Advertising and Entry:
The Case of Physician Services

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This paper examines the entry implications of physician advertising. Evidence suggests that advertising inhibits entry into this market. Nevertheless, experienced physicians (incumbents), to whom advertising would offer the greatest financial benefit, in fact advertise less—a paradox that may be explained by nonfinancial concerns, such as unwillingness to break well-internalized professional norms against advertising. Physician advertising has risen sharply in recent years, and it appears that this trend will continue. If incumbents increasingly resort to advertising, there could be a substantial redistribution of income from less-well-established physicians to better-established ones.

How does advertising affect competition? This question has been of considerable interest to sellers seeking to gain an edge, policymakers attempting to set appropriate rules, and economists in search of their Holy Grail: an understanding of market function. We join the economists in their quest. General conclusions about the impact of advertis-

ing on competition do not emerge from the literature because the specifics of market structure, such as information conditions and the availability of capital to new competitors, are so important. In their survey of the literature, Comanor and Wilson (1979, p. 470) conclude that

> the weight of available evidence is consistent with the hypothesis that heavy advertising can have substantial anticompetitive consequences. However, because the distribution of advertising intensities is highly skewed, there is no indication that these effects are pervasive throughout the economy, or even within the manufacturing sector. Rather, they appear to be concentrated in a number of industries with high advertising-sales ratios and/or high absolute levels of advertising per firm.

More recently, Kessides (1986) used data on U.S. manufacturing industries to study the relationship between advertising and firm entry from 1972 to 1977 for 266 U.S. industries. His results suggest that advertising promotes entry in the strong majority of industries but may retard it in a few.

We examine advertising in the market for physician services. The problem is salient given the magnitude of the resources involved (physicians are responsible for most decisions in the health care sector, which by 1986 constituted 10.9 percent of gross national product);[1] the information conditions in the market (there is no standardized product and quality is hard to judge); and the considerable policy interest in whether inhibitions to physician advertising are anticompetitive. We focus on entry, broadly interpreted as the ability of new participants to secure a share of the market, as reflected in earnings. Most previous work on advertising and entry has addressed manufacturing, which provides limited guidance on effects in the physician services market.

Leffler's (1981) work on the effects of advertising of prescription drugs may be germane since reputation is critical to sales in both businesses. (Prescription drugs are far more heavily advertised than physician services, however.) Leffler finds that advertising promotes the entry of superior new drugs but probably retards the entry of low-priced close substitutes.

The effects of advertising on entry have not been studied for the physician services market. Evidence presented by Folland (1987) indicates that less experienced physicians are more likely to advertise.

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[1] The latest year for which actual figures (rather than estimates) are available is 1986. See Health Care Financing Administration (1987, p. 1).

This might seem to suggest that advertising offers greater benefits to entrants (less experienced physicians) and thus will promote competition. However, the advertising decision may depend on other factors besides the desire to increase income. A strong ethic against advertising has been an established norm in medicine until recently. Older physicians may feel quite uncomfortable with advertising and may choose not to advertise even if doing so would improve their income. In a world in which attitudes toward advertising are changing, a greater propensity to advertise need not imply that greater financial benefits are realized. Our analysis will explicitly test the naive conclusion that young doctors secure more financial benefit from advertising than older ones.

Advertising may affect competition in ways apart from influencing entry. For example, it may affect the market among more established physicians, giving a greater market share to those able to project a more positive image. Or, if market shares are relatively unchanged, it could increase price competition or merely impose advertising costs on producers. (Just such arguments have been used to suggest that bans on cigarette advertising may raise tobacco company profits.) On the other hand, as Chamberlin (1962, p. 72) noted many years ago, advertising can create the type of perceived product differentiation that promotes the monopolistic component of monopolistic competition.

Our interest remains focused on how advertising affects entry in the market for physician services. To estimate this relationship, we use a two-stage switching regression model similar in format to the union-nonunion wage model of Lee (1978) and the educational choice model of Willis and Rosen (1979). More specifically, we estimate annual earnings for physician advertisers and nonadvertisers, adjusting for possible selection effects.[2] Then we compare the relationship between earnings and an array of physician characteristics, such as years of experience. This allows us to draw inferences about whether physician advertising promotes entry, by acting as a substitute for consumer familiarity with a service (presumably consumers are more familiar with physicians who have practiced longer), or whether it tends to inhibit such competition, by acting as a complement to consumer familiarity.

The paper is divided into six sections. Section I discusses the nature

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[2] An alternative possibility is to use hourly earnings. However, annual earnings provide a better measure of the benefits from physician advertising. For instance, to the extent that advertising increases the physician's caseload, it will also increase annual earnings but could well decrease hourly earnings. We thank an anonymous referee for pointing this out. While annual earnings are a preferable measure for our purposes, using hourly earnings leads to results very similar to those reported in the text.

of physician advertising. Section II presents a brief history of advertising in the medical profession, highlighting the vigorous efforts of the Federal Trade Commission (FTC) to eliminate advertising restrictions in this industry. Section III formally states the hypotheses to be tested, while Section IV specifies the empirical model to be estimated. The estimation results, using data from a 1987 American Medical Association (AMA) survey, are presented and discussed in Section V. Section VI presents conclusions.

I. The Nature of Physician Advertising

The available evidence (there have been no academic studies) suggests that physician advertisements consist primarily of objective information, such as practice location and specialty, in contrast to quality claims, testimonials, and glitz. Survey results reported by Folland (1987) indicate that over 90 percent of physicians believe that it is very difficult to advertise competence and quality of services. Many physicians (69 percent in Folland's survey) also believe that advertising will damage their prestige. These beliefs may explain the absence of quality claims and testimonials in physician advertising.

Peer pressure to avoid particularly undignified forms of advertising, such as quality claims and testimonials, may be quite strong. In discussing trends in physician advertising, Gray (1986, p. 188) points out that while physicians may engage in "low-profile" forms of advertising, such as information brochures, telephone stickers, and patient newsletters, "the stigma of commercialism still taints some more overt forms of advertising. Peer pressure continues to deter some doctors from going ahead—and continues to sting those who do."

