ECONOMIC REPORT
SEPTEMBER 1980

Effects of Restrictions on Advertising and Commercial Practice in the Professions: The Case of Optometry

by

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This report has been prepared by the Bureau of Economics of the Federal Trade Commission. It has not been reviewed by, nor does it necessarily reflect the views of, the Commission or any of its members.

ACKNOWLEDGEMENTS

This study was initiated by Darius W. Gaskins, Jr., former Director of the Bureau of Economics, and completed under William S. Comanor, Director of the Bureau of Economics. P. David Qualls, former Assistant Director for Industry Analysis and former Deputy Director, commented on a draft of this report. Donald T. Sant, Assistant Director for Industry Analysis, also read a draft and provided so much crucial advice on statistical matters that he virtually deserves coauthorship.

The authors owe an enormous debt of gratitude to many people in optometry and related professions, who assisted in this study out of a sense of responsibility and with the intention of ensuring its integrity. Although not all those who provided information and suggestions can be listed here, the following deserve special mention: Kenneth Myers, Director of the Optometric Service, Department of Medicine and Surgery, U.S. Veterans Administration, acted throughout the study as the primary study advisor and coordinator of activities with the professional schools. From the beginning of this project, Alden N. Haffner, former President of the State College of Optometry (now Associate Chancellor for Health Sciences, State University of New York), together with Edward R. Johnston, former Dean for Academic Affairs, (now President), State College of Optometry agreed to work with the Bureau of Economics. D. Leonard Werner, Professor and Chairman of the Clinical Optometric Sciences Department and Director for Professional Services, and Stuart M. Podell, Chief of the Primary Care Optometrics Department and Assistant Professor of Optometry, both of SUNY, were instrumental in all phases. Lester E. Janoff, former Coordinator of Curriculum and Professor of Optometry, Pennsylvania College of Optometry (now Director of Professional Services, American Optical), and later Joel A. Silbert, Chief of Primary Care Services, Eye Institute, and Assistant Professor of Optometry, Pennsylvania College of Optometry, contributed a parallel effort. We are also grateful to the National Association of Optometrists and Opticians (NAOO) for their thorough response to our request for certain evaluations used in the study. Of course, none of these individuals or institutions necessarily endorses the ultimate conclusions of this report.

Among others who contributed to this study in important ways, we should acknowledge nineteen individuals under the supervision of Ellin Spector and Phyllis Aronowitz, of the Institute for Survey Research at Temple University, who demonstrated great competence and diligence in the field work. They were: Carol Allgood, Sissy Bowden, Lillian Boylston, James Burdett, Gay Carpinelli, Deborah Costa, Gwen Ford, Roni Gitchell, Evelyn Helms, Eve Kirby, Merle Klein, Shirley Krampf, Lolette Kuby, Gerald Lennon, Beverly Nelson, Helen Norton, Leo Rutman, Bernadette Selby, and Elaine Trull. Sharyl Wallace and Marlene Zvirblis served as alternates. Three members of the Bureau of Economics, James Case, Donald Sant, and Robert Zimmerman, assisted as field supervisors during the experiment.

In addition, Richard Link and David Wise provided assistance and comment on methodological and substantive issues. Lynn Carpenter performed most of the data tabulations and computer work. Joe Young, Barbara Battle, Carolyn Samuels, Cheryl Williams, and Demple Aultman also provided valuable assistance. Betsy Zichterman, Dianne Jones, Mary Brown, and Vera Chase typed various drafts of this report. Laurel Rabin provided editorial assistance. To all of these individuals, as well as others who contributed their efforts, we offer our thanks.

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PREFACE

This is a revised edition which replaces the April 1980 edition. Minor changes have been made in Figure 3 and Tables 1, 3-3, 3-4 and 3-12. Textual references to Figure 3 and the tables have also been revised.

The study is divided into two self-contained parts. Part I offers a non-technical discussion of the essential aspects and findings of the study and will probably be more useful to noneconomists. Part II presents a detailed analysis of the issues, the methodology, and the results. The results presented in Part I are derived from the statistical analyses described in Part II.

PART I

HIGHLIGHTS OF THE STUDY

The Issues

Proponents of controls on advertising and commercial practice argue that restrictions are necessary both to protect unwary consumers from unscrupulous professionals and to maintain high levels of quality. They argue that because professional services are largely intangible, complex, or difficult to assess, advertising professionals may offer services at lower prices but then substitute low for high quality care. Many professionals argue that advertising will allow such sellers to reach a substantial pool of potential customers and that competition will force high quality professionals to lower their prices and quality of care in order to "meet competition." Thus advertising will produce a lowering of quality throughout the market. According to this theory, those professionals who do not want to lower their standards of quality will be driven out of the market because consumers will gravitate to the lower-priced professionals.

In contrast, those who oppose commercial restrictions argue that certain professional services are, in fact, relatively routine. For such services consumers should benefit from shopping on the basis of price. Commercial restrictions on advertising raise the cost of shopping and result in higher prices in the market. Commercial restrictions on forms of practice may reduce the opportunity for sellers to adopt cost-cutting technologies and to pass those savings on to consumers in the form of lower prices. The argument concludes that the primary effect of commercial restrictions for professional services is to raise the prices consumers must pay for these services. Therefore, some consumers will not purchase the kinds of services needed or will do so less often. This argument is consistent with empirical evidence concerning consumer behavior in other areas of economic activity involving routine goods and services.

Because commercial behavior in the professions has been so widely restricted, there has been little opportunity to examine the relation between commercialism and the price and quality of professional services. Nonetheless, for a considerable period of time there has been a great variety in the degree of restrictions for optometric services. Some states and cities have no restrictions on either advertising or commercial practice and others have complete prohibitions on both. This study was designed to compare the relative price and quality of optometric services available across regulatory environments and kinds of practice. The study does not purport to measure the absolute level of quality of optometric services available, nor can the study be used to compare optometry with other professions providing primary eye care.

The Experiment

To examine the effect of advertising and commercial practice on the price and quality of optometric services, trained subjects were sent to various cities to purchase routine eye examinations and eyeglasses.

Behaving like ordinary consumers, subjects purchased eye examinations and (in most cases) eyeglasses from optometrists in restrictive cities where advertising and commercial practice were prohibited, and in nonrestrictive cities, where advertising and commercial practice were permitted.

Classifying Cities[1]

Cities were distinguished by the type of mass media advertising observed on eye examinations and eyeglasses as well as by whether or not large chain optical firms operated in the market. Mass media advertising was monitored in the Yellow Pages and in newspapers. No attempt was made to obtain measures of radio and television advertising by optometrists or local optical firms.[2] In the most restrictive cities, essentially no advertising of either eyeglasses or eye examinations was observed. In the least restrictive cities there was price advertising of eyeglasses and at least nonprice advertising of eye examinations.

To evaluate the effect of large chain optical firms on the price and quality of optometric services, cities were further classified by whether or not large chain optical firms sold eyeglasses and eye examinations. In nonrestrictive cities large chain optical firms sold both eye examinations and eyeglasses. There were no large chain firms in restrictive cities. It was anticipated that large chain firms might enjoy economies of scale in both purchasing and distribution. Such economies could lead to lower prices not only from the firms themselves, but also from optometrists competing with them.

Classifying Optometrists

Restrictive cities, by definition, did not include either optometrists who advertised in the media or optometrists who worked for large chain firms.

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[1] The term cities or metropolitian areas will be used to describe what were in reality Standard Metropolitan Statistical Areas (SMSAs) in the survey methodology. See Chapter 2, pp. 39-40 for the details of how the cities were selected and Table 2-1, p. 41, for the classification and identity of the cities.

[2] Obtaining such data would have required that local television and radio stations be contacted, and it was feared that requests for such data might reveal that the cities were in the survey, thereby possibly biasing the results. It was anticipated that most radio and television advertisers would also advertise in the newspapers and Yellow Pages.

Except for a few optometrists who advertised on site, all were necessarily nonadvertisers.[1]

Nonrestrictive cities included three major types of optometrists: nonadvertisers, advertisers, and large chain firms.[2] Nonadvertisers were defined as optometrists who listed in the Yellow Pages only such information as name, address, and telephone number. Mention of "eye examination" and perfunctory directions were also considered acceptable; use of boldface type was not. Nonadvertisers did not include optometrists who advertised in the newspapers or optometrists who advertised on site. Advertising optometrists were defined as optometrists or local optical firms that advertised in the Yellow Pages or the newspapers. Large chain firms were identified by using a list, supplied to the Federal Trade Commission (FTC) by a trade association, of major retail optical firms. Such firms advertised in the Yellow Pages, or newspapers often under the heading of "Opticians", and had outlets in more than one state or SMSA.

Training Subjects

Nineteen subjects, experienced survey interviewers with relatively routine visual problems, were selected and trained to identify, recall, and record the major components of a complete eye examination. The training took place on the campus of the State University of New York, College of Optometry (SUNY), from November 7-10, 1977. Reviewing and testing took place at the Pennsylvania College of Optometry (PCO) on November 11, 1977. The training, which was completed just prior to the field work, provided subjects with an understanding of the procedures, tests, and equipment commonly employed in routine eye examinations. The training also prepared the subjects for completing debriefing sheets subsequent to each examination purchased in the field. Both schools performed complete eye examinations on each subject. The examinations provided the baseline data necessary to evaluate the accuracy of the prescriptions received.

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[1] The few optometrists who had either large signs or window displays were classified as on-site advertisers. Such optometrists were treated as a separate group throughout the analysis.

[2] Again, some optometrists did have either large signs or window displays even though they did not advertise in the media. Such on-site advertisers were treated separately throughout the analysis.

