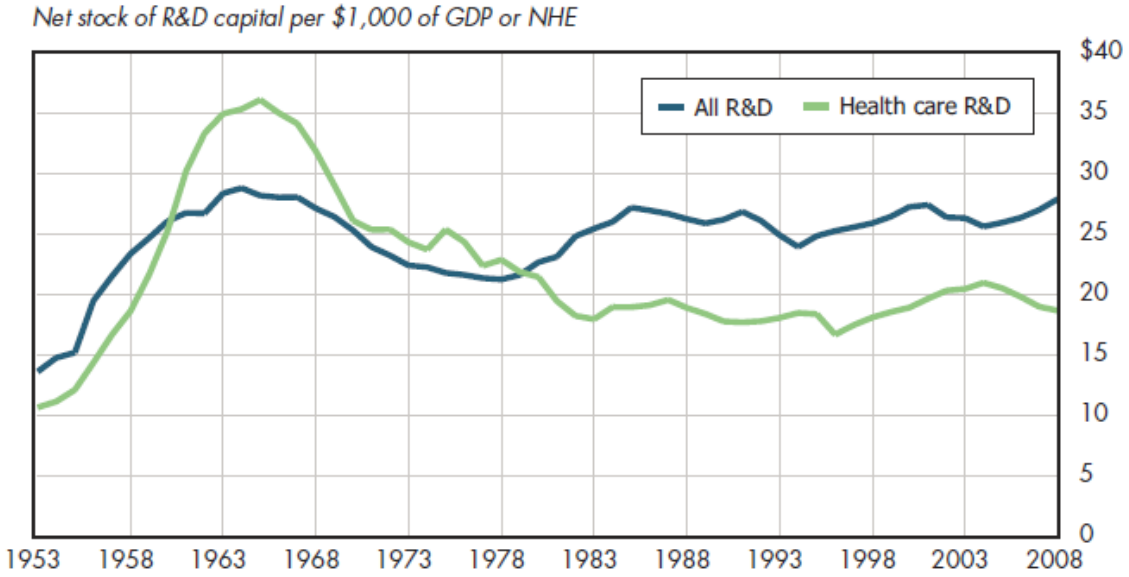
Note: All growth rates calculated through the end of the last year shown in each interval. Health services includes private sector ambulatory health services, hospitals, nursing and residential care facilities. It does not include pharmaceuticals, medical devices, health insurance, or government hospital workers. The data for health services did not begin until 1997.

[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10126/1.2/>.

By some measures, growth in capital stock is higher in some health-related industries than in the general economy. Unless R&D investments also increased at a similarly accelerated rate, the ratio of R&D to capital stocks would tend to decline even if investments in R&D were growing at identical rates in health care compared with the general economy.

Thus, a more "neutral" comparison would be to measure R&D relative to total output. When done, the health sector looks much more comparable to the general economy (figure 9.5b). There have been periods such as 1960-1979 in which relative R&D investments have been higher in health care. However, using this same measure, the current level of R&D in the overall economy is approximately 50 percent higher than in health care.

9.5b The ratio of R&D capital to GDP is higher than the ratio of health care R&D to NHE; the opposite was true from 1960 to 1979



Note: R&D expenditures include both private and public sector spending, regardless of where the R&D was actually conducted.

Neither of these measures proves that the health sector invests "too little" in R&D. First, they are only approximate measures. Second, the measure that compares R&D to productive stocks is limited to one component of the health industry, leaving out the subsector—pharmaceuticals—that arguably is the most important from an R&D perspective. Finally, whether an investment in R&D makes sense in any industry depends on the technological opportunity set available at that time. The expected rate of return to such investments often can depend on advances in basic science (for example, nanotechnology) that are beyond the control of any given industry. As long as there are differences in such rates of return, disparities in the rate of R&D investment are unavoidable.