In addition, the FTC applies particularly strict standards of truthfulness to advertisements by physicians.[3] Barney (1985, p. 5) quotes an FTC statement on this issue: "What may be false and deceptive for doctors may be permissible for sellers of other products and services. Harmless puffery for a household product may be deceptive in a medical context." Thus stricter regulatory standards may also limit the use of quality claims, testimonials, and other "puffery" in physician advertisements.

Physician advertising of fees appears to be rare. Folland (1987) reports that over 70 percent of physicians feel that advertising of fees will adversely affect their public image, and 60 percent do not believe that fee advertising will offer them any personal benefit.

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[3] The FTC's strict stance on deceptive advertising in the medical profession appears to have come in response to pressure exerted by the AMA to reduce the FTC's authority in medical markets. We thank an anonymous referee for pointing this out.

New developments in physician advertising can be expected over the next few years. In response to a perceived lack of consumer information about alternative physician choices, a physician advertising industry is beginning to emerge. Firms that handle physician advertisements contract directly with physicians, obtaining detailed information about each. These agencies then advertise their services to consumers.[4]

II. Restrictions on Physician Advertising: A Brief History

Until the 1980s, advertising was frowned on by medical organizations. In its first code of ethics, published in 1847, the AMA referred to advertising as "the ordinary practices of empirics, highly reprehensible in a regular physician" (Leake 1975, p. 224). Perhaps in response to the threat of FTC intervention, this position was modified to permit limited advertising. In 1976 the AMA's Judicial Council on advertising and solicitation by physicians stated that neither its "long-standing policy" nor the AMA's *Principles of Medical Ethics* prohibited advertising. Rather, solicitation was opposed:

> The *Principles* do not proscribe advertising, they proscribe the solicitation of patients. Advertising means the action of making information or intention known to the public. . . . The term "solicitation" in the *Principles* means the attempt to obtain patients by persuasion or influence, using statements or claims which (1) contain testimonials; (2) are intended or likely to create inflated or unjustified expectations of favorable results; (3) are self-laudatory and imply that the physician has skills superior to other physicians engaged in his field or specialty of practice; or (4) contain incorrect or incomplete facts, or representations or implications that are likely to cause the average person to misunderstand or be deceived. [1976, p. 2328]

Discontent with these limitations, the FTC pursued litigation against organizations that tried to restrict advertising in the medical

[4] One such company is Consumer Health Services. Based in Boulder, Colo., it currently serves seven metropolitan areas: Chicago, Dallas/Fort Worth, Denver, Houston, Kansas City, Milwaukee, and Washington, D.C. In selecting a physician through these agencies, consumers are asked to state their needs in general terms and are then given detailed information about a variety of physicians who might be suitable. This information includes practice location, specialty, and board certification status, as well as other important details such as fees, treatment philosophy, and bedside manner.

profession.[5] In 1975 the FTC issued a complaint against the AMA, alleging that the association illegally restrained trade among physicians in violation of section 5 of the FTC Act by preventing solicitation of business by advertising. In 1980 the New York federal appeals court ruled in favor of the FTC, arguing that the commission had the authority to regulate the competitive practices of professional organizations. A 1982 appeal to the Supreme Court resulted in a 4–4 decision deadlock, so that the opinion of the lower court was upheld.[6] This outcome empowered the FTC to forbid AMA bans on advertising for the solicitation of patients, except in cases in which advertising was false or deceptive.

These actions facilitated a dramatic rise in physician advertising. While less than 5 percent of self-employed physicians advertised in 1982, by 1987 this figure had risen to 20 percent.[7] As physician supply grows rapidly in the coming years,[8] there is every reason to suspect that this trend toward increased advertising will continue.[9]

III.   Hypotheses to Be Tested

The rapid growth of physician advertising and its uncertain influence on consumers raise questions about its economic consequences. Our analysis considers the entry effects of physician advertising. A physi-

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[5] In addition the Supreme Court determined, in the landmark case of Bates v. the State Bar of Arizona (1977), that comprehensive restrictions on advertising by professionals through state laws and regulations were unconstitutional. This decision in effect rescinded state laws that prohibited any advertising by professionals, including physicians.

[6] The ninth justice, Harry Blackmun, disqualified himself from the case without explanation. One source speculated that his decision may have stemmed from his prior association "with the medical profession as counsel to the Mayo Clinic in Minnesota during the 1950s" (see Pecarski 1982).

[7] These figures are obtained from, respectively, the AMA's Socioeconomic Monitoring System (SMS) for the fourth quarter of 1982 and core 1987 surveys of physicians. (Core surveys, conducted annually, are the largest and most comprehensive of the SMS surveys.)

[8] For example, a study by Kletke, Marder, and Silberger (1987) projects that the physician population will increase by 34 percent between 1985 and 2000, growing much faster than the U.S. population as a whole.

[9] Survey data on physician attitudes toward advertising support this claim. Folland (1987, p. 315) reports that almost one-half of the physicians surveyed "state that they will increase their use of marketing techniques when faced with increased competitive pressures. The relevance of this statement to advertising growth is clarified by related responses to items on attitudes and perceptions. Over one-half of the physicians state that they expect competitive pressures to increase. Furthermore, a large majority believes, quite contrary to the marketing literature, that marketing is merely a synonym for advertising. Thus, the picture emerges of a professional group that is reluctant to advertise but increasingly willing to do so in response to economic incentives."

cian's degree of entry will be taken to be inversely related to years of practice experience. Female physicians and foreign medical graduates (FMGs) will also be considered entrants.

Entry is customarily understood to mean the decision to participate in a market at all. However, entry need not be regarded as an all-or-nothing proposition. There can be degrees of entry. For example, even if two firms coexist within a given market, one may be better established and may have already attained enough customers to keep its plants operating at full capacity. Its competitor, however, may be a newcomer with relatively few customers and substantial excess capacity. The latter firm may be thought of as an entrant relative to the former.

In the same way, physicians with relatively few years of practice experience may be considered entrants. Such physicians are more likely to be building their practices and to have more excess capacity. Similar reasoning may be applied to female physicians and FMGs. Traditionally, male physicians and U.S. medical graduates have dominated the physician services market in the United States. In recent years, however, this pattern has been challenged by the relative growth of female physicians and physicians trained outside of the United States (Kletke et al. 1987).