The Results

The discussion that follows focuses first on price, second on quality, and, finally, on the relation between price and quality.

Price

The analysis here focuses only on the most and the least restrictive cities: the former, cities with no advertising of either eyeglasses or eye examinations and with no large chain optical firms; the latter, cities with price advertising of eyeglasses, and nonprice advertising of eye examinations in the presence of large chain optical firms.[1] Prices are for the combined price of an examination and eyeglasses and were determined from receipts that each subject requested.[2]

Table 1 presents estimates of the average total prices charged for examinations and eyeglasses in the most and least restrictive cities. The estimates are based upon a sample of 280 observations where both eyeglasses and eye examinations were purchased. The estimates suggest the following:[3]

(1) The average price charged by all optometrists is lower in the least restrictive cities than in the most restrictive cities. The $23.74 difference is statistically significant.

(2) The average price charged by nonadvertising optometrists is lower in the least restrictive cities than in the most restrictive cities. The $21 difference is statistically significant.

(3) The average prices charged by advertisers and chain firms in the least restrictive cities are about the same; both are lower than the prices charged by nonadvertisers in the least restrictive cities. The $10-12 difference is statistically significant.

Summary: The total prices charged for eye examinations and eyeglasses are significantly lower in the least restrictive cities. Large chain optical firms, advertising optometrists, and even nonadvertising optometrists all charge less in these cities than optometrists in the most restrictive cities. The lowest prices are those charged by large chain optical firms and other advertising optometrists.

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[1] Data were collected and analyzed for five distinctly different categories of cities. Analysis presented in Chapter 3 reveals that the results for environments with intermediate levels of restrictions are consistent with the results presented below, but sometimes at lower levels of statistical significance.

[2] Prices are net of any taxes. Some data were also collected on the price of the eye examinations. Analysis of the data yields a pattern similar to the pattern shown for the combined price (see Chapter 3.)

[3] See Appendix C for explanation of this and other sample sizes.

TABLE 1

Estimates of Average Prices
Charged for Examinations and Eyeglasses

	Most Restrictive Cities	Least Restrictive Cities
All Optometrists	$94.46	$70.72
Nonadvertisers[1]	94.64	73.44
Advertisers	None	63.57
Chain Firms	None	61.37

[1] Excludes optometrists who advertise on site.

NOTE: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of price other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation in prescriptive needs, city-to-city variation in optometrists per capita, and city-to-city variation in adjusted income per capita. Because the prices are corrected estimates, they are not necessarily the average prices observed in the sample cities.

Source: Bureau of Economics, FTC.

Quality

Many professionals argue that price comparisons such as those above fail to take account of any quality differences and are therefore not meaningful. For services as potentially complex as those offered by professionals, the assumption of equal quality may not be warranted. This section explores quality by focusing on four dimensions of the services purchased: (1) thoroughness of the eye examination; (2) accuracy of the prescription; (3) accuracy and workmanship of the resulting eyeglasses; and (4) extent of unnecessary prescribing. For each dimension of quality a description of the measure is presented, followed by an analysis of the results.

1. The Thoroughness of the Eye Examinations

A. Measures

Subjects completed a debriefing sheet for each eye examination taken during field work. The debriefing sheets included the following: the identity of the examining optometrist; whether or not the optometrist advertised on site; and questions about the thoroughness of the examination, including these important components: the case history, the eye health examination, the vision test, and the discussion of findings. Subjects were also asked to estimate elapsed time for an important procedure or test (see p. 7) as well as for the examination as a whole, excluding the selection of frames and lenses. For each question subjects were asked to respond "Yes," "No," or "Don't remember." If they were at all confused, subjects were asked to write down the circumstances leading to their uncertainty.

Subsequent to the field work each debriefing sheet was read by FTC staff. Copies purged of identification data were also read by study advisor, Dr. Kenneth Myers, Ph.D., O.D., Director of the Optometric Service, Department of Medicine and Surgery, U.S. Veterans Administration. By reviewing subjects' remarks explaining their uncertainty, Dr. Myers was able to complete answers to some questions. Weights were then applied to denote the importance of the various components, including procedures and tests, of each examination. Working with the College of Optometry, State University of New York (SUNY) and the Pennsylvania College of Optometry (PCO), Dr. Myers developed the set of weights associated with scores, designated below as "FTC Index." The National Association of Opticians and Optometrists (NAOO), a group representing commercial optometrists, developed the set of weights associated with scores designated as "NAOO Index."[1] Both indexes are stated as percentages, so that an examination in which all appropriate tests had been performed would

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[1] The American Optometric Association, the National Optometric Association, and Association of Schools and Colleges of Optometry were also asked, but declined, to supply additional sets of weights.

have a score of 100.[1] Although the two different weighting systems were used to determine if the results were sensitive to potentially different professional points of view, the resulting scores are highly correlated, this suggests that the study results are basically insensitive to the weighting system used.

Although the scores provide detailed measures of the thoroughness of the examination, they nevertheless do not reveal the nature of the procedures and tests (see below) that may have been left out of an examination with a low score. Some tests are related primarily to the assessment of eye health; others are related primarily to the derivation of the correct prescription. And, although all of the procedures and tests that received positive weights were considered important, both weighting systems give positive weights to procedures that are less than critical. A 70 percent score does not necessarily imply that only 70 percent of important tests were performed. Each index merely provides a continuum that can be used to make comparisons across regulatory environments and kinds of practice. Thus, the analysis of indexes is supplemented with analyses of the thoroughness of major components of the examination, including the frequencies with which important tests were performed.

The three major components of the typical optometrist's eye examination include the following: (1) case history: a series of questions used to determine the patient's history of medical and visual care; (2) eye health examination: a series of tests and procedures used to detect eye disease and injury; and (3) vision test: a series of tests to determine visual performance and prescriptive needs. In addition, a few particularly important individual tests are identified as measures of thoroughness. In the eye health component of the examination, the specific measures are the following: (1) the percentage of optometrists who used an ophthalmoscope to examine the interior of the eye; (2) the estimated average number of seconds each eye was examined with an ophthalmoscope; (3) the percentage of optometrists using a tonometer (to test for glaucoma). In the vision test component of the examination, the specific measures include: (1) the percentage of optometrists taking an "objective" measure of vision with a retinoscope; and (2) the percentage of optometrists taking a "subjective" measure of vision (refraction). Each of the above procedures and tests was assigned the greatest individual weight in the overall thoroughness indexes; collectively the procedures and tests account for a substantial percentage of the overall thoroughness scores.[2]

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[1] Where subjects could not remember whether or not a procedure had been performed, the point values were deducted from both the actual score and the possible score. Thus, an exam would score 100 percent if all tests that the subject could remember had been performed.

[2] See Appendix B for a detailed presentation of unit weights.

Whether the indexes or the examination components are analyzed, it should be emphasized that the measures presented are measures of inputs rather than outputs. Thus, whether or not an examiner would have found the pathology, had it been present, can be inferred only indirectly.

B. Results

Table 2 below presents the estimates for average thoroughness of the eye examinations as measured by the FTC and NAOO Indexes. The estimates are derived by classifying all cities as either restrictive, cities where there were no large chain optical firms, or nonrestrictive, cities where large chain optical firms sold both eyeglasses and eye examinations. The estimates are based on a sample of 434 observations.

The estimates suggest the following:

(1) Examinations purchased from optometrists in restrictive and nonrestrictive cities are, on average, of about equal thoroughness.

(2) Examinations purchased from large chain firms and advertising optometrists are, on average, less thorough than examinations purchased from the nonadvertising optometrists in nonrestrictive cities. The difference is statistically significant.

TABLE 2

Estimates of Average Thoroughness of Eye Examinations

	Restrictive Cities		Nonrestrictive Cities	
	FTC Index	NAOO Index	FTC Index	NAOO Index
All Optometrists	58.5	61.0	61.6	63.7
Nonadvertisers*	58.8	61.6	70.0	72.1
Advertisers	None	None	47.4	51.4
Chain Firms	None	None	51.6	54.2

* Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of thoroughness other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation in evaluation, state-to-state variation in optometrists per capita, and city-to-city variation in change in population. Because the scores are corrected estimates, they are not necessarily identical to the average scores of examinations in the sample cities.

Source: Bureau of Economics, FTC.

(3) Examinations purchased from nonadvertising optometrists in nonrestrictive cities are, on average, more thorough than examinations purchased from nonadvertising optometrists in restrictive cities. The difference is statistically significant.

The estimates in Table 2 present a seemingly complex picture. Nonadvertising optometrists in nonrestrictive cities appear to be different both from their advertising counterparts in the same cities and from their nonadvertising counterparts in restrictive cities. To better understand the data underlying the estimates, frequency distributions were created for the various types of optometrists in nonrestrictive cities. The types include the three for which estimates were presented in Table 2 plus a fourth type of optometrist who did not advertise in the media but who did advertise on site.[1] The distributions shown here are for the FTC Index only, but distributions for the NAOO Index show similar patterns (See Chapter 3).

The frequency distributions in Figure 1 show visually what the estimates in Table 2 suggest. Nonadvertising optometrists tend to offer higher quality examinations than large chain firms and both types of advertising optometrists. The distributions also reveal substantial variation within each type of optometrist.

By combining the four distributions in proportion to the number of optometrists in each type, a distribution for all optometrists in each kind of city can be created. The combined distribution of examination scores for nonrestrictive cities may then be compared to the distribution for restrictive cities.

