

Comments on Paper by Skinner and Zhou

by Victor R. Fuchs

What are the distributional effects of advances in medical care? This important question has been relatively neglected by health economists. I will discuss some of the reasons for this neglect and speculate about possible answers. But first, I will comment on the Skinner-Zhou (S-Z) paper, looking at the questions they address and the answers they provide.

Their first question concerns trends in health care expenditures by income class between 1987 - 2001. They calculate average Medicare expenditures per beneficiary, ages 65 or over, in each income decile based on zip code of the recipient of care. They find that the rate of growth of expenditures was negatively correlated with income. The increase for the lowest income decile (\$2,624) was more than double the increase for recipients in the highest decile (\$1,214).

In evaluating their conclusion, some caveats seem warranted. First, expenditures are not the same as utilization of care. Medicare reimbursement rates for the same services vary across different areas and the differentials may vary over time. Second, and more important, some changes in expenditures, as noted by S-Z, are the result of changes in coverage. For example, Medicare's changes in reimbursement for home care had a very large distributional effect, but the sharp increase in Medicare home care expenditures for lower income beneficiaries tells us nothing about the distributional effects of medical advances.

It is also important to note that Medicare covers only a portion of the total medical expenditures of the elderly, and the proportion covered varies with income. A recent study by Chen and Escarce

(C-E) based on the 1996-1998 Medical Expenditures Panel Survey (MEPS) found that income related inequality in spending was higher among seniors than in any other age group.¹ Whereas S-Z found that Medicare expenditures in 1996-98 in the lowest income decile were thirty percent higher than the highest decile (calculated from their Table 1), C-E estimate from Gini indexes that wealthy seniors accounted for 83 percent more expenditures than poor seniors. Some of the difference in results may reflect differences in measurement of inequality as well as differences in the scope of expenditures covered in the two studies.

The C-E study provides no information on trends on expenditures and inequality, but even if it did, such data would not be a reliable guide to the distributional effects of medical advances. Suppose for example, the trend showed a relative increase in expenditures on low income seniors (as in the S-Z study). Such a trend could be the result of medical advances that favored high income individuals, thus decreasing their need for medical care.

The second question addressed by S-Z concerns trends in mortality. They use Medicare data to estimate survival curves for synthetic cohorts of seniors based on the zip code income of Medicare beneficiaries. They find that the increase in life expectancy was positively correlated with income. The difference between the lowest income decile and the highest is striking – an increase of 0.2 years versus an increase of 0.8 years.

Does this result show that medical advances during the study period favored high income seniors over their low income peers? Possibly. But as S-Z note, the differential trends could be the result of income-related change in health behaviors such as cigarette smoking or diet rather than anything related to medical care. The fact that mortality trends favored high income individuals while the increase

in health care expenditures was more rapid for seniors with low income is not surprising. In multivariate analyses of differences in health care utilization across areas, the mortality rate is by far the most important predictor (Fuchs, McClellan, Skinner).² Death is usually preceded by sickness, and sick people use the most care.

The third approach pursued by S-Z, and the one they believe is most relevant regarding the distributional effects of medical advances, is to compare the extent to which different income groups receive care that the medical community has characterized as “effective”. The interventions they study are mammography rates for women ages 65-69, and, for AMI patients, the rates of use of beta blockers at discharge, ACE inhibitors at discharge, reperfusion within 12 hours, and advice to discontinue smoking. They also refer to eye examination rates for diabetes patients but do not present the quantitative results.

The central conclusions of this portion of the paper are (1) high income patients are more likely than those with low income to receive interventions that have been deemed effective; and (2) this differential has not changed much over time. The implication of these results for the question of the distributional effects of medical advances is not clear. One additional question addressed by S-Z produces an important answer. They show that a significant portion of the income differential in receipt of effective care is related to the region of residence, not to income differentials within regions.

The S-Z paper contains several interesting results, but none that tell us much about the distributional effects of medical advances. This is very understandable. It is difficult to imagine a single empirical study yielding a robust, general answer to that question. Moreover, economic theory offers no clear prediction either.

Consider some of the problems. First, the distributional effects of a medical advance will depend on the incidence of the health problem that benefits from it. Suppose that low income individuals are more prone to mortality and morbidity from infections, while cancer is more of an equal opportunity disease, as seems to be case. Then, other things equal, advances in prevention or treatment of infections will favor low income individuals while comparable advances in oncology will not. Even within a more sharply defined health category such as trauma, it is clear that advances in the treatment of wounds from gun shots and knife stabbings will have different distributional implications than comparable advances in treatment of skiing accidents.

Even if incidence does not vary with income, differential access to a medical advance will affect its distributional consequences. Is the advance expensive or inexpensive? Covered by insurance or not? Easily mastered by medical personnel in all areas of the country or more limited in geographical availability? For some advances, the level of education and the cognitive ability of patients may influence its distributional impact. If the advance requires significant patient input for monitoring and compliance, and if income is positively correlated with ability to supply that input, the advance will, *ceteris paribus*, favor high income individuals. An advance that reduces the importance of patient input would have the opposite effect.

