Long-term Financial Implications of Specialty Training for Physicians

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PURPOSE: Given the recent changes in physician reimbursement and managed care penetration, we examined the financial returns that might be anticipated when considering different medical careers.

METHODS: We used survey data from the American Medical Association and standard financial techniques to calculate the return on educational investment (as the discounted, annual hours-adjusted, net present value of additional training) over a working lifetime for six different specialties (family practice, pediatrics, general internal medicine, gastroenterology, cardiology, and general surgery).

RESULTS: From 1992 to 1998, the annual yield on specialty training (hours-adjusted internal rate of return) declined for all specialty groups, especially for primary care specialties. The difference in the average income between a given specialty and general practice decreased for general internal medicine, from $5400 (95% confidence interval [CI]: $5000 to $5800) in 1992 to $1180 (95% CI: $1160 to $1205) in 1998, and became negative for family practice (from $5200 [95% CI: $1000 to $9500] to −$2500 [95% CI: −$5800 to $800]) and pediatrics (from $4000 [95% CI: $1200 to $6800] to −$6300 [95% CI: −$9700 to −$2900]). Values for surgery decreased from $33,100 (95% CI: $29,400 to $36,400) in 1992 to $27,200 (95% CI: $21,700 to $32,100) in 1998, whereas there were increases for cardiology, from $35,100 (95% CI: $30,000 to $39,700) to $36,700 (95% CI: $26,500 to $45,700), and for gastroenterology, from $30,000 (95% CI: $21,800 to $37,200) to $34,700 (95% CI: $22,700 to $45,300).

CONCLUSION: Our analysis suggests that recent efforts to use financial incentives to make primary care fields more attractive have not been effective. Financial returns and the incentives they create should be carefully considered as part of health care reform. **Am J Med. 2002;113:393–399.** ©2002 by Excerpta Medica, Inc.

In a previous analysis, we found that U.S. medical students could expect a poorer financial return on their educational investment when they chose a career in primary care medicine instead of a procedure-based specialty, business, the law, or dentistry (1). Since then, efforts to reduce the disparity between the incomes of primary care and procedure-based physicians have been implemented (2), the number of practicing physicians per 100,000 persons has increased by 13% (3), and managed care penetration has doubled (4). Because of these changes, we conducted an updated analysis of the financial returns that might be anticipated by a medical student choosing a medical career path. We determined the return on additional specialty training that fourth-year medical students might expect by pursuing a career in family practice, pediatrics, general internal medicine, gastroenterology, cardiology, or general surgery, between 1992 and 1998.

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METHODS

We used an established method—discounted cash flow analysis—for evaluating the financial return on an educational investment and accounting for differences in the number of hours worked in each specialty (1,5,6). This method can estimate the financial benefits associated with additional educational training (income beyond the age-specific earnings had one not pursued additional education) given an initial investment in that educational effort, including direct (tuition, books) and indirect (lost age- and experience-appropriate income) costs. The method allows for calculation of two types of measures of return on educational investment.

The net present value of the educational investment is estimated from the annual cash flow of investment returns (CF), which is the after expense annual income (Y) minus educational costs (E) minus opportunity costs (O). Because a dollar today is worth more than a dollar in the future, today's net present value (NPV) of an expected financial return on educational investment over n years is estimated as

Table. Age- and Specialty-Specific Annual Income, Annual Opportunity Cost, Hours Worked Annually, and Cash Flow Per 2750-Hour Work Year, in 1998