Figure 2 presents the combined distributions for restrictive and nonrestrictive cities. The distributions reveal substantial variation within both restrictive and nonrestrictive cities, but the variation is remarkably similar. Within each kind of city substantial percentages of the examination scores are both much higher and much lower than the averages. In nonrestrictive cities less-thorough examinations tended to be purchased from advertising optometrists and chain-firm optometrists. In restrictive cities less-thorough examinations were available from at least as large a percentage of optometrists. But the optometrists could not advertise or practice commercially. Hence, whereas nonadvertising optometrists in nonrestrictive cities appear to give more thorough examinations, virtually all optometrists in restrictive cities are nonadvertisers, and no such patterns can be observed.

For each major component of the eye examination (see p. 7), Table 3 presents the estimated average percentage score (FTC Index) by type of optometrist for restrictive and nonrestrictive environments. In addition, Table 3 identifies six important specific tests. Within the eye health portion of the examination, Table 3 shows: the percentage of optometrists who use an ophthalmoscope and who hold it close to the eye; the

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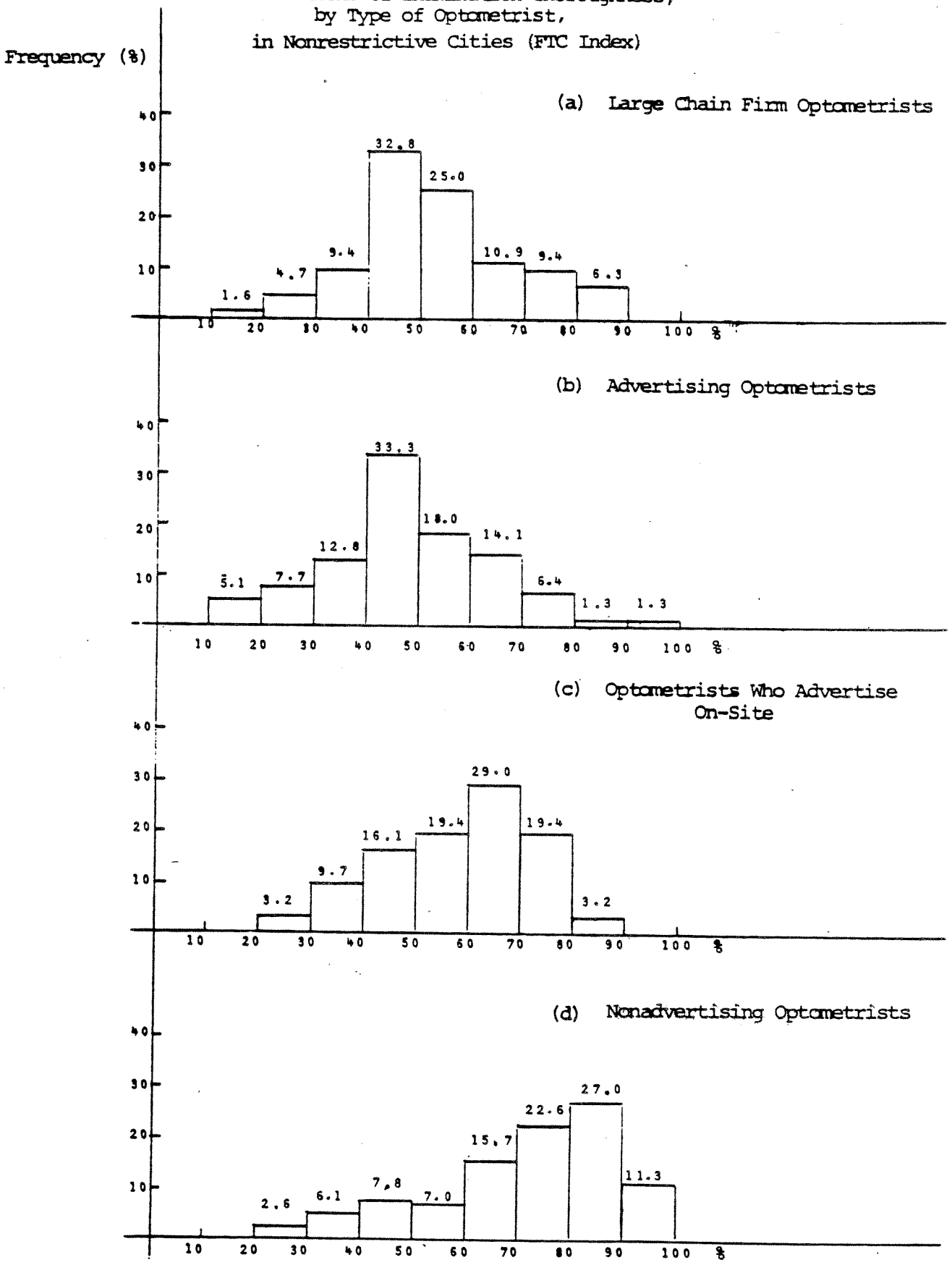
[1] As with the estimates presented in the tables above, each score is derived from a multivariate analysis which adjusts for subject-to-subject differences in evaluations, state-to-state differences in optometrists per capita, and city-to-city differences in percent change in population.

Figure 1

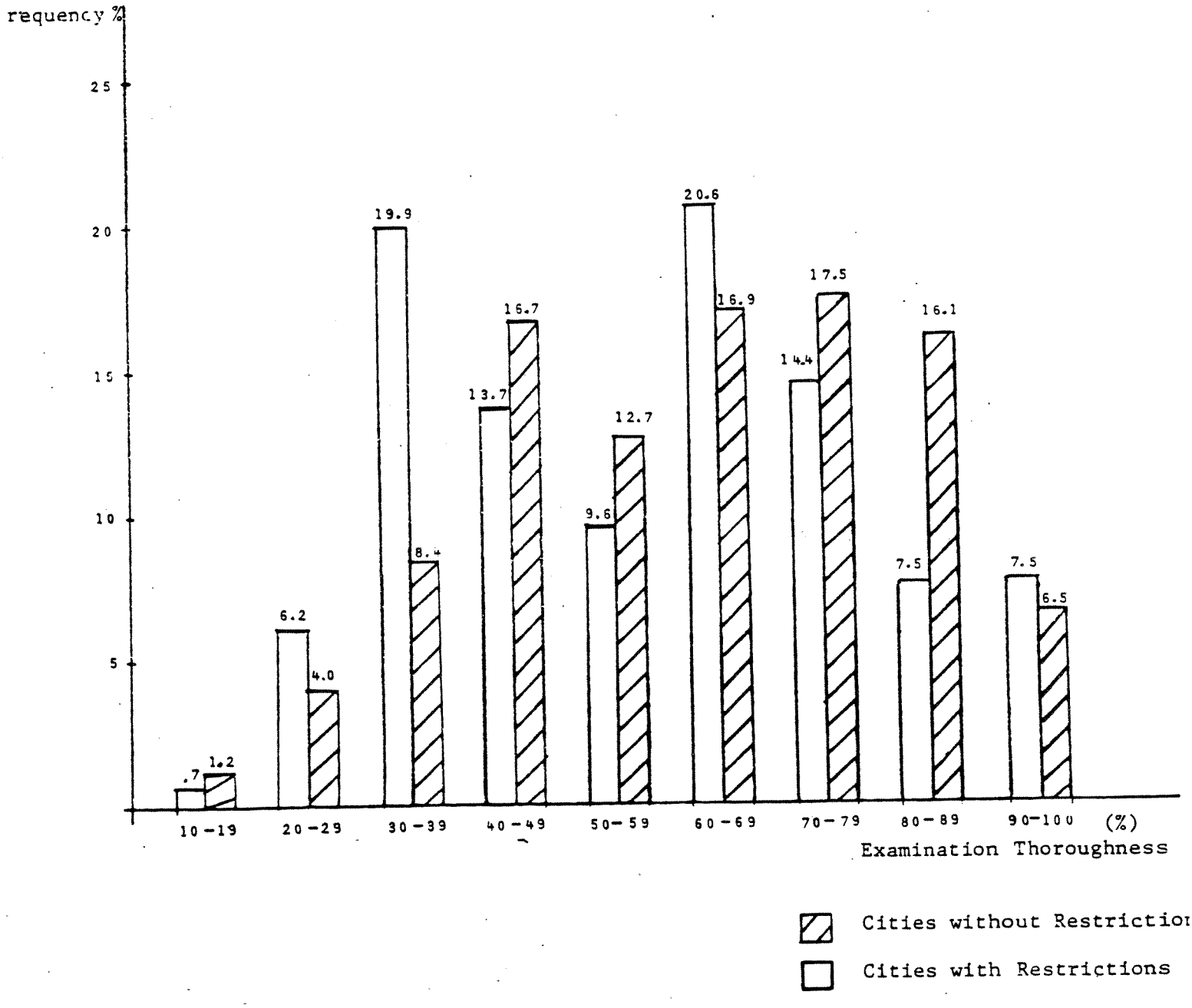
Distributions of Examination Thoroughness, by Type of Optometrist, in Nonrestrictive Cities (FTC Index)



Source: Bureau of Economics, FTC

Figure 2

Distributions of Examination Thoroughness,
in Cities with and without Restrictions
(FTC Index)



Source: Bureau of Economics, FTC.

TABLE 3

Estimated Values for
Important Components of the Eye Examination,
by Type of Optometrist in Restrictive and Nonrestrictive Cities[1]
(FTC Index)

	Restrictive Cities	Nonrestrictive Cities		
Important Components	Nonadvertising Optometrists	Nonadvertising Optometrists	Advertising Optometrists	Large Chain Firms
1. Case History (Average score %)	44.4	55.4	31.6	39.6
2. Eye Health Examination (Average score %)	52.3	69.5	42.7	47.9
Percent close to the eye with the ophthalmoscope	82.7	91.3	74.2	76.6
Average number of seconds examining each eye with ophthalmoscope	25.5	34.2	21.3	23.2
Percentage using slit lamp	19.0	39.0	5.0	9.0
Percentage using tonometer	55.0	61.0	51.0	64.0
3. Vision Testing (Average score %)	55.1	70.9	54.2	55.6
Percentage using retinoscope	77.3	90.4	87.6	83.6
Percentage giving subjective vision test	100.0	100.0	100.0	100.0

[1] The estimates are based upon multivariate analyses of all regulatory environments, and they are net of variation due to differences in subjects, state optometrists per capita, and change in population. Sample sizes vary depending upon the subsection or test, but all sample sizes are within a few observations of 430.