Using these definitions of entry, we shall test the following hypotheses: H1: advertising promotes entry; H2: advertising inhibits entry; H3: advertising does not affect entry.

A finding that advertising raises the earnings of less-well-established physicians relative to their better-established competitors would support H1. This would suggest that advertising heightens consumer awareness of alternative medical care providers, thus promoting entry. On the other hand, if advertising lowers the relative earnings of less-well-established physicians, this would suggest that advertising increases loyalty to better-established "brands" of medical providers, decreasing the competitive threat posed by entrants. Such a finding would support H2. Finally, if advertising has no effect on the relative earnings of entrants and incumbents, we would conclude that it has neither helped nor hindered entry into this market.

IV. Empirical Specification of the Model

The specification of the model follows standard procedures used for estimating earnings with self-selection criteria. Willis and Rosen (1979) provide an excellent discussion of these procedures.

Assume that the physician expects to receive annual earnings equal to Y_a if he or she advertises and Y_b otherwise. The ith physician will advertise if $Y_{ai} > Y_{bi}$ and will choose not to advertise if $Y_{ai} \leq Y_{bi}$.

With Pr as probability, the selection criteria are

$$\Pr(\text{choose } a) = \Pr(Y_a > Y_b),$$
$$\Pr(\text{choose } b) = \Pr(Y_a \le Y_b). \tag{1}$$

If the ith physician advertises, his or her earnings may be estimated as

$$\ln Y_{ai} = c_a + d_a \cdot \mathbf{X}_i + e_{ai}, \tag{2}$$

where $\ln Y_{ai}$ is the natural logarithm of annual earnings for the ith physician, $\mathbf{X}_i$ is a vector of exogenous variables, c_a and d_a are coefficients to be estimated, and e_{ai} is an error term. Similarly, if the ith physician does not advertise, earnings may be estimated as

$$\ln Y_{bi} = c_b + d_b \cdot \mathbf{X}_i + e_{bi}. \tag{3}$$

Self-Selection Effects

To test the effects of advertising on physician earnings, we need to control for unobserved differences between the two cohorts in our sample. Advertisers and nonadvertisers may differ in ways that are not directly observable. For example, nonadvertisers may have stronger referral networks than advertisers. Advertisers may be physicians more skilled in self-promotion. Accordingly, our estimation strategy corrects for possible self-selection effects, using well-known econometric techniques (Heckman 1979; Maddala 1983).

The decision whether to advertise depends on the vectors of exogenous variables $\mathbf{X}$ and $\mathbf{Z}$:

$$A_i = g + h \cdot \mathbf{X}_i + j \cdot \mathbf{Z}_i + u_i, \tag{4}$$

where A_i equals one if the ith physician advertises and equals zero otherwise; g, h, and j are coefficients to be estimated; and u_i is an error term.

Estimation of selection effects requires that $\mathbf{X}$ and $\mathbf{Z}$ have elements that are not in common. The problem is to find an exogenous variable that affects the physician's decision to advertise but has no other impact on earnings. For this purpose we use a dummy variable (MOVED) that is equal to one if the physician is not practicing in the state in which he or she was graduated from medical school and zero otherwise.[10] Movers should perceive more variability in their earnings

[10] One could alternatively define movers as physicians who practice in a state other than their state of residency training. Unfortunately, information on the individual physician's place of residency training is not readily available. Unpublished AMA data (which present nationally aggregated trends in physician movement patterns as of 1982) suggest, however, that this alternative measure of physician movement would be highly correlated with the one actually employed here since more than two-thirds of all

potential than stayers, who are presumably more familiar with the market conditions in their practice areas and can thus put narrower bounds on their potential earnings.

Advertising can reduce the variability of earnings even if prices remain fixed, as the following scenario illustrates. Define a good outcome as the earnings expected with a full patient caseload and a bad outcome as the earnings expected with a less than full patient caseload. If a good outcome occurs, advertising would add no benefits since a full patient caseload will already have been achieved. But advertising can have substantial benefits when a bad state of nature occurs, creating idle capacity.

If movers perceive greater variability in potential earnings, they may expect to be left with more idle capacity than stayers if an unfavorable outcome occurs. Movers should be more likely to advertise in this case; (nonincreasing) risk aversion would reinforce this tendency.

We expect that movers will tend to migrate to states having higher earnings opportunities. But will movers' earnings differ systematically from those of stayers once differences in average earnings opportunities have been controlled for? If they do, then the advertising equation will not be identified, and further statistical analysis correcting for self-selection will be problematic at best.[11]

The conventional wisdom argues that movers should exhibit positive self-selection bias. The assumption is that movers are a special group and that mobility costs increase the odds that the most capable and ambitious individuals will move. A recent study on the earnings of U.S. immigrants by Borjas (1987), however, challenges this convention. He points out that the presence of positive selection effects for movers is an empirical question, one that cannot be resolved a priori.[12] Furthermore, he notes, positive self-selection "requires a set

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physicians receive their residency and medical school training within the same state. A number of other variables were tried in an attempt to identify the advertising equation. These include measures of consumer exposure to advertising, such as area per capita newspaper circulation, and more aggregated measures of physician mobility, such as the mean state-level percentage of physicians who received their medical education out of state. While the signs of the coefficients on these variables were usually in the expected direction, they were not statistically significant.

[11] Maddala (1983, chap. 8) discusses the identification issue for two-stage switching regression models. He notes that identification requires that at least one explanatory variable be excluded from the second-stage estimates except in the special case in which the error term from one cohort is uncorrelated with the error term from a second cohort.

[12] A recent study of rural Mexican migration to the United States by Stark and Taylor (1988) provides an interesting counterexample to the conventional wisdom that movers should have higher earnings potential than stayers. The researchers found no evidence to suggest that the earnings of immigrants (as measured by remittances to their families in the home country) differ from what stayers could expect to earn if they

of conditions that will not be generally satisfied" (p. 532).[13] An important result of his analysis is that "foreign-born persons in the United States need not be drawn from the most able and most ambitious in the country of origin" (p. 551).