	Age (years)					
	27–29	30–31	32–35	36–45	46–55	56–65
Annual income ($)						
Family practice	35,700	131,400	131,400	134,400	168,800	141,300
Pediatrics	35,700	108,900	108,900	141,300	148,100	139,200
General internal medicine	35,700	127,200	127,200	156,400	156,400	182,600
Cardiology	35,700	39,800	188,500	291,800	291,800	340,700
Gastroenterology	35,700	39,800	222,000	273,000	273,000	318,700
General surgery	35,700	39,800	173,800	278,100	254,400	232,900
Annual opportunity cost ($)	108,817	108,800	146,200	146,200	133,200	159,100
Debt repayment ($)	9767	9800	9800	9800	6800	0
Hours worked annually						
Family practice	2470	2470	2470	2540	2550	2680
Pediatrics	2340	2340	2340	2560	2640	2670
General internal medicine	2920	2920	2920	2830	2900	2600
Cardiology	3040	3040	3040	2950	3020	2710
Gastroenterology	3020	3020	3020	2930	3000	2690
General surgery	2880	2880	2880	2860	2800	2720
Cash flow per 2750-hour year ($)*						
Family practice	(81,500)	(16,500)	(16,500)	1300	10,400	75,400
Pediatrics	(85,700)	(43,700)	(43,700)	8700	(11,500)	73,300
General internal medicine	(68,800)	(17,900)	(17,900)	22,500	(2600)	121,300
Cardiology	(69,700)	(101,500)	26,400	139,300	93,500	167,100
Gastroenterology	(66,100)	(96,200)	38,300	147,900	120,800	277,200
General surgery	(66,600)	(96,900)	69,100	131,200	104,400	256,700

* Numbers in parentheses indicate negative cash flow, compared with general practice.

$$\mathrm{NPV} = \sum_{j=0}^{n} \frac{\mathrm{CF}_j}{(1 + \mathrm{r})^{j+1}}$$

where *r* is the interest (discount) rate. The internal rate of return on the educational investment is estimated as the annual interest rate at which the sum of the present values of a series of expected incomes is equal to the costs required to produce them. In the present analysis, as with most examples, negative cash flows occur in earlier periods and positive cash flows occur later.

Because there is no database listing what physicians earn at each age as each type of specialist, we used self-reported age- and specialty-specific incomes of practicing physicians. However, physicians in each specialty were not assigned randomly to that specialty group; individual physician characteristics associated with choice of specialty may be associated with specialty-specific incomes. Therefore, our findings do not indicate the return from specialty training, but rather the recent market returns on educational investment for physicians who chose these specialties.

We assumed that each medical specialty has a fixed working lifetime, from graduation to retirement (ages 27 to 65 years); discounting makes the contribution of the final years trivial to the analysis. We used the minimum postgraduate training periods required for board eligibility for each specialty (7) and assumed that residencies are completed without interruption. Because information on the number of hours worked by residents is not available, we conservatively assumed that residents work the same number of hours as the youngest group of attending physicians in their specialty. We also assumed that physicians immediately become employed in their chosen specialty upon completion of specialty training. We assumed that each career path was associated with the average educational indebtedness of graduating medical students, for each year examined (8). Although some studies have suggested that educational debt is associated with specialty choice (9,10), others have not confirmed those findings (11). We assumed that educational debt was repaid over 15 years, at a fixed annual interest rate of 8%, beginning at completion of the first year of residency.

We used two data sources to obtain specialty- and age-specific information on incomes and hours worked. For residency training years, we used median, postgraduate year–specific housestaff stipends in Council of Teaching Hospitals and Health Systems hospitals (8). After completion of residency programs (12–19), we used data compiled by the American Medical Association (AMA) annual survey. The survey is conducted by telephone and is designed to provide representative information on nonfederal physicians who spend the greatest proportion