Source: Bureau of Economics, FTC.

estimated average number of seconds each eye is examined with an ophthalmoscope; the percentage of optometrists using a slit lamp; and the percentage of optometrists using a tonometer. Within the vision testing portion of the examination, the percentage of optometrists using a retinoscope and performing a subjective refraction are also shown.

With the scores for different types of optometrists, the data in Table 3 present a pattern similar to that observed in the analysis of the thoroughness index. For the three major components of the examination, the average score of nonadvertising optometrists in the nonrestrictive cities is significantly higher than the average score of nonadvertising optometrists in the restrictive cities and of advertising and chain firm optometrists in the nonrestrictive cities. Similarly, nonadvertising optometrists in nonrestrictive cities are more likely than other optometrists to examine the cornea with a slit lamp and to spend more time examining the interior of the eye with an ophthalmoscope. The use of the tonometer, the retinoscope, and the performance of the subjective refraction test show a different pattern, however. The percentage of optometrists using the tonometer does vary from type to type, but none of the variations is significant. Optometrists of all types in the nonrestrictive cities performed objective vision tests with about the same frequency and significantly more frequently than optometrists in restrictive cities. Subjective refractions were performed everywhere.

Overall, the results suggest that nonadvertising optometrists in nonrestrictive cities give more thorough examinations than advertising optometrists, chain firm optometrists, or nonadvertising optometrists in restrictive cities. However, advertising and chain firm optometrists are just as likely as nonadvertising optometrists to perform certain critical tests. Tests for glaucoma with a tonometer and tests related to the derivation of the prescription (retinoscopy and refraction) were performed by advertising optometrists and chain firm optometrists in nonrestrictive cities with about the same frequency as nonadvertising optometrists.

Summary: In nonrestrictive cities, less thorough eye examinations tend to be given by advertising optometrists and chain-firm optometrists; more thorough examinations tend to be given by nonadvertising optometrists. In restrictive cities the variation across practitioners in the thoroughness of examinations is about as great as it is in nonrestrictive cities. Virtually all optometrists in restrictive cities are nonadvertisers, however, since none can advertise in the mass media. Despite the variation, the average thoroughness of examinations in restrictive cities tends to be similar to the average thoroughness of examinations in nonrestrictive cities, where the average is taken across all optometrists regardless of type.

Optometrists giving thorough examinations do not appear to be driven from nonrestrictive cities. Fully 55 percent of the optometrists in nonrestrictive cities do not advertise, either in the media or on site. And a slightly greater percentage of the optometrists in nonrestrictive cities give high-scoring examinations than optometrists in restrictive cities. About 23 percent of the optometrists in nonrestrictive cities versus about 15 percent of

the optometrists in restrictive cities give examinations having FTC Index of 80 percent or higher. About 40 percent of the optometrists in nonrestrictive cities versus about 29 percent of the optometrists in restrictive cities give examinations with an FTC Index of 70 percent or higher. The NACO Index shows a similar pattern.

Nonadvertising optometrists in the nonrestrictive cities score higher in each major portion of the eye examination than all other types of optometrists, including optometrists in restrictive cities. The analysis reveals similar results on six important procedures and tests. Nonetheless, all optometrists perform subjective vision tests. And the data show no consistent differences between types of optometrists in the use of the retinoscope and tonometer.

2. The Accuracy of the Prescriptions

Subjects were instructed to request a copy of the prescription at the conclusion of each examination. After removing information identifying the name and any affiliation of the prescribing optometrists, the prescriptions were forwarded to each of the consulting schools of optometry. The faculty at each school was asked to make a clinical pass-fail judgment concerning the appropriateness of each prescription received in the field. The judgments were based upon the detailed examination records the schools had compiled on the subject during the training session. Differences of opinion between the schools were due to differing assessments of the subjects' needs or to differing application of professional judgment. The data suggest that PCO judged slightly fewer prescriptions adequate than SUNY.

Table 4 presents estimates of the percentage of the prescriptions judged appropriate by one or both of the schools. The estimates are based upon the entire sample of 400 observations,[1] and they suggest that optometrists in nonrestrictive cities obtain the correct prescriptions slightly, but not significantly, more often than optometrists in restrictive cities. Analysis of estimates of the percentage of prescriptions judged appropriate by each school individually leads to similar conclusions.

Summary: Statistical estimates suggest that in both restrictive and nonrestrictive cities advertising and chain-firm optometrists produced prescriptions no less appropriate than nonadvertising optometrists.

3. The Accuracy and Workmanship of the Eyeglasses

Eyeglasses purchased by the subjects were mailed to the FTC where the glasses were coded with numbers to identify the dispensing optometrists. Labels engraved on the nosepieces and earpieces were taped so that glasses from large chain firms could not be identified. The eyeglasses were first

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[1] Slightly fewer observations exist in this sample than in the entire data set since prescriptions were not obtained or were not usable in 34 instances. See Appendix C for details on sample size.

TABLE 4

Estimates of the Percentage of
Prescriptions Judged Appropriate
by One or Both Schools

	Restrictive Cities	Nonrestrictive Cities
All Optometrists	82	88
Nonadvertisers*	82	88
Advertisers	Not applicable	90
Optical Chain Firms	Not applicable	86

* Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of appropriateness other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation, state-to-state variation in optometrists per capita, and city-to-city variation in change in population. Because the percentages are corrected estimates, they are not necessarily identical to the average percentages observed in the sample cities.

Source: Bureau of Economics, FTC.

shipped to PCO where an automated lensometer (a sophisticated instrument to read and print out measurements of sphere, cylinder, axis, and prism of each lens) was used to measure decentration, that is the displacement of the optical centers of the eyeglasses; for correct vision these centers should approximate the distance between the subject's pupils. To measure decentration, the eyeglasses were dotted using the automated lensometer and measuring the distance by hand. The accuracy of each pair of eyeglasses was then judged using the following criteria:

(1) Each pair of eyeglasses was subjected to a mechanical standard. Eyeglasses were judged accurate if the prescriptions for them met tolerances established in the 1972 American National Standards Institute (ANSI) Z80.1 guideline standards. Because the ANSI standards have rather small tolerances (see Chapter 3, p. 75), it was anticipated that a large percentage of eyeglasses might fail.

(2) Each pair of eyeglasses was subjected to judgmental clinical evaluations. Eyeglasses were compared to the written prescriptions by the faculties at PCO and SUNY to determine if they were adequate for the patient.

Table 5 presents estimates of the percentage of eyeglasses judged adequate by the ANSI standards; Table 6 presents the percentage of eyeglasses judged adequate by PCO, SUNY, or both. The estimates are based upon samples of 217 observations,[1] and they suggest that adequate eyeglasses are prescribed with about the same frequency in both restrictive and nonrestrictive cities.[2]

Like the clinical evaluation of adequacy, the evaluation of workmanship involved subjective judgment. Accordingly, PCO and SUNY were asked to complete questionnaires consisting of the following questions: (1) Did the lenses have any significant imperfections? (2) Were the lenses edged and mounted well? (3) Did the frames have any significant imperfections? Workmanship was judged adequate if the answer to each of the three questions was yes. Since the eyeglasses were mailed to the subjects, no measure of fit is available.

Table 7 presents estimates of the percentage of eyeglasses judged of adequate workmanship by PCO, SUNY, or both. The estimates are based upon a

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[1] The data were analyzed excluding the observations taken in two cities where the experiment became known prior to receipt of the glasses. Also, observations were excluded in seven instances where the optometrist did not provide a prescription.

[2] Whether or not the prescription was judged adequate to meet the subject's needs, the eyeglasses were compared with the prescription. From an individual patient's point of view, both the prescription and the eyeglasses must be accurate or any errors must be compensating.

TABLE 5

Estimates of the Percentage of Eyeglasses
Judged Adequate by
ANSI Standards

	Restrictive Cities	Nonrestrictive Cities
All Optometrists	50	64
Nonadvertisers*	50	64
Advertisers	Not Applicable	70
Chain Firms	Not Applicable	52

* Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of adequacy other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation, state-to-state variation in optometrists per capita, and city-to-city variation in change in population. Because the percentages are corrected estimates, they are not necessarily identical to the average percentages observed in the sample cities.

Source: Bureau of Economics, FTC.

TABLE 6

Estimates of the Percentage of Eyeglasses
Judged Adequate
by One or Both Schools

	Restrictive Cities	Nonrestrictive Cities
All Optometrists	85	87
Nonadvertisers*	84	86
Advertisers	Not applicable	92
Chain Firms	Not applicable	81

* Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of adequacy other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation, state-to-state variation in optometrists per capita, and city-to-city variation in change in population. Because the percentages are corrected estimates, they are not necessarily identical to the average percentages observed in the sample cities.

Source: Bureau of Economics, FTC.

TABLE 7

Estimates of the Percentage of Eyeglasses
Judged of Adequate Workmanship
by One or Both Schools

	Restrictive Cities	Nonrestrictive Cities
All Optometrists	82	92
Nonadvertisers*	81	94
Advertisers	Not applicable	85
Chain Firms	Not applicable	87

* Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of adequacy other than the presence of advertising and large chain optical firms. The corrections are for state-to-state variation in optometrists per capita and city-to-city variation in change in population. Because the percentages are corrected estimates, they are not necessarily identical to the average percentages observed in the sample cities.