Whether there will be any significant selection on earnings (positive or negative) for movers depends on the size of mobility costs, which are both monetary and psychic.[14] For immigrants to the United States, especially those traveling great distances and coming from very different cultural backgrounds, mobility costs may be substantial. For most physicians, such costs are far lower.[15] The physician who

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migrated to the United States. They did find, however, that the earnings of stayers exceeded what the cohort of immigrants could expect to earn in Mexico had they chosen not to migrate. How might we explain this phenomenon? A plausible explanation is that actual earnings depend on business connections, landholdings, and other factors besides native ability. Mexicans who elect not to migrate may be relatively well endowed in terms of business connections, landholdings, and so on in the home country, and for that reason they may earn more than migrants could expect had they stayed in Mexico. Once migration occurs, native ability becomes more important because many of the additional factors noted (such as business connections) may not be exportable. And when native ability becomes more important, the earnings differential between the two cohorts evaporates. Thus the Stark-Taylor results are consistent with the notion that migration may depend on unobserved factors (such as poor business connections in the home country or poor soil) that are unrelated to native ability. At the same time, their results suggest that stayers may enjoy an advantage in these unobserved factors, which help determine earnings. These results seem to suggest that, contrary to the conventional wisdom, we should observe lower earnings for movers since the individuals with whom they must now compete presumably have better business connections, landholdings, and so on. However, an important point made by Borjas (1987) is that such generalizations are dangerous: whether movers have higher, lower, or the same earnings as stayers may well vary from case to case.

[13] These conditions are that (1) error terms in the earnings of stayers are highly correlated with error terms in their earnings if they were to move, and (2) income is more dispersed in the areas in which movers locate. In the context of our analysis, the first condition requires that physicians who would earn above-average incomes in one state would also earn above-average incomes if they moved to another state. While one would expect there to be positive correlation here, it may not be sufficiently high to result in positive bias. Furthermore, positive selection requires that both conditions 1 and 2 be satisfied. Empirical tests for the existence of positive selection (described in the text) suggest that they are not satisfied.

[14] Borjas (1987, p. 535) observes that "mobility costs ensure that only some persons . . . find it worthwhile to emigrate and thereby create the selection biases that are apparent in immigration data." An alternative potential source of selection bias is that movers are less risk averse than stayers. This possibility has been rejected in the recent literature on labor migration. Movers tend to exhibit risk-averse behavior in other aspects of economic decision making, so there is little reason to suspect that they will exhibit risk-loving behavior just with respect to moving. See Katz and Stark (1986) for further details.

[15] Mobility costs may be substantial for FMGs, most of whom take their residencies in the same locale as their medical school, since many of these physicians will be coming to the United States from a foreign country to start their practices. Earnings of FMGs may also differ because their training differs from that of U.S. medical graduates and, for foreign-born FMGs, because of differences in cultural background. However, FMG status is explicitly controlled for in the earnings equation presented later in the paper.

moves incurs travel costs and sacrifices professional connections made during medical education. On the other hand, a number of states offer physicians financial incentives to practice there.[16] This could offset, or even outweigh, moving costs and opportunity costs from forgone professional connections.

Finally, the importance of psychic costs as a barrier to physician movement is unclear. Some physicians want to locate their practice in a particular state other than that of their medical school, in which case moving provides psychic benefits. In any event, the psychic costs of locating in a different state are surely much lower than the psychic costs of leaving one's country entirely.

This discussion suggests that self-selection effects on earnings for physicians who move may not be important, either because mobility costs are not large or because mobility costs differ across physicians because of differences in unobserved characteristics that are not associated with earnings ability (e.g., physicians' locational preferences). To illustrate, suppose that two physicians have equal earnings ability (equal credentials, native ability, and so forth). The only difference between them is that one likes the state in which he or she was graduated from medical school while the other strongly prefers another state. The former physician will have higher mobility costs than the latter (if the psychic benefits from moving are factored in, mobility costs for the latter physician may be negligible). In this example, one physician moves and the other stays, but this outcome does not change the geographic distribution of ability.[17]

As a check on the empirical validity of this hypothesis, we included the variable MOVED along with the other variables used in the advertising probit regression (see table 1) to determine physicians' annual earnings. We ran such a regression for the entire physician sample, as well as separate regressions for advertisers and nonadvertisers. In no case was any statistically significant relationship observed between the variable MOVED and physicians' annual earnings. Thus it seems unlikely that there are systematic differences in the average earnings ability of movers versus stayers.

Hence any observed effects of physician movement on earnings should be purged of selection effects induced by the potentially large mobility costs borne by FMGs, or by earnings differentials reflecting differences in FMG training or cultural background. Furthermore, the entry implications of physician advertising do not change when FMGs are excluded from the analysis.

[16] For example, Burfield, Hough, and Marder (1986, p. 546) note that some states attract physicians through a "'beggar-thy-neighbor' policy, relying on other states to train physicians and then giving financial incentives to induce those physicians to relocate."

[17] The same result would follow if two otherwise identical physicians differ in the amount of student loans they have incurred. The one with a heavier burden may choose a state with better earnings opportunities.

TABLE 1

MEAN VALUES FOR VARIABLES USED IN STUDY

Variable Name	All Physicians ($N = 1,995$)	Nonadvertisers ($N = 1,603$)	Advertisers ($N = 392$)
ADVERT	.20	.00	1.00
	(.40)	(.00)	(.00)
ln Y*	− 2.07	− 2.06	− 2.11
	(.65)	(.64)	(.67)
MOVED	.65	.63	.71
	(.48)	(.48)	(.46)
EXP/100	.22	.23	.18
	(.11)	(.11)	(.94)
(EXP/100)^2	.06	.07	.04
	(.06)	(.06)	(.04)
FEMALE	.07	.05	.11
	(.25)	(.23)	(.32)
FMG	.18	.17	.23
	(.39)	(.38)	(.42)
BDCERT	.74	.75	.70
	(.44)	(.43)	(.46)
GROUP	.44	.42	.53
	(.50)	(.49)	(.50)
CORP	.50	.50	.47
	(.50)	(.50)	(.50)
AVGINC	.81	.80	.81
	(.09)	(.08)	(.09)
ln AVGINC*	− .22	− .22	− .21
	(.11)	(.11)	(.11)
URBAN	.62	.63	.57
	(.38)	(.38)	(.38)
IMED	.21	.20	.21
	(.40)	(.40)	(.41)
SURGS	.26	.27	.22
	(.44)	(.44)	(.41)
OBGYN	.08	.09	.07
	(.28)	(.28)	(.26)
PED	.07	.07	.07
	(.26)	(.26)	(.25)
PSYCH	.08	.09	.06
	(.28)	(.29)	(.23)
OTHER	.12	.12	.12
	(.33)	(.33)	(.32)
SLFSLC	.00	.32	− 1.29
	(.67)	(.16)	(.31)

NOTE.—Standard deviations are in parentheses.
* These values are negative because earnings were normalized to lie between zero and one before the logarithmic transformation was taken.