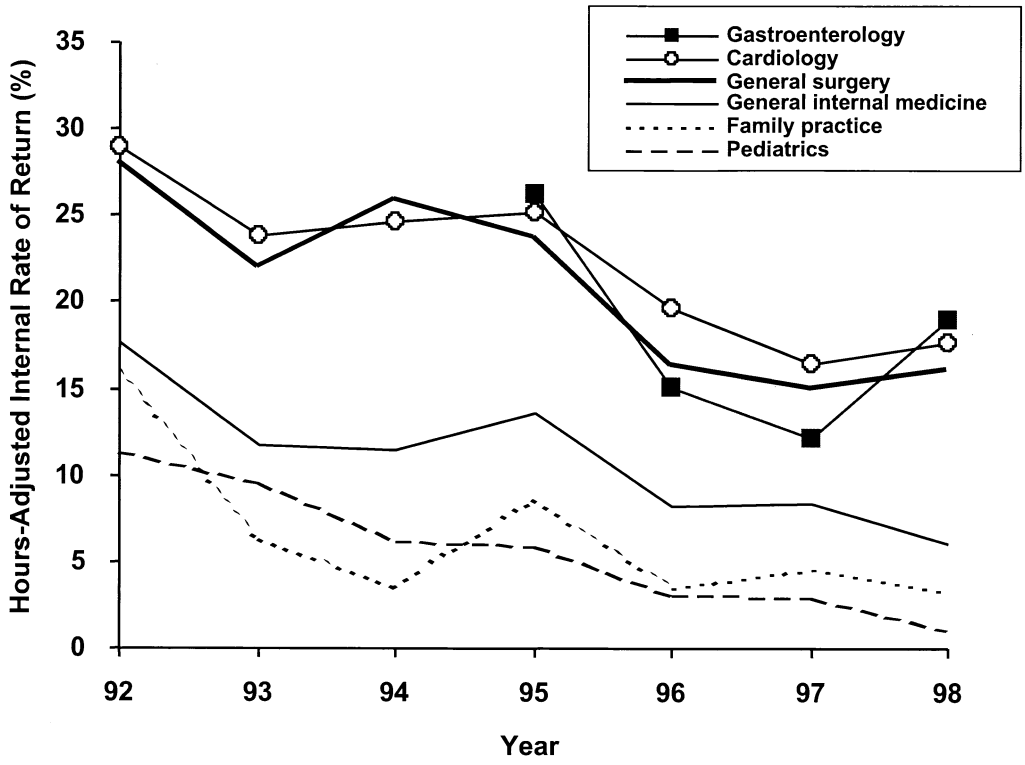

Figure 1. The hours-adjusted internal rate of return on additional medical specialty training for six medical specialties. For comparative purposes, the internal rate of return for general practice is 0% in all years.

of their time in patient care activities, and is administered annually to a random sample of a subset of the AMA Masterfile, which contains current and historical information on every doctor of medicine in the United States. The subset excludes doctors of osteopathy, graduates of foreign medical schools who are only temporarily licensed to practice in the United States, inactive physicians, physicians who were surveyed during the previous 5 years, physicians listed as "do not contact" in the Masterfile, physicians not practicing in the United States, and unlicensed physicians. Physicians who spent fewer than 20 hours per week caring for patients or who could not be contacted by telephone were also excluded.

We generated age-specific (residency years, <36 years, 36 to 45 years, 46 to 55 years, and 56 to 65 years) and specialty-specific data on mean annual income (after expenses and before taxes), mean number of hours worked per week in professional activities, and mean number of weeks worked per year for primary care medicine (family practice, pediatrics, and general internal medicine) and procedure-based medicine (cardiology, gastroenterology, and general surgery). When age-specific data were not available on aggregated subspecialties, we applied age-specific ratios from the aggregated data to individual subspecialty data. Because the AMA survey did not disaggregate gastroenterology from "other medical specialties" until 1995, we were only able to calculate results for that specialty from 1995 through 1998.

We applied a common opportunity cost—the income that would have been generated had a physician not pursued additional medical specialty training—to all groups. Opportunity cost was estimated as the age-specific income earned and hours worked by a general practice physician. We assumed that general practice physicians completed 1 year of postgraduate internship and then entered practice. Although published AMA survey results did not disaggregate general practice physicians from family practice physicians during this period, we obtained disaggregated data for these two specialties.

