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The importance of the physician in the generic versus trade-name prescription decision

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I examine the importance of physicians in the process by which patients receive either trade-name or generic drugs. Using a dataset on physicians, their patients, and the multisource drugs prescribed, I find that almost all physicians prescribe both types of drugs to their patients, but some physicians are more likely to prescribe generic drugs while other physicians are more likely to prescribe trade-name drugs. Very little of the prescription decision can be explained by observable characteristics of individual patients, but all of the evidence indicates that physicians are indeed an important agent in determining whether patients receive either trade-name or generic drugs.

1. Introduction

■ In 1989, over 70% of pharmaceutical prescriptions were written for multisource drugs, that is, drugs for which both generic and trade-name versions are available. Yet of these multisource prescriptions, fewer than 30% specified the generic version of the drug. Since generics are generally priced 30–60% lower than their trade-name counterparts (Grabowski and Vernon, 1992), substantial cost savings could be realized in this $40-billion-per-year market if generics captured greater market share. Possible explanations for the paucity of generic prescriptions include the existence of information imperfections that limit the physician's knowledge, and agency problems arising from the physician acting as agent for the patient and for the patient's insurance company.

In this article I examine whether the seemingly small market share of generics can be attributed at least partially to the behavior of physicians. Using data from a survey of physicians, their patients, and the drugs prescribed, I examine whether physicians vary their prescription decisions on a patient-by-patient basis or whether they systematically prescribe the same versions (trade name or generic) to all patients. I test whether

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from those for the full sample, indicating that measurement error in the mean-characteristics variables is not causing large biases in the results.

There are two potential reasons to be concerned about the inclusion of state laws in the estimation in Tables 4–6. As explained in Section 5, the inclusion of only linear terms for state substitution laws may not adequately capture their effect on the prescription choice if they change the effective price differential of the drug. Moreover, estimating a coefficient on an interaction between mandatory substitution laws and the drug dummies might arguably allow for separate identification of baseline differences across drugs from the proportion of the drug's cost to the patient that is internalized by physicians (the term γ_1 in the model). Rather than attempting to estimate and interpret regression coefficients from a model allowing for full interactions between drug dummies, insurance dummies, and the two types of state prescription laws, I indirectly account for this possibility by simply estimating the model with only the subsample of 4,334 observations from states with permissive substitution laws and one-line prescription pads. The results, reported in Tables 7–9, are quite similar to those for the full sample reported in Tables 4–6. This means that there is little difference in the treatment of patients across different regimes of state substitution and prescription-pad laws (so that γ_1 is essentially zero). Given that much of the variance in the prescription decision is unexplained, it is not surprising that differences across states in laws that may be poorly understood by physicians and poorly adhered to by pharmacists have little or no direct effect on prescription behavior. This result is nonetheless consistent with the conclusion that physicians internalize little of any differential costs to different patients.

7. Conclusion

■ This article examines the importance of physicians in the process by which patients get either trade-name or generic drugs. The central result is that the physician is an important agent in the prescription decision. This should be a key focus of future research, since the reasons for why some physicians are more likely than others to prescribe generic drugs is largely left unexplained by the empirical analysis presented here. Identifying the sources of heterogeneity in behavior across physicians is an important part of understanding how the market for prescription drugs operates and, more generally, how physicians behave when faced with different information and incentives.

One avenue for future research should focus on differences across drugs in generic prescription rates. A formal treatment of information diffusion would be a useful starting point for thinking about this issue. One possibility for examining diffusion empirically is to gather data on the length of time generics and trade-name drugs have been marketed and to incorporate such information into the model of prescription choice. Another element in the examination of the diffusion of generics would be to combine data from the NAMCS surveys in other years. At the time this article was written, the NCHS would not release to me physician-identifying data for years other than 1989.[29] It would also be useful to consider other dimensions of differences across drugs, such as their use in treating chronic versus acute conditions, or life-threatening versus mild conditions.

On the policy side, it is clear that there are potentially large social costs due to the habitual prescription of trade-name drugs. When physicians make prescription decisions based on incomplete information combined with agency problems, they do not make cost-effective decisions. Even state legislation that encourages generic substitution does not seem to have had an impact on physician prescription decisions. Changes in the structure of the health care system, however, may dramatically alter the market

[29] As of the 1991 NAMCS, the NCHS has included physician identifiers in the public-use data, but there is no information on the state in which the physician practices.