V. Estimation

The model specified in Section IV is estimated using data from the AMA's SMS 1987 core survey, which includes data on the advertising practices of a nationally representative sample of 4,014 physicians (response rate was 67.0 percent). The sample used for this study is restricted to self-employed physicians since employee physicians are likely to have little control over advertising decisions.[18] Also excluded were specialists such as anesthesiologists and pathologists, who tend to be hospital-based and to rely on referrals for patients, and thus are unlikely to consider advertising.

These exclusions left a sample of 2,643 physicians. Missing values in some of the response variables (most notably in physician earnings) caused an additional 648 observations to be lost, so that the usable sample numbered 1,995 physicians.[19] Fortunately a comparison of the total sample of self-employed physicians with the sample of self-employeds who report earnings suggests that the two groups are very similar, at least in terms of measured characteristics.

We begin by estimating a probit regression to determine the advertising decision. Advertisers are physicians who, at any time during the previous 5 years, had advertised their practices in newspapers or magazines or on television or radio.[20] In addition to the variable MOVED discussed above, other explanatory variables included are the physician's sex, FMG status, board certification status, years of experience, and specialty. Dummy variables are also included that measure whether the physician's practice is solo or group and whether the practice is incorporated. Table 1 lists the mean values of the variables used in this study. (To facilitate comparisons of coefficients, all continuous variables are normalized to lie between zero and one; variable names and descriptions are listed in the Appendix.)

While the impact of these variables on the propensity to advertise is an empirical question, we expected that less experienced physicians, women, and FMGs would be more likely to advertise. Older physicians and those having "traditional" characteristics seem more likely

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[18] Employee physicians are growing in number, but only gradually; the strong majority of physicians (73.5 percent in 1987 according to AMA survey data) are self-employed.

[19] In their study on self-selection in educational choice, Willis and Rosen (1979) also noted a substantial number of missing values due to nonresponse to questions about earnings. Specifically, they lost 952 observations out of 5,085 respondents because of nonresponse to questions about initial and later earnings. Apparently many people are touchy about divulging this information.

[20] Unfortunately, the AMA survey did not ask advertising physicians how long they had been advertising. Since physician advertising is a relatively recent phenomenon, increasing fourfold over the period 1982–87, it seems likely that physicians who have been consistently advertising for 5 years or more are comparatively rare.

to adhere to the traditional canons of the medical profession, which frown on advertising.

Group practice physicians should be more likely to advertise. (This hypothesis assumes that there is a positive relationship between the scale of an enterprise and the returns to a given amount of advertising, as suggested by the evidence that a greater proportion of large than small firms advertise.) Board-certified physicians should be less likely to advertise if they obtain referrals more easily than uncertified physicians.

We include a variable measuring whether the physician's practice is incorporated in order to test whether the incorporated physician is more likely to conduct his or her practice like a business and therefore to advertise. The propensity of specialists (relative to general/family practitioners) to advertise is unclear a priori. Since the demand for primary-care physicians (general/family practitioners, internal medicine specialists, and pediatricians) is substantially more price sensitive than the demand for surgical and other nonprimary care (see Pauly and Satterthwaite 1981), differences between primary- and nonprimary-care physicians in advertising may provide some evidence on the relationship between demand elasticity and physician advertising.

Finally, two variables are included to control for differences in the practice environment: the physician's urban or rural location and average physician earnings from 1981 to 1985 in the state in which the physician practices.[21]

Table 2 shows the results of the probit regression. A number of the explanatory variables are highly significant.[22] Physicians who practice outside their state of medical school graduation are more likely to advertise, at the 1 percent level of significance. As expected, group practice physicians, females, and FMGs are significantly more likely to advertise, while older physicians are less likely to advertise. The

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[21] As a check on the robustness of the results reported below, we also estimated the model defined by eqq. (2)–(4) including a variety of additional variables to control for variations in market conditions (i.e., per capita physicians, area income, age composition of the population, penetration by health maintenance organizations, etc.) and dummy variables to control for regional effects. Including these additional variables had very little effect on the results reported below and added little explanatory power to either the advertising or earnings regressions; hence, they were omitted from the final empirical estimates.

[22] Folland (1987) examined the determinants of physician advertising using a sample of about 350 physicians from Pennsylvania. Because of his small sample size, his determinants have considerably less explanatory power than the results obtained here. Folland did demonstrate a significant negative relationship between years of practice experience and propensity to advertise, however. Our results on the relationship between advertising and physician and practice characteristics are similar to those reported by Rizzo (1988) in a comment on the Folland paper. However, Rizzo did not test for potential relationships between market characteristics and the advertising decision, nor did his analysis examine the competitive implications of advertising.

TABLE 2

PROBIT REGRESSION FOR THE DETERMINANTS OF
PHYSICIAN ADVERTISING (N = 1,995)

Dependent Variable = ADVERT

Independent Variable	
MOVED	.28***
	(3.56)
EXP/100	−2.76***
	(8.20)
FEMALE	.34***
	(2.73)
FMG	.17*
	(1.90)
BDCERT	−.11
	(1.42)
GROUP	.29***
	(3.99)
CORP	−.09
	(1.32)
AVGINC	.83**
	(2.11)
URBAN	−.12
	(1.33)
IMED	−.38***
	(3.54)
SURGS	−.38***
	(3.67)
OBGYN	−.47***
	(3.27)
PED	−.45***
	(3.04)
PSYCH	−.47***
	(2.99)
OTHER	−.42***
	(3.36)

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

coefficient on the board certification status variable is negative but not statistically significant.

All specialists are significantly less likely to advertise than general/family practitioners. Specialists may rely more heavily on referrals than generalists do and hence have less need for advertising to procure patients. The primary-care specialties also differ in the propensity to advertise, with pediatricians and internal medicine specialists significantly less likely to advertise than general/family practitioners. In other words, these results provide little basis for inferences about the relationship between demand elasticity and the propensity to advertise.