Prior to discounting, we divided each calculated annual cash flow by the annual number of hours worked to create a comparative hourly figure for each specialty group each year. We calculated two measures of return on educational investment. Hours-adjusted internal rate of return is the annual interest rate that equalizes the negative and positive cash flows on an investment by weighting them according to when they occur, accounting for differences in the numbers of hours worked. Annual hours-adjusted net present value is the current value of an expected stream of cash flow per hour at a predetermined rate of interest (the discount rate set at 5% per year), and assuming a standard 2750-hour work year. In addition, to

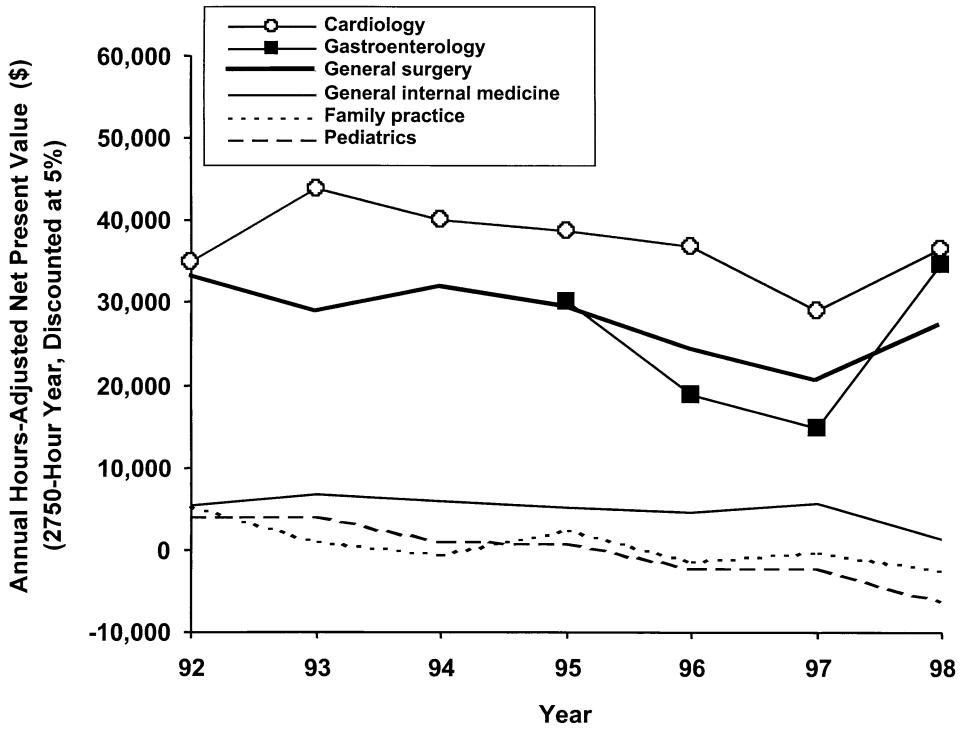

Figure 2. The annual hours-adjusted net present value of additional educational training in six specialties discounted at 5%, and presented as an annual figure, between 1992 and 1998. For comparative purposes, the annual hours-adjusted net present value for general practice is $0 in each year.

compare the cumulative annual effects of costs and returns over time, we calculated the cumulative hours-adjusted net present value from the completion of medical school to a specified age. By performing the analysis with income figures 1.96 times the standard error for incomes above and below the mean income level reported, we calculated 95% confidence intervals [CI] for our two primary measures. Finally, to examine the incremental return on educational investment for internists who might consider subspecialization in cardiology or gastroenterology, we performed a subanalysis of those subspecialties, using general internal medicine as the opportunity cost.

We limited our analysis to the period from 1992 to 1998 for three reasons. First, we wanted to conduct analyses that might be valuable to current medical students who are considering career opportunities. Second, managed care penetration doubled in the United States during the period examined (20), and a higher proportion of physicians reported participation in health maintenance organizations, managed care contracts, and capitated payment mechanisms (12–19). Because a doubling in the level of managed care penetration was estimated to reduce physicians' annual earnings by 7% to 11% and hourly earnings by 6% to 9% (21), we expected to find a substantial drop in real annual earnings and hourly earnings. Finally, the time period chosen follows the 1992 implementation of the Medicare Fee Schedule, which was expected to increase the annual income for family practitioners by 30% and that for general internists by 7% while decreasing the annual income for surgeons by 7% (2,22).