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- Table 9.5.1. Net Stock of R&D Capital Compared with Productive Capital Stocks of Private Health Care Business, 1987-2008

5.2 References

A. Author's calculations.
B. National Science Foundation.

[4]https://hub.mili.csom.umn.edu/content/m10126/latest/9.5bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10126/latest/9.5bDATA.ppt
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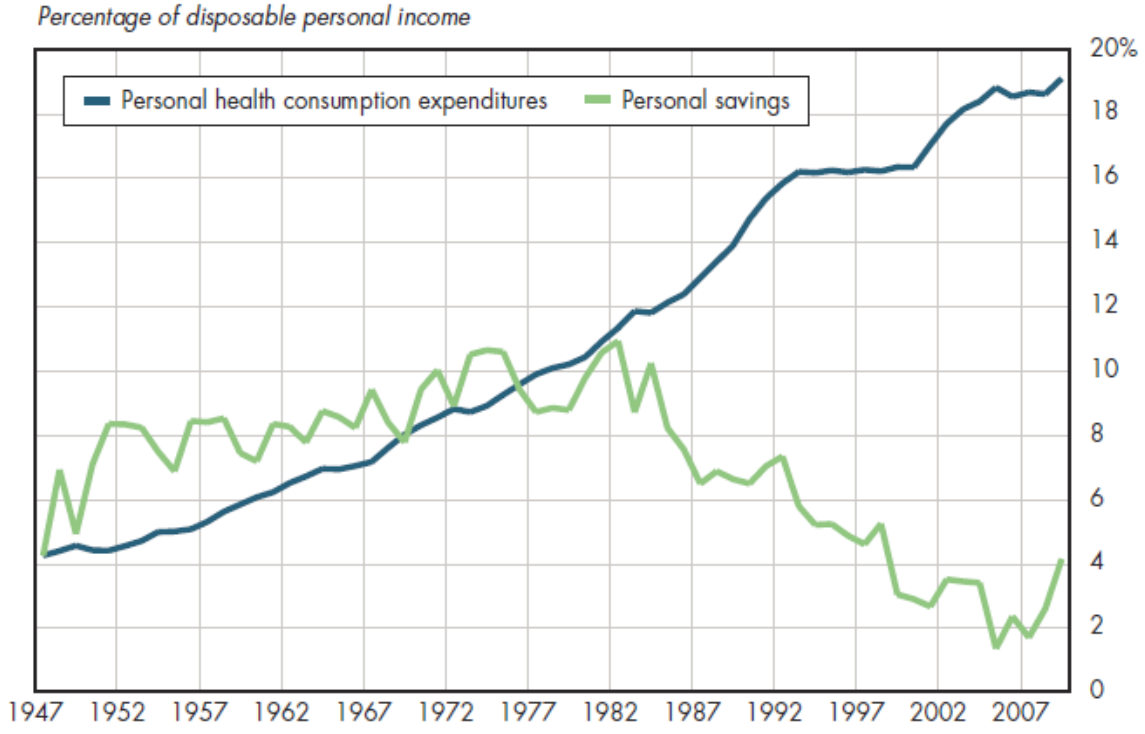
Chapter 6

9.6 Increase in Health Spending Explained 80% of Decline in Personal Savings[1]

For at least 25 years, rising health expenditures generally have been matched by a parallel decline in the personal savings rate (figure 9.6a). Capital stocks are the accumulation of investment flows, the financing of which depends on savings. Total savings for the nation encompass private savings, government savings, and foreign investment.

9.6a The shares of income for personal health care and personal savings increased before 1982, but savings generally declined thereafter