TABLE 3

EFFECTS OF ADVERTISING ON PHYSICIAN EARNINGS ($N = 1,995$)

Dependent Variable $= \ln Y$

Independent Variable	ADVERT = 1 ($N = 392$, $\bar{R}^2 = .31$)	ADVERT = 0 ($N = 1,603$, $\bar{R}^2 = .31$)
SLFSLC	.31	−.30
	(.93)	(1.20)
EXP/100	4.99***	3.27***
	(3.44)	(5.07)
(EXP/100)^2	−9.64***	−7.83***
	(3.01)	(7.64)
FEMALE	−.56***	−.28***
	(4.47)	(4.00)
FMG	−.17*	.02
	(1.71)	(.35)
BDCERT	.09	.20***
	(1.31)	(5.72)
GROUP	.16*	.23***
	(1.79)	(5.76)
CORP	.18***	.15***
	(2.68)	(5.17)
ln AVGINC	.73**	.55***
	(2.49)	(4.12)
URBAN	.05	.04
	(.58)	(.95)
IMED	.40***	.17***
	(3.39)	(2.91)
SURGS	.66***	.42***
	(5.50)	(7.55)
OBGYN	.67***	.33***
	(4.02)	(4.67)
PED	.21	−.02
	(1.21)	(.26)
PSYCH	.36**	.16**
	(2.16)	(2.22)
OTHER	.61***	.39***
	(4.23)	(6.00)

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Average physician earnings (AVGINC) are directly related to advertising propensity. The explanation for this result is not readily apparent and may depend on a host of factors, including differences in locational preferences between advertisers and nonadvertisers (i.e., the former may prefer to locate in areas in which earnings opportunities are greater).

Table 3 presents estimates of physician earnings corrected for self-selection. The dependent variable is the natural logarithm of the physician's net annual earnings and is obtained from the SMS data.

The self-selection variable is defined as

$$
\text{SLFSLC} = \begin{cases} -f\!\left(\dfrac{\Psi_i}{s_u}\right)\!\Big/F\!\left(\dfrac{\Psi_i}{s_u}\right) \text{ if the } i\text{th physician advertises} \\[2ex] f\!\left(\dfrac{\Psi_i}{s_u}\right)\!\Big/\!\left[1 - F\!\left(\dfrac{\Psi_i}{s_u}\right)\right] \text{ if the } i\text{th physician does} \\[1ex] \text{not advertise,} \end{cases}
$$

where $\Psi_i = g + h \cdot \mathbf{X}_i + j \cdot \mathbf{Z}_i$ estimated from equation (4), s_u is the standard deviation of u, $F(\Psi_i/s_u)$ is the standard normal cumulative distribution function estimated from the probit regression, and $f(\Psi_i/s_u)$ is the probability density function estimated from the probit regression.

The estimated coefficient on SLFSLC in the advertising cohort is statistically insignificant. This suggests that observed earnings patterns of physicians who advertise do not differ significantly from those that would be observed if nonadvertisers with the same measured characteristics as current advertisers had chosen to advertise. Apparently, advertisers do not have any hidden advantage in their ability to raise their earnings through advertising. The coefficient on SLFSLC for nonadvertisers also indicates no significant selection bias. That is, observed earnings among nonadvertisers do not differ significantly from the patterns expected if advertisers with the same measured characteristics had chosen not to advertise. This suggests that physicians who refrain from advertising may do so for reasons other than financial considerations.

The coefficients on the physician's sex, FMG status, and years of experience are consistent with the notion that physician advertising tends to inhibit entry. For example, in the nonadvertising group, earnings rise less steeply with experience than in the advertising group.[23] This suggests that physician advertising does not act as a substitute for experience but is complementary to experience.[24]

Among physicians who advertise, the relative earnings of female

[23] A caveat is in order, however. Although the relative earnings of entrants decline in the advertising cohort, advertising could eventually yield benefits to entrants by helping them to become better known to both potential customers and their more established peers (on the other hand, advertising may alienate fellow physicians). We are grateful to the editor for pointing this out.

[24] The welfare implications of this result are unclear. On the one hand, consumers may pick more experienced physicians because they believe experience raises quality. Since advertising may make it easier for consumers to locate this preferred physician type, it would seem to improve welfare. However, even if consumers are correct in believing that more experienced physicians offer higher quality on average, they may overestimate the quality differential. If so, advertising may lead consumers to favor more experienced physicians much more than they would if they were fully informed about quality.

physicians and FMGs fall markedly.[25] This suggests that the rates of return to advertising are substantially lower for female and FMG physicians than for males and non-FMGs, respectively.[26] Therefore, introducing an advertising regime gives experienced physicians an added potential advantage. But within such a regime, entrants, as individuals, may find that they can increase their incomes through advertising. (Though a rules change may help one group—in this case incumbents—more than another, individuals within each group should respond in their own self-interest, given the new rules.) Since there is no strong evidence suggesting that a physician's sex or FMG status is related to quality of care,[27] the substantially lower rates of return to advertising by females and FMGs may reflect consumer preferences, ignorance, or, more disturbing, prejudice.

Uncertified physicians fare better than board-certified physicians under advertising. The implications of this result for the relationship

[25] We tested differences between the advertising and nonadvertising regressions in the estimated coefficients for SEX, FMG, EXP, and EXP^2 for statistical significance. Specifically, we pooled the advertising and nonadvertising cohorts, adding interaction terms to allow for the coefficients on the explanatory variables and the intercept term to vary across these cohorts (e.g., we interacted the variable SEX with a dummy variable equal to one if the physician was not an advertiser and zero otherwise). Including these interaction terms introduced a high degree of correlation among the regressors. Furthermore, the estimated coefficients on the interaction terms were quite sensitive to small changes in the empirical specification. Therefore, the results of this test must be viewed with some skepticism since multicollinearity may pose a serious problem in the pooled regression. Multicollinearity could lead to statistically insignificant test results when the actual differences in coefficients are in fact significant. In discussing tests for the statistical significance of coefficients across regressions, Maddala (1977, p. 199) notes that "if there is a high degree of multicollinearity in the regressors, it is not unusual that what look to us like drastic differences in the coefficients turn out to be 'statistically insignificant.' In such cases one should . . . not get too excited about having found the differences 'statistically insignificant,' because from the practical point of view these differences are often 'very significant.' " We did find, however, that the differences for females and FMGs across the two cohorts were statistically significant. While the pooled regression estimates indicated a steeper experience-earnings profile in the advertising cohort, this result was not statistically significant. (This is not entirely surprising because the experience variables were highly correlated with the experience variables interacted with the cohort dummy.)