RESULTS

Age- and specialty-specific data on income, hours worked, educational debt repayment, opportunity costs, and cash flow per hour for 1998 are shown in the Table. During the 7-year period from 1992 to 1998, the hours-adjusted internal rate of return on additional medical specialty training declined for every specialty group examined (Figure 1). Cardiology, gastroenterology, and general surgery had parallel results, dropping from an hours-adjusted internal rate of return of 28% (95% CI: 26% to 30%) for general surgery and 29% (95% CI: 27% to 31%) for cardiology in 1992, and 26% (95% CI: 22% to 30%) for gastroenterology in 1995, to 16% (95% CI: 14% to 18%) for general surgery, 18% (95% CI: 15% to 20%) for cardiology, and 19% (95% CI: 15% to 22%) for gastroenterology in 1998. Combining these procedure-based specialties, the average hours-adjusted internal rate of return dropped by 37% during the 7 years. Family practice, pediatrics, and general internal medicine shared similar trajectories, declining from 16% (95% CI: 6.5% to

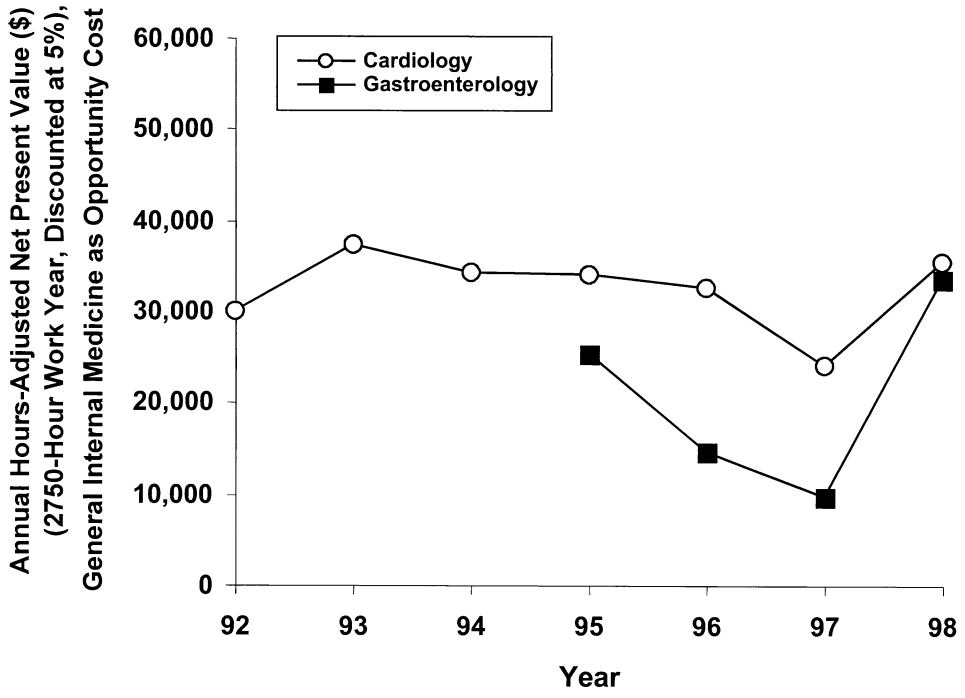

Figure 3. The annual hours-adjusted net present value of additional educational training in two subspecialties, using general internal medicine as the opportunity cost, discounted at 5%, and presented as an annual figure, between 1992 and 1998.

25%) for family practice, 11% (95% CI: 6.5% to 17%) for pediatrics, and 18% (95% CI: 17% to 18%) for general internal medicine in 1992, to 3.3% (95% CI: 1.3% to 5.2%) for family practice, 1.1% (95% CI: −0.8% to 2.9%) for pediatrics, and 6.1% (95% CI: 6.0% to 6.2%) for general internal medicine in 1998. Combining these primary care specialties, the average hours-adjusted internal rate of return dropped by 79% during the 7 years.