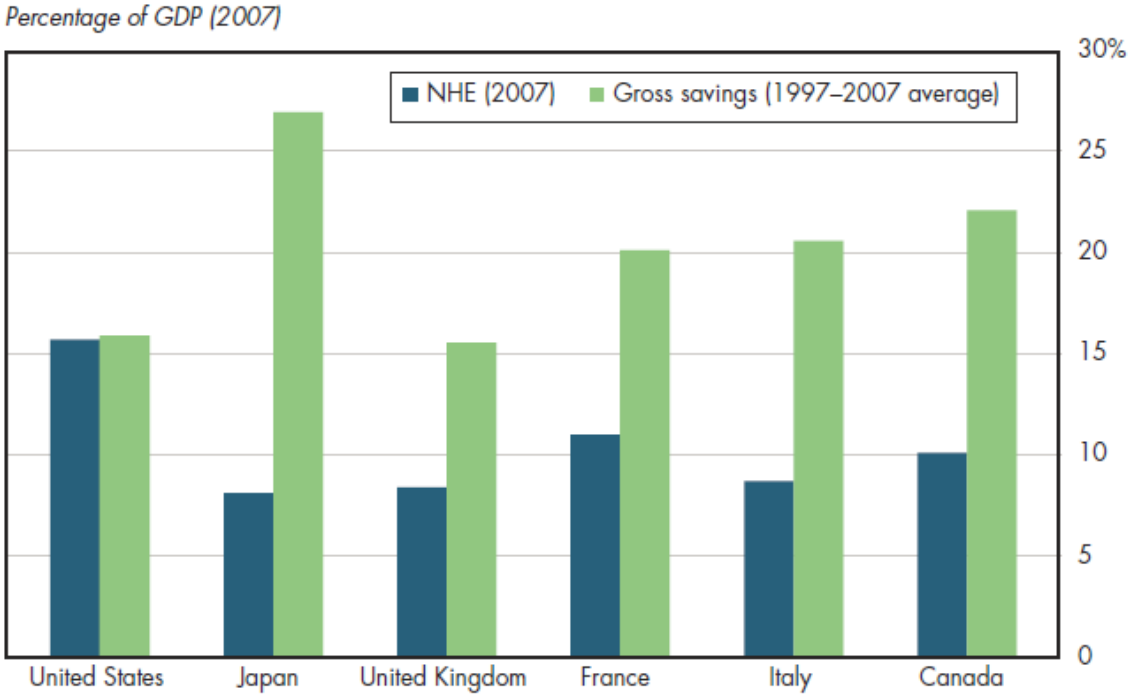


[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10127/1.2/>.

Measured relative to disposable (post-tax) personal income, the personal savings rate generally was on an upward path for 35 years starting in 1947 (figure 9.6a). Taken together, Americans typically saved more than they spent on personal health care during this period. After 1982, there was a sharp reversal in this trend. The savings rate generally declined even as personal health spending continued to rise. Mathematically, the positive slope of the personal health spending line is almost as steep as the negative slope of the personal savings line. Statistically, approximately 80 percent of the variation in the personal savings rate can be explained simply by knowing the share of disposable income allocated to personal health spending.

On average, gross annual saving in the United States is almost identical to its level of national health expenditures. In contrast, the savings rate among the rest of its G7 competitors generally is much more than their spending on health care (figure 9.6b).

9.6b Health spending matches gross annual saving in the United States; in most other G7 countries, the national savings rate is much higher than their NHE



The relationship between savings and health spending is not nearly as tight at the cross-national level as it is within the United States over time. Although the nation that has the lowest share of GDP devoted to health spending also has the highest savings rate (Japan), the nation that has the next-lowest health spending also has a savings rate almost identical to that of the United States (the UK). In terms of comparable purchasing power, U.S. GDP per capita is much higher than among its biggest competitors. To match U.S. savings in real per capita terms would unavoidably require these nations to devote a higher share of GDP to savings.

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- Fig. 9.6a: Table 9.6.1. Personal Saving and Personal Health Care Expenditures as a Percentage of Disposable Personal Income, 1947-2009
- Fig. 9.6b: Table 9.6.2. Gross National Saving and National Health Expenditures as a Percentage of GDP, Selected Countries, 2007

6.2 References

A. Author's calculations.
B. Department of Commerce. Bureau of Economic Analysis.
C. Organisation for Economic Co-operation and Development.

[4]https://hub.mili.csom.umn.edu/content/m10127/latest/9.6bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10127/latest/9.6bDATA.ppt
[6]https://hub.mili.csom.umn.edu/content/m10127/latest/9.6aTAB.xls
[7]https://hub.mili.csom.umn.edu/content/m10127/latest/9.6bTAB.xls