Source: Bureau of Economics, FTC.

sample of 224 observations,[1] and they suggest that there are no significant differences in the percentage of eyeglasses judged adequate either by type of optometrist or by kind of city. Analysis of each school's judgments individually yields similar results.

Summary: Statistical estimates suggest that neither advertising nor commercial practice adversely affect the accuracy or quality of the eyeglasses.

4. The Extent of Unnecessary Prescribing

One hundred twenty-three examinations were taken by five subjects, each of whom arrived at the examination wearing eyeglasses with a prescription that the consulting optometrists believed to be appropriate. At the end of each examination, the subjects recorded the examining optometrist's recommendation concerning whether or not new glasses would be beneficial. The subjects were instructed to tell the optometrist that they wanted to purchase new eyeglasses only if the eyeglasses would make a real difference in their ability to see. The data are analyzed in two ways: First, the data are used to determine which examinations resulted in a recommendation of new glasses regardless of the accuracy of the prescriptions. Second, the data are used to see which examinations resulted in a recommendation of new glasses even though the prescription was judged correct. For the first analysis a sample size of 123 observations is used; this analysis includes recommendations from optometrists for prescriptions different from those for the eyeglasses the subjects were already wearing. For the second analysis, a sample size of 92 observations is used; this analysis only includes recommendations from optometrists who derived essentially the same prescriptions as the ones for the eyeglasses the subjects were already wearing.

Tables 8 and 9 present estimates of unnecessary prescribing by kind of city and type of optometrist. Because the sample sizes are relatively small, only substantial differences between estimates are statistically significant. The differences that do emerge are contrary to the hypothesis that chain firms and advertisers prescribe unnecessarily more frequently than nonadvertisers in restrictive cities. Hence a larger sample would be unlikely to suggest an opposite conclusion.

Summary: Statistical estimates suggest that advertising optometrists and large chain firms do not unnecessarily recommend new eyeglasses more frequently than nonadvertising optometrists.

Quality: A Summary

Analysis of the thoroughness of eye examinations suggests that there is substantial variation in both restrictive and nonrestrictive cities. In nonrestrictive cities, less-thorough examinations are given by advertising optometrists and large chain firms. In restrictive cities, less-thorough

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[1] The data were analyzed excluding the observations taken in two cities where the experiment became known prior to the receipt of the eyeglasses.

TABLE 8

Estimates of the Percentage of
Optometrists Prescribing
Unnecessarily
(all observations)

	Restrictive Cities	Nonrestrictive Cities
All Optometrists	32	12
Nonadvertisers*	32	9
Advertisers	Not Applicable	18
Chain Firms	Not Applicable	14

* Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of prescribing other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation in behavior, state-to-state variation in optometrists per capita, and city-to-city variation in change in population. Because the percentages are corrected estimates, they are not necessarily identical to the average percentages observed in the sample cities.

Source: Bureau of Economics, FTC.

TABLE 9

Estimates of the Percentage
of Optometrists Prescribing
Unnecessarily

	Restrictive Cities	Nonrestrictive Cities
All Optometrists*	36	9
Nonadvertisers†	36	7
Advertisers	Not Applicable	13
Chain Firms	Not Applicable	10

* This includes only optometrists who derived the correct prescription.

† Excludes optometrists who advertise on site.

Note: The estimates are derived from a multivariate analysis that corrected for possibly important determinants of prescribing other than the presence of advertising and large chain optical firms. The corrections are for subject-to-subject variation in behavior, state-to-state variation in optometrists per per capita, and city-to-city variation in change in population. Because the percentages are corrected estimates, they are not necessarily identical to the average percentages observed in the sample cities.

Source: Bureau of Economics, FTC.

examinations are given by about the same percentage of optometrists, but, by definition, such optometrists can neither advertise nor work for large chain firms.

Analysis of the accuracy of the prescriptions, the accuracy and workmanship of the eyeglasses, and the extent of unnecessary prescribing suggests that advertisers and large chain firms perform no worse than nonadvertising optometrists in either restrictive or nonrestrictive cities. The data suggest that consumers who purchase an eye examination only to get the correct prescription and an accurate pair of eyeglasses may safely shop on the basis of price. In addition, the data suggest that, on average, large chain optical firms and other advertising optometrists appear to charge prices lower than the prices charged by nonadvertising optometrists. If, however, a consumer is interested in having a thorough eye examination, the data suggest that more thorough examinations are likely to be obtained from nonadvertisers. But even with nonadvertisers, consumers in nonrestrictive cities appear to have an advantage. In nonrestrictive cities the decision not to advertise or practice commercially appears, on average, to be associated with a decision to offer a more thorough examination. In restrictive cities, no such association can be made. Nonadvertisers appear to give more thorough examinations in nonrestrictive than in restrictive cities; and the data suggest that they also charge lower prices (pp. 4-5).

But the data reveal substantial differences in the thoroughness of examinations not only between, but also within, cities and types of optometrists. Comparing prices for nonhomogeneous services may be misleading; it is, therefore, necessary to analyze the relation between price and quality.

The Relation between Price and Quality

Table 1 (p. 5) shows that optometrists associated with large chain firms and those who advertise charge lower prices than the nonadvertisers. Table 1 also reveals that optometrists in the most restrictive cities charge higher prices than nonadvertisers in the least restrictive cities. Yet the analysis of the thoroughness of eye examinations shows substantial variation. In nonrestrictive cities the variation is associated with advertising and commercial practice. In restrictive cities, variation is just as substantial, but optometrists who give less-thorough examinations can neither advertise in the media nor practice commercially. Because of the substantial variation in thoroughness, it is important to compare the prices of examinations of similar thoroughness.

Figure 3 shows statistical estimates of the cost of eyeglasses plus an eye examination having an FTC Index equal to 60, an arbitrary but typical value. The estimates are for nonadvertisers in the most restrictive cities, nonadvertisers in the least restrictive cities, and large chain firms, which only exist in nonrestrictive cities.[1] The estimates suggest the following:

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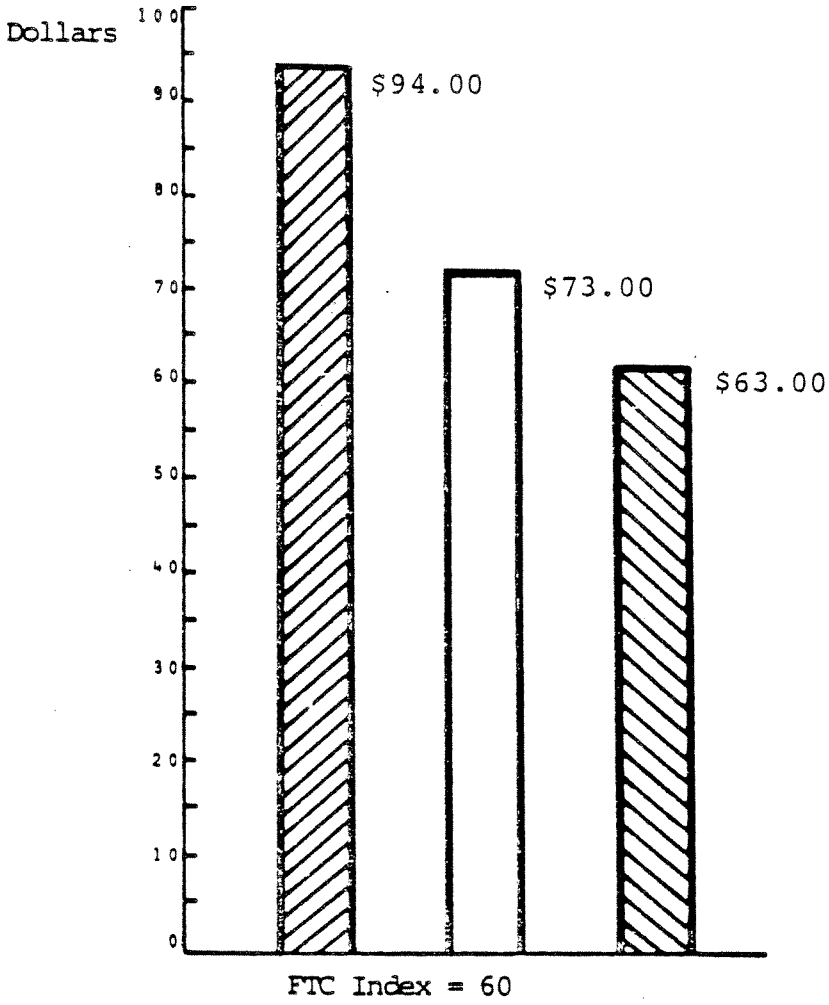
[1] The estimates are derived from a multivariate analysis that corrects for variation based on optometrists per capita, income per capita, and subjects. The multivariate analysis is based upon 280 observations, but the estimates presented here are for the most and the least restrictive cities only.

Figure 3

Average Price of Examinations and Eyeglasses
with an FTC Thoroughness Index of 60



▨ - Nonadvertising optometrists, in cities where advertising and commercial practice are prohibited.

□ - Nonadvertising optometrists in cities where advertising and commercial practice are permitted.

▨ - Optometrists associated with large chain optical companies.

Source: Bureau of Economics, FTC

(1) Eyeglasses and an eye examination of similar thoroughness cost less when purchased from a nonadvertiser in the least restrictive cities than when purchased from a nonadvertiser in the most restrictive cities. On average the cost difference was about $21 for examinations having the same FTC Index.