The annual hours-adjusted net present value of additional medical specialty training for the six specialty groups declined for all primary care specialties examined (Figure 2). The value for general internal medicine dropped from $5400 (95% CI: $5000 to $5800) in 1992 to $1180 (95% CI: $1160 to $1205) in 1998; that for family practice dropped from $5200 (95% CI: $1000 to $9500) to −$2500 (95% CI: −$5800 to $800); and that for pediatrics dropped from $4000 (95% CI: $1200 to $6800) in 1992 to −$6300 (95% CI: −$9700 to −$2900) in 1998. Thus, during the last 7 years, returns on additional educational training associated with entering either family practice or pediatrics in lieu of general practice have become negative. The hours-adjusted net present value figures for general surgery dropped from $33,100 per year (95% CI: $29,400 to $36,400) in 1992 to $27,200 per year (95% CI: $21,700 to $32,100) in 1998. Those for the two medical subspecialties increased somewhat over time, from $35,100 (95% CI: $30,000 to $39,700) in 1992 to $36,700 (95% CI: $26,500 to $45,700) in 1998 for cardiology, and from $30,000 (95% CI: $21,800 to $37,200) in 1995 to $34,700 (95% CI: $22,700 to $45,300) in 1998 for gastroenterology.

We also estimated the annual hours-adjusted net present value of additional educational training for subspecialization in cardiology or gastroenterology as compared with general internal medicine (Figure 3). Although general internists have a greater income than do general practitioners, the net present values for cardiology and gastroenterology remain substantial: for cardiology, about $30,000 each year examined, and for gastroenterology, between $10,000 and $30,000. The hours-adjusted internal rates of return figures were also high, from 27% to 38% for cardiology and 20% to 40% for gastroenterology.

The cumulative net present value of additional training for the six specialties provides insight into the timing and velocity of discounted, hours-adjusted cash flows with respect to the opportunity cost (Figure 4). During the residency years, because of the lower incomes of residents in comparison with general practice, all specialties decline. At the end of residency training, the cumulative net present value of additional training increases rapidly for general surgery, cardiology, and gastroenterology, reflecting their greater income. However, primary care specialties continue to have relatively lower hours-adjusted incomes than general practice during the early-career segment, about equal hours-adjusted incomes during the middle-career segment, and somewhat higher hours-adjusted incomes in the late-career segment. Thus, only in

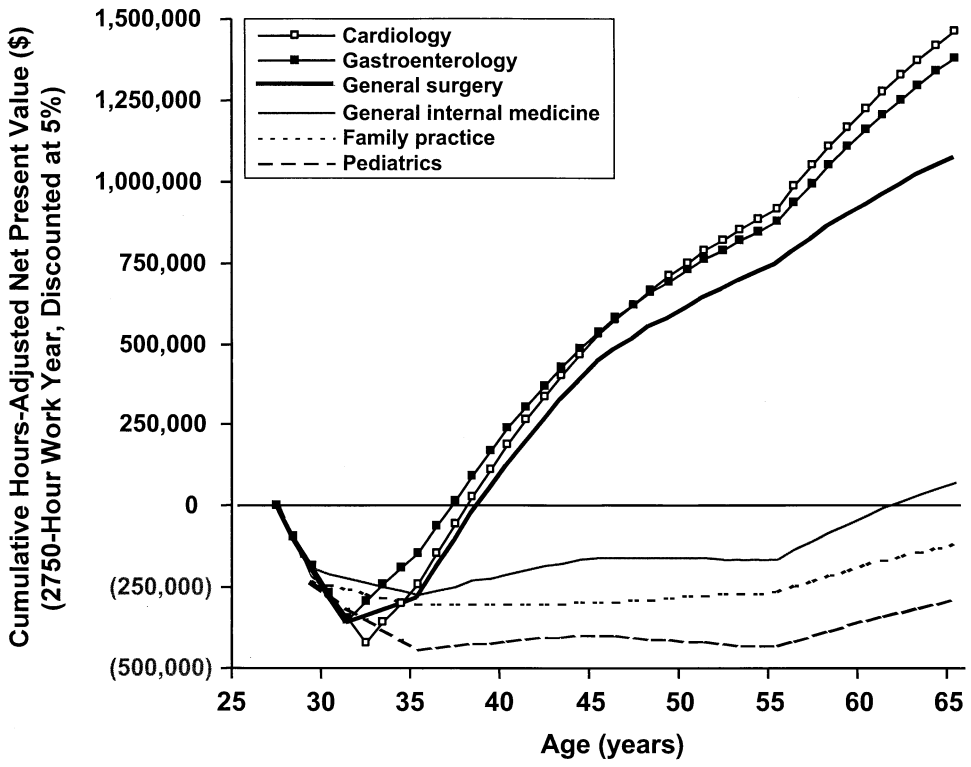

Figure 4. The cumulative hours-adjusted net present value of additional educational training in six specialties, discounted at 5%, assuming a 2750-hour work year, for 1998. Numbers in parentheses indicate negative cumulative hours-adjusted net present values.