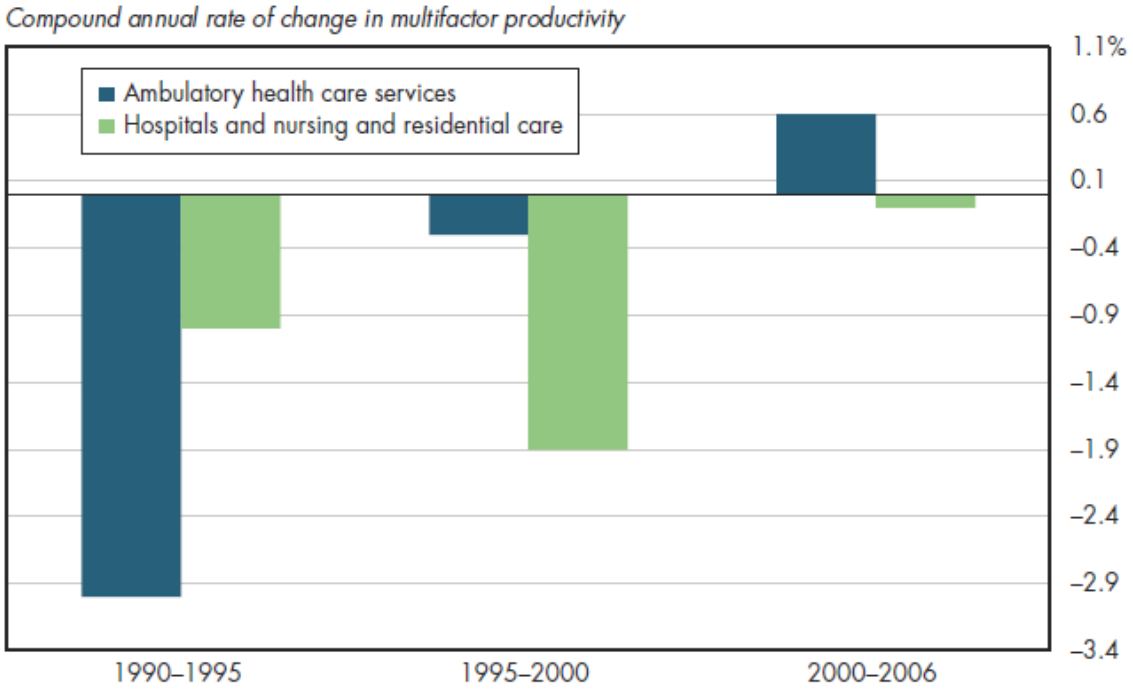
Chapter 7

9.7 Increase in Total Input Has Outpaced Output in Many Parts of Health Sector[1]

For much of the past 20 years, overall productivity growth has been negative for ambulatory health care and health facilities. Only in the last decade has multifactor productivity increased slightly in the ambulatory health services sector (figure 9.7a). Various factors of production such as labor, capital, and even information capital are discussed previously in this chapter. However, other inputs into the production process affect the level of output that is attainable. These include energy, materials, and purchased services (for example, legal services), among others. The various inputs are combined, based on their relative contribution to the cost of production. Thus, the net increase in inputs essentially is a weighted average of changes in all the various factors of production. For example, conceivably, efficiency improvements in the energy sector would result in a net decrease in energy inputs required to produce a unit of health output. Thus, the multifactor measure of inputs would have to combine negative growth in energy inputs with positive increases in other factors of production.

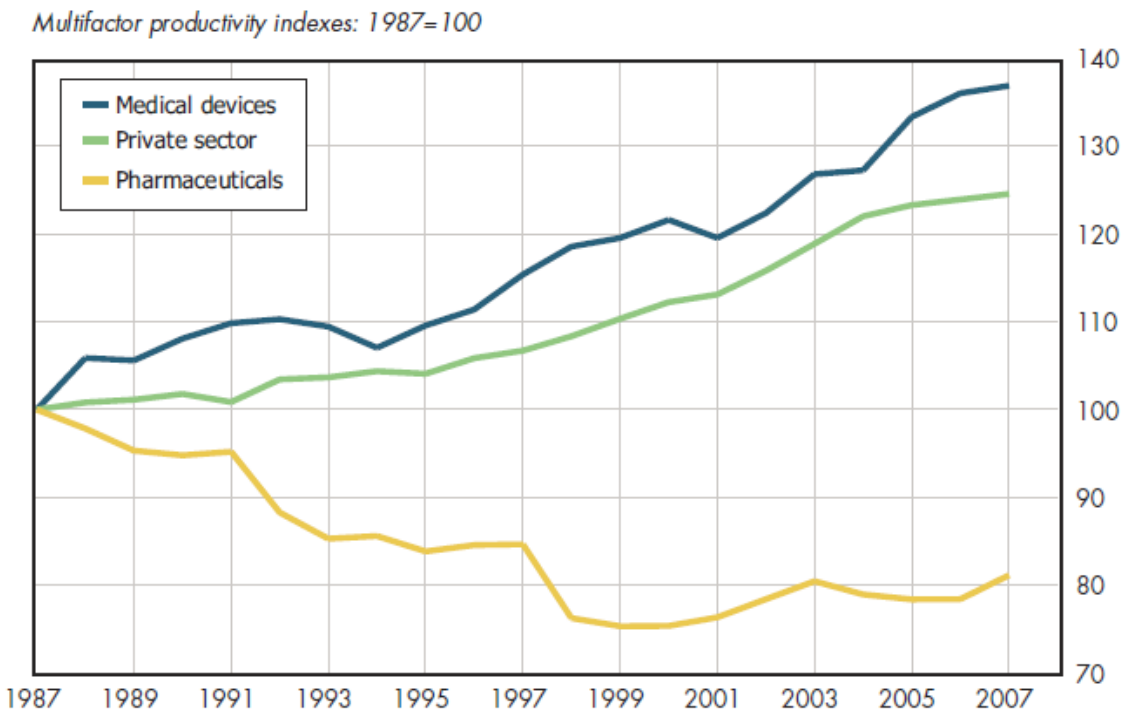
[1]This content is available online at <https://hub.mili.csom.umn.edu/content/m10128/1.3/>.