(2) In the least restrictive cities, eyeglasses and an examination of a given thoroughness cost less when purchased from a large chain firm than when purchased from a nonadvertiser. On average the cost difference is about $10 for examinations having the same FTC Index. Note, however, that previous results suggest that more thorough examinations are much more frequently available from nonadvertisers than from chain firms.

(3) Eyeglasses and an examination of a given thoroughness, cost less when purchased from large chain firms than when purchased from nonadvertisers in restrictive cities. On average the cost difference is about $31 for examinations having the same FTC Index.

SUMMARY AND CONCLUSIONS

The purpose of this study has been to analyze empirically the effect of advertising and commercial practice on the price and quality of optometric services. The relation has been a matter of some dispute. Proponents of advertising and commercial practice have argued that such behavior increases competition and lowers prices. Opponents have argued that such behavior lowers the quality of professional care available in the market.

The data in this study support the view that advertising and commercial practice lower prices. Very thorough examinations and eyeglasses cost, on average, $21 less in markets where advertising and commercial practice are allowed. Less thorough examinations and eyeglasses cost, on average, $31 less when purchased from a large chain optical firm than when purchased from an optometrist in a market without advertising and commercial practice.

The data are not consistent with the view that advertising and commercial practice lower the quality of professional care available in the market. The average quality of eye examinations available to consumers is about the same whether or not advertising and commercial practice are allowed.

Optometrists of all types provide adequate prescriptions and eyeglasses with about the same frequency. Substantial variation does exist, however, in the thoroughness of the examinations. Overall, the variation across optometrists is similar in both restrictive and nonrestrictive cities. But in nonrestrictive cities, the decision to advertise or practice commercially appears to be associated with a decision to give a less thorough, less costly examination. Advertising optometrists and chain optical firms in nonrestrictive cities are less likely to perform certain important tests related to the assessment of eye health, and their prices are lower than those of nonadvertisers in the same city.

Some have argued that advertising or chain firm optometrists would be more likely to unnecessarily prescribe eyeglasses or perform unneeded tests and services because they are more profit oriented than nonadvertising professionals. Chain firm optometrists might be especially vulnerable to this charge since their employers' primary interest is the selling of eyeglasses. This study found no significant difference in the incidence of unnecessary prescribing of eyeglasses between advertising and nonadvertising optometrists or between individual advertising optometrists and optometrists employed by the large chain optical firms.

In many states professionals are prohibited from being employed by corporations not owned or controlled by professionals. Proponents of these regulations believe that commercially employed professionals may be encouraged to engage in cost-cutting conduct that compromises professional standards of quality. Data in this study do not confirm this view. Optometrists who are either employed by, or sublet space in, the large optical outlets give examinations that are, on average, no less thorough than examinations purchased from advertising optometrists not associated with large chains. Nor are there any significant differences in the appropriateness of the prescriptions or the adequacy of the eyeglasses.

In summary, this study found the following:

(1) The existence of advertising and commerical practice by some optometrists in a market does not result in a lowering of the quality of examinations available to consumers. While the overall distribution of quality across all types of optometrists is about the same in restrictive and nonrestrictive cities, there is considerable variation in quality between optometrists.

(2) The existence of price advertising and commercial practice by some optometrists does result in lower prices. The prices of both less thorough and more thorough eye examinations and eyeglasses were significantly lower in the least restrictive cities than in the most restrictive cities.

(3) In nonrestrictive cities, nonadvertising, traditional optometrists give more thorough eye examinations and charged higher prices than advertising and chain firm optometrists.

(4) Advertising and chain firm optometrists are just as likely to obtain the correct prescription and produce adequate eyeglasses as nonadvertisers but on average, at lower prices.

(5) There are no significant differences in the workmanship of the eyeglasses regardless of where they are purchased.

(6) There are no significant differences in the incidence of unnecessary prescribing between advertising and nonadvertising optometrists.

(7) There are no significant differences in quality of the eye examinations between individual advertising optometrists and optometrists associated with large chain optical firms.

PART II

THE STUDY IN DETAIL

CHAPTER 1

Professional Services and Consumer Welfare

1. Effects of Advertising on Product Prices

Simple theories of consumer behavior assume that the price and quality of consumer goods and services are determined by market forces and that information about price and quality is freely available. These assumptions imply that identical goods and services will sell at identical prices. Everyday experience, however, shows that these theories do not explain the real world where even standardized products and services are retailed at various prices. Because prices do vary, information can benefit consumers by enabling them to purchase at lower prices. Such information can be obtained either through consumer search or seller provision.

Search (or "shopping") may be undertaken in varying amounts and with varying degrees of efficiency. Some consumers are better able to budget their time or are better educated and may therefore shop more efficiently. Others have lower opportunity cost and may simply engage in more search. Alternatively, information may originate on the seller side of the market, namely, through advertising of product availability and price. Since shopping is costly in terms of time and effort, consumers can be assisted through advertisements that provide information about prices and availability. Advertising creates feedback for sellers also. Higher-priced sellers will face pressure from lower priced sellers and should be forced to reduce their prices for equivalent products in order to remain competitive. In the end, higher-priced firms should be forced either to withdraw from the market or to sell at competitive prices, and the average price of the good or service being advertised should fall (unless, of course, the per unit cost of advertising is sufficiently large to offset this gain).

Over the past few years a number of studies have suggested that advertising reduces prices for the consumer. John Cady studied the retail prescription drug industry, Alex Maurizi and Thom Kelly studied the effects of posting retail gasoline prices, and Lee and Alexandra Benham analyzed the retail eyeglass industry. While some of these studies have, inevitably, been subject to criticism, all nevertheless indicate that market-wide prices fall in the presence of advertising.

A. Prescription Drug Price Advertising

Cady collected price data on ten prescription drugs from a national sample of over 1,900 pharmacies for the year 1970.[1] States were

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[1] John Cady, Restricted Advertising and Competition: The Case of Retail Drugs, Washington, D.C.: American Enterprise Institute, March 1976; John Cady, "An Estimate of the Price Effects of Restrictions on Drug Price Advertising," Economic Inquiry (December 1976).

classified as "regulated" if they had at least one of the following restrictions: controls on the use of outdoor signs, prohibitions on promotional schemes, prohibitions on advertising of prices, and prohibitions on advertising that implied a policy of discount drug pricing. States were classified as "unregulated" when none of the foregoing restrictions was in effect. Cady found that drug prices were over 5 percent higher in regulated states than they were in the unregulated states. In addition, the lower prices prevailing in unregulated states were accompanied by the same level of credit, delivery, and prescription waiting-area services, as well as a higher level of emergency services.[1] Cady estimated that the benefits from removing advertising restrictions in the prescription drug industry may amount to $380 million per year.

B. Retail Gasoline

Alex Maurizi and Thom Kelly analyzed the effects of price posting in the retail gasoline industry.[2] Price data were taken where price posting was allowed--six California and seven other western urban areas; prices were also taken where price posting was not allowed--four geographical areas comprising the New York City metropolitan region.[3] Less than 10 percent of the service stations in the New York area posted prices in 1970 as compared with more than 90 percent in the Los Angeles area.

Because there are a number of variables other than price posting that will affect the retail price of gasoline, Maurizi and Kelly attempted to control for the effects upon price of variables such as average family income, wholesale gasoline prices, brand name, the intensity of price posting, gasoline taxes, and whether or not stations gave out trading stamps. The results of their analysis indicate that the simple act of posting prices reduces prices by 1 cent per gallon for regular-leaded and 0.8 cents per gallon for premium. As the number of stations in the market increase their posting of prices, the prices of regular and premium are reduced. A 50 percent increase in the number of stations posting prices on regular gasoline resultes in a reduction in the average price of gasoline of 0.3 cents per gallon. The

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1 The index of prescription prices was $3.83 in regulated states and $3.64 in unregulated states and the difference was significant at the 1 percent level. It should be noted that Cady classified states according to legal statutes and regulations. It is possible for advertising to occur even though there is a statute or law against it and vice versa.

2 Alex Maurizi and Thom Kelly, Prices and Consumer Information: The Benefits from Posting Retail Gasoline Price, American Enterprise Institute, Washington, D.C., 1978.

3 Data on prices of both unleaded regular and premium gasoline were based on a survey by Lundberg, a firm that collects information on the retail gasoline industry throughout the United States. Data on gasoline prices were based on a sample size of approximately 15,500 service stations that sold both types of gasoline in 1970. The Lundberg data include information on whether gasoline prices are posted on a large sign visible to passing motorists.

same percent increase in posting of premium prices resulted in a decline in price of 0.6 cents per gallon. The study concludes that in 1975 universal price posting throughout the nation would have resulted in net gains to consumers of at least $525 million, and possibly as much as $813 million.

C. Eyeglass Industry

In his 1972 study,[1] Lee Benham classified states as "restrictive" or "nonrestrictive" with regard to advertising of ophthalmic goods and services sold by ophthalmologists, optometrists, and opticians. The data on eyeglasses and eye examinations used in the study were obtained from a 1963 national survey of individuals.[2] The study has a sub-sample of 634 individuals who each underwent an eye examination or obtained a pair of eyeglasses in 1963. Two hundred ninety-one individuals in the survey reported only the total price of the combined eye examination and eyeglasses. Benham claimed that there was little variation in examination prices across states and that prices for examinations and eyeglasses were not highly correlated; therefore, any differences in total prices were attributable solely to differences in the price of eyeglasses.[3] The average price of eyeglasses in the restrictive states was $33.04 versus $26.34 in the nonrestrictive states.