the last 5 years of the working lifetime does general internal medicine surpass general practice; the cumulative net present value for family practice and pediatrics never equals that for general practice.

DISCUSSION

We used standard financial techniques to examine financial returns on additional medical specialty training for six clinical career paths that a fourth-year medical student might pursue. We found that financial returns on additional specialty training have been consistently higher for procedure-based medicine than for primary care medicine, but have been declining for all specialties in recent years. The returns associated with additional training in family practice or pediatrics, as compared with general practice, became negative from 1992 to 1998. These negative returns associated with completing board eligibility requirements in family practice or pediatrics do not bode well for the attractiveness of those specialties.

We did not see the large declines in annual incomes that were predicted as a result of the increase in managed care penetration during this period (21); real and nominal annual incomes increased for all six specialties. However, the intended income shift from procedure-based specialties to primary care specialties expected as a result of the Medicare Fee Schedule (2,22) did not have a positive effect on the financial attractiveness of primary care specialties. From the perspective of an investment in educational training, it is unlikely that medical students would be more encouraged to enter primary care compared with procedure-based specialties in 1998 than they had been in 1992. It is clear, however, that the returns associated with fellowship training in cardiology or gastroenterology are substantial and might motivate general internal medicine residents to pursue additional subspecialty training instead of practicing primary care medicine.

There are several limitations to our approach. First, our results depend on the accuracy of self-reported income, hours, and specialty data. Second, returns were calculated using data from practicing physicians; because those physicians were not randomly assigned to different specialties, the returns that they generated may reflect the characteristics of those pursuing the specialties. Our estimates of the gains in income associated with specialty training are probably an overestimate for specialists (because they would have earned more than the average generalist had they chosen to pursue that route) and gener-

alists (because many of them may have chosen to be generalists because they knew they would not do well as specialists). To the degree that a particular medical student deviates from the mean characteristics and income-generating capacity of a specialty, individual returns on educational investment will vary. Third, to the extent that a student's level of educational debt varies from the mean, so will the return on additional medical specialty training, although this would not change the relative ranking of returns on specialty training. Fourth, our analysis cannot account for any variation in the risk associated with particular career paths. If physicians practicing procedure-based medicine encounter much greater scrutiny or much lower incomes in the future, then high returns associated with those specialties might be justifiable. Similarly, if certain specialties were more likely to experience market saturation, poor business practices, increasing fixed office expenses, or higher levels of unreimbursed care, such factors could account for the differences in returns seen. Fifth, our representation of the opportunity cost as a physician in general practice may be a dubious career path for most medical students. Because of increasing quality improvement, accreditation, and regulatory efforts, general practice may be a career of the past. Nonetheless, the relative ranking of the career paths examined would stand regardless of the opportunity cost career path used.

Finally, our analysis ignores other factors that affect the choice of profession, such as intellectual stimulation, lifestyle, and prestige (5). But policymakers would be remiss if they ignored the powerful influence of the up-front costs of professional training and students' concern about their ability to repay the debt they incur. The direct and indirect costs of additional medical training are real, as are the lost opportunities to earn income elsewhere. Many students may make an informal calculation of return using near-term costs and future ability to repay debt. Such a calculation strongly favors medical careers with high incomes.

Market forces are pervasive. Economic incentives designed to encourage medical students to choose primary care careers do not seem to have had much of an effect on the returns on educational investment. Our examination of the returns on different educational career paths indicates that primary care physicians continue to be underpaid compared with procedure-based physicians. These returns and the incentives they produce should be considered carefully as part of health care reform.

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