9.7a Multifactor productivity growth has steadily increased in ambulatory care over 20 years but is negative for health facilities



Viewed from this perspective, multifactor productivity generally has been declining in the pharmaceutical industry during the past 20 years (although this might have reversed itself since 1998). In sharp contrast, multifactor productivity in the medical device industry has grown by more than 30 percent during this period. This productivity outpaced the rate of increase in multifactor productivity in the private sector (figure 9.7b).

9.7b Multifactor productivity has decreased in pharmaceuticals even while increasing in the medical device industry more quickly than in the private sector



These disparate trends reinforce a general point that should have been increasingly clear as this chapter has evolved. The health industry comprises several subsectors that vary greatly in terms of the relative importance of labor, capital, and other factors of production, but also in terms of the degree that changes in such factors contribute to changes in overall output. The goods-producing portions of health care typically are different from the services-producing health industries. Even within the health services sector, health facilities are different from the components of ambulatory health services in terms of various productivity trends. This makes it difficult to generalize about the health industry as a whole.

7.1 Downloads

Download PowerPoint versions of both figures.

- Figure 9.7a Image Slide (as it appears above)[2]
- Figure 9.7a Editable Slide (can be formatted as desired)[3]
- Figure 9.7b Image Slide (as it appears above)[4]
- Figure 9.7b Editable Slide (can be formatted as desired)[5]

Download Excel workbooks used to create Figure 9.7a Table[6] and Figure 9.7b Table[7] . [Note that you'd have separate links for each set of tables] Figures 9.7a and 9.7b were created from the following tables (the workbook includes all supporting tables used to create these tables):

[2]https://hub.mili.csom.umn.edu/content/m10128/latest/9.7aIMG.ppt
[3]https://hub.mili.csom.umn.edu/content/m10128/latest/9.7aDATA.ppt
[4]https://hub.mili.csom.umn.edu/content/m10128/latest/9.7bIMG.ppt
[5]https://hub.mili.csom.umn.edu/content/m10128/latest/9.7bDATA.ppt
[6]https://hub.mili.csom.umn.edu/content/m10128/latest/9.7aTAB.xls
[7]https://hub.mili.csom.umn.edu/content/m10128/latest/9.7bTAB.xls

- Fig. 9.7a: Table 9.7.1. Multifactor Productivity Growth in Health, Legal and Educational Services, Compound Annual Rates of Change, 1987-2006
- Fig. 9.7b: Table 9.7.2. Productivity Trends for Pharma, Medical Devices and Total Private Business, 1987-2007

7.2 References

A. Author's calculations.
B. Department of Labor. Bureau of Labor Statistics.
C. Harper MJ, B Khandrika, R Kinoshita and S Rosenthal. Nonmanufacturing industry contributions to multifactor productivity, 1987-2006. Monthly Labor Review 2010; June:16-31.

Index of Keywords and Terms

Keywords are listed by the section with that keyword (page numbers are in parentheses). Keywords do not necessarily appear in the text of the page. They are merely associated with that section. *Ex.* apples, § 1.1 (1) **Terms** are referenced by the page they appear on. *Ex.* apples, 1

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