In the 1975 study, Lee and Alexandra Benham used a larger sample, 1,625 individuals, taken from a health interview survey conducted in 1970 by the National Opinion Research Center and the Center for Health Administration Studies of the University of Chicago. The study attempted to determine the effect of professional control, including restraints on the flow of commercial information, on the prices of optical services offered. Three measures of professional control were used: (1) The place the eyeglasses were purchased, that is, from a restrictive or nonrestrictive state (this measure was essentially the same one used in the 1972 study); (2) An index of optometrists who were members of the American Optometric Association (AOA): Since AOA and the state affiliates discourage commercial advertising, the researchers assumed that the larger the percentage of optometrists who are members of the AOA, the smaller the number of advertising optometrists in the state; therefore, the less commercial advertising there would be. (3) The market share of large chain optical firms in the states where the eyeglasses

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1 See Lee Benham, "The Effects of Advertising on the Price of Eyeglasses," Journal of Law and Economics, Volume 15(2) (October 1972, and Lee and Alexandra Benham, "Regulating Through the Professions: A Perspective on Information Control," Journal of Law and Economics, Volume 18(2) (October 1975). For comments on the Benham studies see "The Advertising of Ophthalmic Goods and Services: An Economic and Statistical Review of Selected FTC and Related Documents:" Report to American Optometric Association, Southern Research Institute, Birmingham, Alabama (June 25, 1976).

2 See Ronald Anderson and Odin W. Anderson, A Decade of Health Services: Social Survey Trends in Use and Expenditure (1967).

3 Benham (1972), p. 341.

were purchased. In states where commercial firms had large market shares, the researchers expected to find more information flow and weaker control by the professional organizations.

All three variables used to measure professional control had a significant effect on price. Eyeglass prices in restrictive states are approximately $8.46 higher than nonrestrictive states.[1] As the proportion of eyeglasses purchased from commercial firms increased from 0 to 70 percent, the price of eyeglasses decreased $11.71. Finally, as membership in the AOA increased from 43 to 91 percent, the price of eyeglasses increased approximately $12.18. Other results imply that in nonrestrictive states, people purchased more eyeglasses, and presumably, more eye examinations, compared to people in restrictive states. While no data are available on the quality of the glasses and examinations in the Benhams' study, some individuals in the nonrestrictive states were receiving more eye care in the form of eyeglasses than the population in restrictive states.

2. Effects of Advertising and Commercial Practice on Professional Services

With the possible exception of the Benham studies, the empirical analyses of the effects of advertising on prices involve a market for a good rather than a service. Such studies assume that consumers know what commodity they want and that consumers purchase the commodity after shopping for the lowest-cost seller. For services in general and professional services in particular, the situation may be considerably different for several reasons.

Consumers are often unable to determine their precise needs for professional assistance and must rely on a professional for an initial assessment of services required. Professionals generally offer both the diagnosis and treatment, and consumers typically obtain both from the same individual. In principle, this is cost-efficient for both parties. Treatment generally requires some diagnosis or analysis by the same provider, and separation of these tasks would often entail duplicative efforts by practitioners as well as multiple-shopping ventures by customers. Hence, practitioners often provide both the diagnosis and the treatment. Joint provision, however, gives professionals greater opportunity to sell more services than are necessary to treat a problem.

Additional problems arise because, even when consumers know exactly what services are required, they often lack the expertise to evaluate the adequacy of the services rendered. Professional services are often intangible, complex, and difficult for the layperson to assess. Many professional services deal with low-probability or long-latency events, as in tests for various

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[1] It should be noted that the Benhams' study assumes that there is no difference in the quality of glasses between restrictive and nonrestrictive states. The proponents of restrictions claim that the quality of the examination and resulting eyeglasses will be higher in the absence of advertising.

diseases in medical examinations; informational feedbacks are so slow as to be virtually useless. Many professional services are purchased infrequently, and hence neither one's own nor others' experiences are likely to be sufficiently current and numerous to improve matters greatly. Under these circumstances, professionals may also find it easier to sell lower quality services than the informed consumer would prefer.

One way to reduce the amount of low quality care is to restrict entry into the professions to those who can demonstrate that they are able to provide high quality care. Thus professional licensing boards require potential entrants to demonstrate, either through schooling or examination or both, that they have the necessary knowledge to provide quality services. Licensing, however, is a necessary but not a sufficient condition for high quality care. Even highly skilled professionals may choose to produce low quality care, and many professionals argue that advertising will allow such sellers to reach a substantial pool of potential customers. Because consumers find it difficult to evaluate quality, advertising professionals may be able to offer services at lower prices but then substitute low for high quality care. It is argued that such competition will force high quality professionals to lower their prices and quality of care in order to "meet competition." Thus advertising will produce a lowering of quality throughout the market. According to this theory, those professionals who do not want to lower their standards of quality will be driven out of the market because consumers will gravitate to the lower-priced professionals.[1]

The professional associations also argue that if large commercial firms or department stores are permitted to hire professionals, the latter may be forced to lower quality and offer excessive service. If large chain optical firms could also hire paraprofessionals to assist the optometrists, have more than one branch outlet, and use brand name identification in their advertising, they will completely dominate the market and drive out higher-quality, higher-priced professionals. Professional associations often believe that the presence of advertising and commercial practice leads to the destruction of the traditional doctor-patient or lawyer-client relation and, in general, reduces the image of professionalism in these occupations. The commercialization of the professions is seen as adding pressures to provide unnecessary services as well as causing the deterioration of quality.

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[1] Perhaps this was best stated by an optometrist in a letter to the Federal Trade Commission (FTC): from Francis A. Murdy, O.S., Secretary, Massachusetts Board of Registration in Optometry, October 13, 1975, (FTC Document 215-52-1-2-1, "Ophthalmic Goods and Services Staff Report and Opthalmic Industry Profile,' January 15, 1976).

> If price advertising is permitted many registered optometrists will be forced to provide lower quality materials and lower quality services in order to meet low prices advertised by the marginal practitioner. The advertising commercialist in order to make a profit on his low prices will necessarily depend on inferior materials and a high volume operation.

The argument that advertising and commercial practice generally reduce the quality of professional services is based on the belief that consumers cannot judge quality of care. One counterargument to the professional's view is that consumers may have a reasonably clear understanding of many, if not most, services they desire to purchase.[1] In the case of optometry, some consumers may wish to replace their eyeglasses more frequently than they desire complete examinations. Therefore, if the seller of eyeglasses offers an examination designed primarily to determine if there has been a change in their prescription, consumers would find it more convenient to purchase the examination at the same time. Of course, such consumers may also periodically purchase a more thorough eye examination from an optometrist or a physician.

If this is a reasonable assessment of how consumers might behave, it indicates that market forces would tend to produce various levels of quality. Not all consumers require the most complete services in every instance. It may also be expected that the price of a professional service might reflect the quality provided.

3. Regulation of the Professions

The professional organizations and the state boards and commissions that regulate professions often impose extensive controls over business conduct. Physicians, dentists, veterinarians, optometrists, and lawyers, among others, are closely regulated in most states. The regulations specify who may sell the services, how firms may be organized, and what types of information the professionals may give to the public through advertising.

Professional codes of ethics or state laws often (1) prohibit advertising, (2) limit trade name identification, (3) restrict the ownership of professional corporations to licensed members of that profession (for example, large retail corporations may not hire or offer professional services to the public), (4) restrict the number of paraprofessionals and restrict their functions to those under the supervision of a licensed professional, (5) restrict the number of establishments or outlets that a professional can operate under one license, (6) restrict the location of professional outlets to noncommercial environments, and finally, (7) restrict the use of franchise arrangements.

For the purpose of analysis, most regulatory policies can be divided into two categories: (1) restrictions on the production of information and (2) restrictions on technology that may affect modes and costs of providing the services. Restrictions on the production of information primarily take the form of prohibitions on the use of price and nonprice advertising and on the

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[1] Despite their complex nature in general, virtually all professions offer some relatively standardized services. Attorneys write simple wills; veterinarians neuter pets; dentists clean teeth; physicians conduct routine laboratory tests.

use of trade names. Until a recent Supreme Court decision,[1] all forms of advertising by most professionals had been prohibited by state laws, regulations, or codes of ethics. In many instances, price or nonprice advertising was deemed to be "unprofessional" or "unethical" conduct for which licenses to practice might be suspended or revoked. Typically, the restrictions on advertising included prohibitions against the offering of credit; display of signs; and advertising in newspapers, radio, or television. Also prohibited were advertised claims of superior service or advertised announcements of credentials or professional awards.

Many believe these restrictions have the effect of reducing competitive conduct between sellers and raising the cost of professional services. But advertising prohibitions coupled with restrictions on ownership and restrictions on the use of paraprofessionals may affect the price of services in another way. Economies in the production of professional services may be obtained if the ownership of professional firms by nonprofessional corporations is permitted. Larger commercial corporations may have management skills and access to capital not available to professionals. With multiple branch locations within a metropolitan area or state, the mass media can be used effectively to advertise and obtain the volume of customers necessary for production economies to be realized. Mass media advertising itself may be subject to economies of scale. And such firms may operate at scales that permit them to obtain quantity discounts in purchase of materials and supplies.

Since little variation exists between states with regard to the regulation of professions, there is a void in the literature concerning the relation between the quality of services rendered and restrictions upon advertising and commerical practice. If the quality of service is the same, the empirical evidence that does exist on price can be applied. But the deterioration of quality is the essence of the professions' argument against advertising and commercial practice. Hence, this study was designed to determine whether or not differences in price and quality are associated with the presence or absence of advertising and commercial practice. The profession upon which the study is focused is optometry, one of the few licensed professions in which nontrivial examples of advertising could be found. The regulations governing the optometry profession are, in many ways, similar to those governing other professions. However, the findings may or may not be generalized to other professions.