[26] Consumers' reactions to FMG advertisements probably depend more on the readily observed characteristics of FMGs (i.e., whether or not they are foreign-born) than on an assessment of the quality of foreign medical schools (since such information is not as readily available to the consumer).

[27] The lack of academic studies on male-female physician quality differentials probably reflects the lack of even casual evidence to suggest that there is a significant difference. By contrast, the issue of quality differentials between U.S. medical graduates and FMGs has received considerable attention, with mixed results. Several studies found that there are no significant differences in physician performance relating to FMG status. However, other studies that have focused on proxy measures for quality (i.e., board certification status, licensure status, performance on licensing exams, etc.) have concluded that FMGs offer inferior quality of care. See Rhee et al. (1986) for some recent evidence and references to earlier studies of this issue.

between advertising and entry are unclear. On the one hand, it might be argued that referral networks unjustly discriminate against uncertified physicians and that advertising helps break down the monopoly power of these networks, thus promoting entry.

An alternative view is that the earnings advantage enjoyed by certified physicians is justified because they provide higher-quality care than uncertified physicians, and this is why they are treated favorably by referral networks. In this case, the improved relative earnings of uncertified physicians under advertising may result from consumer ignorance about differences in physicians' certification status or the implications of these differences for quality of care.[28] Advertising may appear to have increased entry, but only because consumers lack adequate information to make informed decisions about physicians. With better information, this apparent increase in entry may disappear.

Earnings of group practice physicians decline relative to those of solo practitioners when both types of physicians advertise. Group practice physicians may have stronger referral networks (and hence less excess capacity) than solo practitioners and stand to gain less from advertising on that account. An alternative possibility is that consumers are more responsive to the advertisements of solo practitioners. The entry implications of this result are also unclear. On the one hand, solo practice is the traditional form. This suggests that the improved performance of solo practitioners under advertising is deterring the entry of less traditional forms of medical practice. On the other hand, group practitioners earn significantly more than solos in the absence of advertising. To that extent, the improved performance of solos might be construed as a pro-entry advertising effect. Since group practice is becoming increasingly popular, however, the importance of the entry implications of this result is apt to decline over time.

Earnings for incorporated practices are significantly higher in both the advertising and nonadvertising cohorts. Similarly, earnings are higher in states with higher average physician earnings.

Specialists, particularly those in obstetrics/gynecology and internal medicine, appear to fare better than generalists under advertising. Possibly specialists earn a higher return from advertising because they are filling a larger gap in the consumer's information than generalists, whose services may already be well understood by the consumer.

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[28] Reade and Ratzan (1987) note that physicians listed as specialists in Yellow Pages directories are not distinguished by board certification status, e.g. Furthermore, while a board-certified physician might make his or her certification status known in an advertisement, a physician who is not certified is unlikely to highlight this fact. Uncertified physicians are more likely simply to list their specialty, perhaps citing professional organizations to which they belong, previous achievements, and so on.

Given their higher returns, it is somewhat puzzling that specialists are uniformly less likely to advertise than generalists. It may be that specialists, who depend on referrals for a substantial part of their caseloads, are reluctant to engage in activities (such as advertising) that many physicians in the referral network may disapprove of.

Paradoxically, although the returns to advertising are directly related to years of practice experience (EXP), this variable is correlated with a lower propensity to advertise. Conversely, while advertising seems to offer relatively less additional income to women and FMGs, they are more likely to advertise. Furthermore, the magnitude of the earnings differential between entrants and incumbents may increase substantially in the advertising cohort. For example, using the estimated coefficients from the regressions reported in table 3, purged of selection effects, and mean values for the variables from the entire sample, we find that, during the first 20 years of practice, the age-earnings profile grows at an average annual rate of about 2 percent in the nonadvertising cohort. In the advertising cohort, the growth rate is 4 percent.[29]

Recent survey results reveal some interesting age and sex differences in physicians' evaluation of advertising effectiveness (Powills 1987). In particular, male physicians over 50 years of age were most receptive to the notion that advertising has been effective in informing the public about hospital services. Such sentiments were far less prevalent among physicians under the age of 30. If one believes that physicians are more likely to view ads as being effective if they benefit personally from advertising, then these results are consistent with our findings that older, male physicians benefit more from advertising than their younger, female counterparts.

That experienced physicians tend to avoid advertising, even though as a group they would benefit most from a regime in which advertising was well established, suggests that these physicians may be particularly concerned about the potential negative connotations of advertising. Indeed, this somewhat peculiar equilibrium can be understood in terms of an adverse selection model. To simplify, assume that the distributions of quality in the cohorts of established and new doctors are the same. New doctors, however, have a much weaker ethical inhibition against advertising. Among established physicians, only the most aggressive and those most in need of patients will advertise.[30] Advertising will have a strong negative overtone,

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[29] These results are meant to be illustrative. The age-earnings profile is steeper in the advertising cohort for all plausible time horizons.

[30] The reader, presumably an economist, might inquire whether he or she would advertise, and if not, why not. The answer is likely to be the same as that for physicians: Few peers do it, many would look down on it, and it sends a bad signal.

which may be felt by and may deter some physicians who would otherwise like to advertise. Among physician entrants, by contrast, if advertising is relatively acceptable, even high-quality physicians may advertise; the adverse implications will be less strong.

These considerations suggest two reasons why new physicians may be more likely to advertise even though they secure a lower return from it. First, with fewer years of exposure to the antiadvertising ethic, they may not have internalized a strong distaste for the practice. Second, given greater advertising among such physicians, a less negative signal is sent when they do advertise. In addition, for a variety of utility functions, new physicians—though they derive less benefit—may advertise more because their incomes are lower or more variable.[31]

Over time, of course, as the current generation of older physicians age and retire, advertising will become more widespread and less easy to interpret as a negative signal among older physicians, thus tempting some older physicians to try the new methods. If there are no other changes, the long-run equilibrium will impose equal inhibitions on advertising across ages.