Another problem that may beset empirical measurement of differential health effects of a medical advance is differential offsetting behavior. For example, several new drugs, such as proton pump inhibitors to prevent gastro-esophageal disease or statins to lower cholesterol, allow individuals to make dietary choices that would be very harmful to health if the drugs were not available. If the extent of offsetting behavior differs across income levels, data on changes in mortality and morbidity by income

will not reveal the full distributional consequences of the new drug.

Considerations of this kind suggest one of the most difficult but potentially important aspects of measuring distributional consequences, namely the distinction between the effects of an advance on health and its effects on utility. It is the latter that is presumably the effect of major interest to economists, but that requires attention not only to offsetting behavior but to how the trade-off between health and other goods and services varies with income. One reasonable hypothesis is that health is a superior good. When the medical advance requires additional resources for medical care, high income individuals might consider this utility-enhancing, but those with low income might prefer to forego the improvement in health in favor of other goods and services.

The preceding discussion should serve to underscore the difficulty of making valid generalizations about the distributional effects of medical advances. So much depends upon context: what medical advances? when? where? I conclude these comments with a few speculative inferences drawn from my current research on the decline of mortality in the U.S. and other countries in the 20th century.

In Figure 1, life expectancy in the late 1990s is plotted against the log of real GDP per capita for 149 countries, grouped into deciles by real GDP per capita. The plotted points represent the mean life expectancy and mean real GDP per capita (on log scale) of the countries in each decile. The dashed line show the 95 percent confidence interval for the mean life expectancy within each decile. A single point showing U.S. life expectancy and real GDP per capita in 1900 is also plotted.

Figure 1 suggests the following conclusions:

(1) Mean life expectancy for countries tends to rise with real GDP per capita, but at a sharply

diminishing rate.

(2) At low and medium levels of real GDP per capita there is considerable variation in life expectancy within each decile, but at high levels there is very little variation. To paraphrase Tolstoy's opening line in *Anna Karenina*, with respect to life expectancy, all high income countries are alike.

(3) All countries in the late 1990s had much higher life expectancy, given their real GDP per capita, than would be expected based on the relationship between those variables in the U.S. in 1900. This upward shift in the function testifies to the power of medical advances, broadly defined to include advances in public health knowledge as well as advances in interventions delivered by medical personnel to individual patients. I believe that the former advances were most important in the first half of the century, and the latter in the second half.

(4) For the U.S. the gains in life expectancy since 1900 from advances in knowledge appear to have been much larger than the gains attributable to the increase in real GDP per capita. In 1900 U.S. life expectancy was 47 years and real GDP per capita (1999 dollars) was \$4,000. Figure 1 shows that in the late 1990s countries with real GDP per capita of around \$4,000 had life expectancies of about 67 years; this suggests a potential gain for the U.S. since 1900 of 20 years even if there had been no increase in real GDP per capita. U.S. life expectancy in 1999 was actually 77 years, suggesting that, as a rough approximation, one-third of the total increase in life expectancy was attributable to the growth of real GDP per capita and two-thirds to medical advances, broadly defined.

(5) Countries at the lowest levels of real GDP per capita also experienced substantial gains in life expectancy in the 20th century. The mean for the lowest decile in the late 1990s was 45 years; in 1900 it probably was not much above 30 years. Moreover, the increase of 15 years is probably

attributable entirely to medical advances; it is doubtful that real GDP per capita in these countries was any higher in the late 1990s than in 1900.

Figure 2 throws some light on the distributional consequences of medical advances in a different context – the U.S. in the second half of the 20th century. Annual age-adjusted mortality rates for whites and blacks have been smoothed with a five-year moving average (centered on the middle year), and then annual percentage rates of change have been calculated. Inspection of Figure 2 suggests the following conclusions:

(1) There were two periods in the U.S. since 1950 when age-adjusted death rates decreased particularly rapidly: the early 1950s and the early and mid 1970s. The declines in the first period can be confidently attributed to the large scale introduction of anti-biotics. When mortality rates are disaggregated into deaths from infectious diseases and deaths from all other causes, all of the decline in the early 1950s is in the former category. The declines in the 1970s are almost entirely the result of declines in cardiovascular mortality. In my judgement the sharp drop in deaths from heart disease and especially stroke were the result of more effective control of hypertension. The “medical advance” did not take the form of new drugs or new surgical procedures but a realization by the medical community that there was a significant pay off to the detection and control of hypertension. This change in thinking can be traced in large part to two important studies published in *Journal of the American Medical Association* in 1967 and 1970.³

(2) The declines from these advances were, in percentage terms, as rapid for blacks as for whites. Because mortality levels were, and still are, much higher for blacks than for whites, the declines in absolute terms were much larger for blacks than for whites. It is frequently alleged that benefits of

medical advances don't reach disadvantaged groups as rapidly as their more fortunate peers, but Figure 2 provides no support for that claim, at least for blacks vs. whites during the periods of most important medical advances. Inasmuch as average black income was substantially below that of white income during the study period, it is not unreasonable to infer that a similar comparison between high and low income groups might yield a similar conclusion of no appreciable distributional effects.

My tentative conclusion is that truly effective medical advances in the past have tended to cast their benefits widely – in poor countries as well as rich ones, for blacks as well as whites. Whether that will continue to be true in the future depends, as I have tried to indicate, on many factors. Whether the effects on utility as distinct from effects on health have also been fairly evenly distributed is a subject waiting for theoretical and empirical investigation.

References

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