TABLE 7 **Estimated Coefficients on Demographic Variables, Geographic Variables, and Average Characteristics for Subsample from States with Permissive Substitution and One-Line Prescription Pads**

Variable	Random-Effects Probit Coefficient	Random-Effects Probit *t*-Statistic	% Change in Generic
Constant	−.31	−2.13	
Age	−.01	−3.60	−.15%
Female	−.10	−2.31	−3.08%
Nonwhite	.07	.77	2.29%
Hispanic	−.02	−.17	−.67%
Specialist	.00	.02	.05%
Mean age	.00	.87	.08%
Percent female	−.41	−2.00	−12.77%
Percent black	−.13	−.52	−4.02%
Percent Hispanic	−.60	−1.85	−19.77%
Percent Medicaid	.21	.77	6.59%
Percent Medicare	−.10	−.31	−3.24%
Percent private	.08	.50	2.60%
Percent HMO/prepaid	.20	.92	6.09%
Midwest	−.28	−2.08	−9.00
South	−.30	−.09	−9.56
West	−.05	−.36	−1.66
ρ	.25	8.98	

Note: The dependent variable is one if the generic is prescribed, zero otherwise. The sample size is 4,334. The mean and percent variables refer to the mean and percent characteristics of the physician whom the patient visits. The omitted region category is Northeast. The omitted insurance categories are self-pay and percent self-pay. The percent changes in generic prescription are calculated as the average over the sample of the percent change in the probability of receiving a generic. For example, the percent change in the probability of generic prescription for age is the average percentage change for a marginal increase in age. For the dummy variables, the percent change in generic prescription represents the average percentage change that occurs when a person moves into the category represented by the dummy variable. The parameter ρ is the estimated variance of the random physician effect.

for prescription drugs. Information from IMS America Inc., a market research firm, shows that managed-care payments (both private managed care such as HMOs and Medicaid HMOs) accounted for 58.5% of dollar revenues for pharmaceutical retail sales in 1996, up from less than 30% in 1990 (IMS America, 1996). Given the emphasis on cost containment in HMOs, the continued growth of managed care may increase the market share of generic drugs, or may cause the price differential between trade-name and generic drugs to fall as HMOs negotiate with trade-name manufacturers for price discounts. Other information from IMS (IMS America, 1995) indicates that there is some evidence that changes are already occurring. As of 1995, pharmacists substituted generics in approximately half of all cases where physicians wrote a new prescription for a trade-name drug for which a generic was available. This is up from less than 30% in 1989. Interestingly, however, while 44% of all new prescriptions (including

TABLE 8 **Estimated Coefficients for Drug-Class Dummy Variable for Subsample of States**

Drug Class	Random-Effects Probit Coefficient	Random-Effects *t*-Statistic	% Change in Generic
Antimicrobials	.97	5.53	30.42%
Cardiovascular/renals	.21	.88	5.02%
Central nervous system	.76	3.85	22.54%
Hormones/hormonal mechanisms	1.05	5.78	33.61%
Skin/mucous membrane	−.77	−2.59	−10.72%
Ophthalmics	−.26	−.74	−4.89%
Respiratory tract	−.66	−.88	−9.80%

Note: The omitted drug category is pain relief.

both single- and multisource drugs) were filled with generics in 1995, only 42.4% of prescriptions paid for by private managed care were filled generically. This may suggest that managed-care groups have successfully bargained for price discounts from trade-name drug manufacturers.

There is one important caveat to the potential social benefits of increased generic prescription. Reducing the returns to trade-name drugs may have an adverse effect on

TABLE 9 **Tests of Moral Hazard for the Subsample of States Equality of Individual Insurance Variables with Self-Payment Random-Effects Probit Results**

Insurance Variable	Anti-microbials	Cardio-vasculars	Metabolics	Hormones	Skin/ Mucous Mem-branes	Opthal-mics	Pain Relief	Respir-atory Tract
Medicaid								
Coefficient	−.06	.56	−.48	.37	.61		−.04	−.17
t-statistic	−.45	2.18	−1.67	1.37	1.45		−.13	−.21
% change	−2.31%	17.97%	−15.37%	14.30%	7.11%		−.90%	−1.24%
Medicare								
Coefficient	−.02	.37	−.16	.36	.32	.56	.13	
t-statistic	−.10	1.97	−.71	2.01	.71	1.49	.46	
% change	−.61%	10.91%	−5.60%	14.13%	2.87%	12.07%	2.89%	
Private								
Coefficient	−.01	−.01	−.14	−.20	.13	.20	.12	.10
t-statistic	−.13	−.07	−.91	−1.28	.40	.45	.55	.13
% change	−.51%	−.36%	−5.06%	−7.50%	1.03%	3.42%	2.62%	.94%
HMO/prepaid								
Coefficient	−.04	.17	−.17	−.12	.43	.28	−.06	−.05
t-statistic	−.32	.55	−.65	−.59	1.26	.53	−.21	−.03
% change	−1.38%	4.68%	−5.83%	−4.54%	4.31%	5.21%	−1.13%	−.41%