VI. Conclusion

This paper has examined the impact of advertising on entry in the market for physician services. The results differ sharply from earlier findings, which have tended to indicate that (1) entry-deterring consequences of advertising are confined to industries characterized by heavy advertising (Comanor and Wilson 1979), and (2) for the strong majority of manufacturing industries, advertising promotes entry (Kessides 1986).

Physician advertising acts as a complement to experience, not a substitute. The returns to advertising are substantially lower for female physicians and FMGs (entrants) than for males and non-FMGs, respectively. In other words, an equilibrium in which inhibitions to advertising melt away will not improve the relative financial status of less-well-established physicians. Nevertheless, females, FMGs, and less experienced physicians, following their incentives as individuals, are all more likely to advertise than males, non-FMGs, and more experienced physicians.

Factors beyond income maximization appear to inhibit advertising, such as social pressures, ethical sentiment, or a perception that physi-

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[31] Advertising may also reduce the variability of income. Under the assumption of decreasing risk aversion, poorer individuals will pay more—in money expectation or advertising distaste—for the same absolute shrinkage in income variability.

cians who advertise are of lower quality than others. More experienced physicians, males, and U.S. medical graduates may attach greater importance to these inhibiting factors, in part because their earnings, and possibly perceived quality, tend to be higher even if they do not advertise, but also, in the case of older physicians, because they have lived for many years under regimes that prohibited or strongly frowned on advertising. (Our tests for selection bias revealed that nonadvertisers do not appear to have an advantage in achieving earnings without advertising, which is consistent with the notion that nonfinancial considerations inhibit physicians from advertising.)

To the extent that physician advertising has inhibited entry, it has had an anticompetitive effect in this market. As Comanor and Wilson (1979, p. 472) have noted, however, anticompetitive consequences from advertising pose a difficult question of public policy: "the simple finding that an anticompetitive effect exists is not sufficient to imply that policy actions are required. For example, to the extent that consumer information is increased in the same process that monopoly power is attained, we may be unwilling to adopt specific policy measures directed against the latter for fear of adversely affecting the former as well."

A prudent course of action for policymakers would be to explore options for retaining the benefits from advertising while mitigating the costs. The present problems with physician advertising may stem from consumers' inability to use information effectively. Uncertain how to judge quality, consumers may be relying on poor indicators such as the physician's sex and FMG status.[32]

Our results have three important implications. First, we observe that the decision whether or not to advertise is not merely a choice on how to maximize income. Ethics, norms, and social inhibitions appear to matter. Moreover, because such factors play a role, even physicians with no personal aversions to advertising must worry about the implications the practice conveys. Second, we find that the market for physician advertising is still progressing toward equilibrium. From an analytic standpoint, it is reassuring that an econometric investigation can predict properties at the equilibrium that may be quite different from what is observed today. From a policy standpoint, it appears, the FTC's strong interventions in favor of physician advertising may have

[32] Survey data indicate that most physicians believe that advertising will not enable the consumer to make better-informed physician choices. As Folland (1987, p. 315) reports, "Although most . . . physicians approve of advertising in general . . . they largely disapprove of consumer advertising by physicians on several grounds. First, physicians find advertising to be an unsuitable means of communicating medical information to the consumer. A large majority agrees that 'it is difficult to advertise competence and quality of care in my profession.' . . . In sum, advertising will not help consumers make more intelligent choices among physicians."

promoted entry and competition in the short run, while established physicians remained hesitant to advertise. Eventually, however, through the aging of the population and the breakdown of norms, physicians falling into this group will begin to advertise. Unless advertising yields benefits to entrants over time that we have not been able to measure (i.e., by increasing their visibility among potential patients and peers), more established physicians will gain at the expense of their less established peers. Competition will be diminished. If this proves to be the case, it is unlikely that any government agency will be able to reestablish an antiadvertising ethic. Third, we have added an important case study to the advertising and competition debate. In a market with complex information conditions, we have shown, advertising may inhibit rather than promote competition.

Appendix

Variable Names and Descriptions[33]

ADVERT	Dummy variable that equals one if physician advertised practice by newspaper, magazine, television, and/or radio at any time during 1981–86; equals zero otherwise
ln Y	Natural logarithm of physician's annual net earnings in 1986
MOVED	Dummy variable that equals one if physician not practicing in state in which attended medical school; equals zero otherwise
EXP/100	Years of practice experience divided by 100
$(EXP/100)^2$	Years of practice experience squared
FEMALE	Dummy variable that equals one if physician is female; equals zero otherwise
FMG	Dummy variable that equals one if physician is a foreign medical graduate; equals zero otherwise
BDCERT	Dummy variable that equals one if physician is board certified; equals zero otherwise
GROUP	Dummy variable that equals one if physician's practice is a group practice; equals zero otherwise
CORP	Dummy variable that equals one if physician's practice is incorporated; equals zero otherwise
AVGINC	Average annual physician earnings in state in which physician resides, 1981–85
ln AVGINC	Natural logarithm of average annual physician earnings in state in which physician resides, 1981–85
URBAN	Dummy variable that equals one if physician is located in county having more than 1 million inhabitants; equals .5 if in county having 500,000–999,000 inhabitants; equals zero otherwise

[33] Continuous variables are normalized to lie between zero and one. All variables are either drawn directly or constructed from the AMA's SMS or the AMA's Physician Masterfile.

IMED	Dummy variable that equals one if physician is a specialist in internal medicine; equals zero otherwise
SURGS	Dummy variable that equals one if physician is a general surgeon; equals zero otherwise
OBGYN	Dummy variable that equals one if physician specializes in obstetrics/gynecology; equals zero otherwise
PED	Dummy variable that equals one if physician is a pediatrician; equals zero otherwise
PSYCH	Dummy variable that equals one if physician is a psychiatrist; equals zero otherwise
OTHER	Dummy variable that equals one if physician is in specialty other than those mentioned above; equals zero otherwise
SLFSLC	Variable measuring selection effects (see text for definition)

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