Note: The percent change row represents the average percent change over the sample of patients in the probability of receiving a generic prescription when the patient's insurance status changes from self-pay to the appropriate insurance category. Sample sizes in empty cells are too small to estimate coefficients.

pharmaceutical R&D investment and new drug development. There is little evidence on the magnitude of this effect, which suggests another important avenue for future research. Nonetheless, if the private returns to pharmaceutical R&D need to be supplemented to promote more efficient levels of drug discovery, the best mechanism to subsidize private drug development is probably not the indirect subsidies provided by market imperfections in the demand for prescription drugs.

Appendix A

■ The data for this article are taken from three versions of the 1989 NAMCS: the publicly available NAMCS for patient visits; a version of the NAMCS for patient visits with additional confidential identifying information; and the publicly available NAMCS for drug mentions. The NAMCS is a survey of approximately 1,200 office-based physicians and a subsample of their patients, conducted not-quite annually by the National Center for Health Statistics (NCHS). It is a three-stage sample of primary sampling units (PSUs), physician practices within a PSU, and patient visits within practices. A PSU is a county, group of counties, or standard metropolitan statistical area. After the first and second stages of the sample, selected physicians were randomly assigned to two consecutive weeks of the year beginning in February 1989, and they filled out detailed questionaires on a random subsample of patient visits during those two weeks. The average physician recorded data for approximately 30 patients, although there is a lot of variability in the number of patients per physician. The sampling scheme was designed so that physicians with larger practices recorded data for more patients, although not in fixed proportions to the overall sizes of the practices. (Physicians who saw fewer than ten patients filled out questionaires for all patients they saw.)

These questionaires contain data on demographic characteristics of the patient (age, sex, race, ethnicity) as well as data pertaining to his or her medical condition and details about what occurred during the visit such as duration of the visit, procedures performed, and diagnosis. In addition, the physician recorded for each patient the expected source(s) of payment for the visit: self-pay, Medicare, Medicaid, Blue Cross/Blue Shield, other commercial insurance, HMO/prepaid plans, no charge, or other. If the patient paid for the visit but was to be reimbursed by a third-party payer, the physician was told to only consider the third-party payer as the source of payment. Most importantly, the physician was instructed to list up to five medications ordered for the patient and to record "the same specific drug name (brand or generic) . . . used on any prescription." The definition of medications was interpreted broadly and included both prescription and nonprescription pharmaceuticals.

All three versions of the data contain the results of the questionaires as well as information identifying the specialty of the physician and the region of the country in which the physician practices (North, South, East, Midwest). In the publicly available 1989 NAMCS for patient visits and its confidential counterpart, the unit of observation is a patient visit, and patient-specific sampling weights are included in the data. The confidential NAMCS also links the patients of each physician together via a physician identification number and contains information on the U.S. state in which the physician practiced. The state identifiers allow prescriptions to be classified according to state laws about generic substitution, and the physician identifiers allow for the inclusion of physician-specific effects into the model. Although the public version of the NAMCS is available for other years as well, the confidential version of the data has only been prepared for 1989.

In the NAMCS for drug mentions, the unit of observation is an ordered medicine. Therefore, information is included only for those patients for whom a drug was ordered; for patients for whom multiple medicines were ordered, multiple observations appear (and these observations cannot be linked in these data). Because the drug-mentions data focus on medicines, drug-specific sampling weights are attached to each observation. In addition, these data contain information matching each ordered medicine to a unique trade-name drug code as well as a corresponding generic drug code. The data also include other information about the drug ordered such as the generic name, manufacturer (either generic or trade-name), prescription status (over-the-counter or prescription), and drug class code (one of 20 major classes such as opthalmics or neurologics).[30] In conversations with representatives at the NCHS, it became clear that the manufacturer codes for each drug are not entirely reliable. I therefore verified each manufacturer code using the 1991 *Drug Facts and Comparisons*, a comprehensive pharmaceutical industry source for drug information.

The two sources of sampling weights in the data are the patient weights from the NAMCS for patient visits and the drug weights from the drug-mentions data. Experimentation with these two sets of sampling weights yielded very little difference between unweighted and weighted estimates of any of the results in this article. All results reported here are derived without sampling weights.

[30] See Table 3 for a list of the drug codes used in the empirical analysis.