4. Regulation of Optometry Practice

Optometrists are licensed in each of the 50 states and the District of Columbia. The state licensing statutes define the functions of the optometric profession and limit the performance of these functions to licensed persons. The state licensing laws set out the requirements that must be met by an applicant in order to obtain a license; the state licensing laws provide for the establishment of a board to perform the regulatory functions. The

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[1] Bates v. State Bar of Arizona, 433 U.S. 350 (1977).

licensing boards in all 50 states and the District of Columbia are dominated by licensed optometrists. The boards in 37 states are composed entirely of licensed optometrists.[1]

The functions of the board can be divided into two categories: licensure of qualified practitioners and regulation of business conduct. The boards establish minimum standards for licensing by defining educational requirements for entry and by accrediting optometry schools. They also can design and administer the licensing examination as well as determine the continuing education required to maintain a license. Regulating the business conduct of optometrists often includes restrictions on advertising and commercial practice. Prior to the recent Supreme Court ruling[2] and the promulgation of the FTC trade regulation rule overturning advertising prohibitions,[3] many states severely restricted price advertising by optometrists and opticians. The May 1977 FTC Staff Report indicated that 25 states prohibited the use of any form of advertising by optometrists except the announcement of a new practice or a change of address.[4]

Thirty-seven states explicitly banned opticians' price advertising, either by statute or regulation. The restrictions took the form of conduct defined as "unprofessional" or "unethical," and violation could result in fines or loss of license. Often when advertising was allowed, only the advertising of eyeglass frame prices was permitted. When the FTC Staff Report was published, five states and the District of Columbia formally allowed unrestricted price advertising by optometrists: Arizona, California, Colorado, District of Columbia, Iowa, and Maryland. All other states had some form of restrictions on advertising by optometrists, opticians, or both.[5]

Along with advertising prohibitions, optometry statutes and regulations often impose substantial restrictions on business practices. States also prohibit the employment of optometrists by laypersons or firms. These

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1 Bureau of Consumer Protection, FTC, Ophthalmic Goods and Services, Staff Report to the FTC and Proposed Trade Regulation Rule, January 1976; FTC, Report of the Presiding Officer on Proposed Trade Regulation Rule Regarding Advertising of Ophthalmic Goods and Services, December 10, 1976.

2 Bates.

3 The FTC eyeglass rule has two basic provisions. First, it requires eye doctors to release a copy of the eyeglass prescription to consumers immediately after an eye examination. Second, the rule prohibits public or private burdens or limitations on the advertising of eye examinations, opthalmic goods and services. In a February 6, 1980 decision, however, the United States Court of Appeals suspended the second provision of the rule and remanded it to the FTC for reconsideration.

4 See Ophthalmic Goods and Services, p. 64.

5 Ibid., p. 46.

restrictions are designed to prevent optometrists from working for the large retail optical firms, thus preventing eyeglass retailers from giving eye examinations to their customers. According to the 1977 FTC Staff Report,[1] 27 states prohibit optometrists from practicing in mercantile locations such as large chain department stores. Eighteen states limit the number of branch offices an optometrist can operate—usually to one outlet other than the original location. Thirty-nine states prohibit the use of brand name identification by optometrists (such as "Economy Optical").[2]

5. Optometry as a Profession

Optometrists occupy a prominent place in the provision of eye care. Optometrists perform eye examinations both to test visual acuity and to detect diseases of the eye; they also prescribe lenses, other optical aids, and visual training when appropriate. In some states optometrists can use certain approved topical diagnostic drugs (eye drops) to (1) dilate the patient's pupil to aid in viewing the eye's internal surfaces; (2) anesthetize the cornea for tonometry (glaucoma detection); and (3) relax muscles for some forms of vision testing. However, generally optometrists cannot treat eye diseases or perform surgery.[3] Ophthalmologists perform many of the same functions as optometrists, but as medical doctors, they can also diagnose and treat eye diseases and perform surgery. Opticians fill prescriptions developed by optometrists or ophthalmologists, sell and fit eyeglasses, and, in some states, contact lenses. Most optometrists also fit and sell eyeglasses, but ophthalmologists do so much less frequently.

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[1] Ibid., p. 64.

[2] The present experiment discovered substantial discrepancies between actual practice and state laws and regulations in various cities examined. For further discussion, see Chapter 2.

[3] In a few states the statutory definition of optometry may be somewhat broader. For example, the North Carolina statute (N.C. G.S. 90-114) defines the practice of optometry as any one, or any combination, of the following practices:

> (1) The examination of the human eye by any method, other than surgery, to diagnose, to treat, or to refer for consultation or treatment any abnormal condition of the human eye and its adnexa; or
>
> (2) The employment of instruments, devices, pharmaceutical agents and procedures, other than surgery, intended for the purposes of investigating, examining, treating, diagnosing or correcting visual defects or abnormal conditions of the human eye or its adnexa; or

(Continued)

In order to practice optometry, an individual must have graduated from one of the 13 schools of optometry in the United States. Admission to a school of optometry requires at least two years of prior college study.[1] The optometry curriculum leads to the degree of Doctor of Optometry (O.D.), although seven schools have a graduate program leading to a Master of Science degree as well, and six have programs leading to a Ph.D in physiological optics. Students of optometry take courses in optics, anatomy, and pharmacology; they are trained to deal with vision problems and to recognize eye diseases. Optometry students devote a substantial amount of time in the fourth year of training working in clinics where experience is gained in contact lenses, low vision, children's vision, and vision therapy.

Toward the end of the second, third, and fourth years of the optometry curriculums, almost all students take comprehensive written examinations administered by the National Board of Examiners in Optometry. A total of 19.5 test hours result. Candidates are examined in the following areas: visual science; ocular anatomy; theoretical optics; ophthalmic optics; theory and practice of optometry; ocular pathology; ocular pharmacology; and social, economic, legal, ethical, and professional aspects of optometry. Candidates are passed or failed based upon these scores; many state optometry boards accept the passing of the National Boards in lieu of state written examinations. Before a final license is given, all states still require a practical clinical examination and a few require serving an internship.

6. Studies of the Effects of Advertising and Commercial Practice in Optometry

Because advertising and commercial practice have been rare in the professions, scarcely any studies of their effects have been conducted. As pointed out in Part I (p. 2), the one distinguishing characteristic of optometry versus the other professions is the variability between states with

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Footnote 3 continued from previous page.

> (3) The prescribing and application of lenses, devices containing lenses, prisms, contact lenses, orthoptics, vision training, pharmaceutical agents, and prosthetic devices to correct, relieve, or treat defects or abnormal conditions of the human eye or its adnexa.
>
> Provided, however, in using or prescribing pharmaceutical agents, other than topical pharmaceutical agents within the definition hereinabove set out which are used for the purpose of examining the eye, the optometrist so using or prescribing shall communicate and collaborate with a physician duly licensed to practice medicine in North Carolina designated or agreed to by the patient, (1909, c. 444, s. 1; C.S., s. 6687; 1923, c. 42, s. 1; 1977, c. 482, s. 1.)

[1] According to a recent survey published by the Association of Schools and Colleges of Optometry, 70 percent of first year students in the 1978-79 academic year completed four years or more of college.

regard to restraints on advertising and commercial practice.[1] Because of this, empirical evidence on the impact of regulatory constraints can be gathered.

One study of the optometry profession, by James W. Begun,[2] attempted to measure the effects of professional restrictions on prices and quality through indirect means. Begun mailed questionnaires to 2,238 optometrists selected from a national directory of all optometrists in the United States. From that sample, 1,195 usable questionnaires were returned. The study questioned optometrists concerning the prices they charged for examinations, the length of time they devoted to eye examinations, the kinds of tests performed, and the measure of quality, that is, the inputs that optometrists declared they used in routine eye examinations.

Begun found that examination prices were substantially higher in states with professional restrictions on advertising and among optometrists considered more "professional." Examination prices, as reported by optometrists, appeared to be approximately 20 percent higher among those in the American Optometric Association (AOA) who did not advertise and among those who spent more time on the examination. The longer the examination, the higher was the price. Optometrists with high AOA involvement spent, on average, 5 minutes more on the examination, performed more tests, and had more equipment available for use than did those who had low or little involvement with the AOA. In addition, Begun found that when quality was held constant across states, examination prices were still higher in states with more professional control.[3]

Using the data from the earlier Begun study, a study by Begun and Feldman[4] found that there were no significant price differences on examinations of a given quality between states that allow price advertising of both optometric services (examinations) and eyeglasses and states that ban only price advertising on examinations. However, Begun and Feldman found that predicted prices were significantly higher in states where there were bans on both optometrists' and opticians' price advertising of examinations and eyeglasses.[5]

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1 This is, in part, because optometry is not a very old profession and has had rising standards over recent years, though substantial state-to-state differences have persisted.

2 James W. Begun, Professionalism and the Public Interest: Price and Quality in Optometry, (Ph.D. dissertation, University of North Carolina, 1977).

3 Begun, p. 79.

4 James W. Begun and Roger Feldman, "The Effects of Advertising: Lessons from Optometry," Journal of Human Resources, XIII. Supplement 1978 (National Bureau of Economic Research Conference on The Economics of Physician and Patient Behavior.)

5 Ibid., p. 260, Table 6.

CHAPTER 2

EXPERIMENTAL METHOD

The present study uses data collected by actually purchasing eye examinations and eyeglasses. Purchases were made in cities where advertising was present and in cities where it was absent. Data were also collected from optometrists practicing in large chain optical firms in cities where they are allowed to exist.

This chapter provides a detailed discussion of the methodology underlying the experiment. The discussion is divided into six parts: (1) classifying markets, (2) selecting markets, (3) sampling, (4) subject selection, (5) subject training, and (6) field procedures.

Classifying Markets

Markets were first classified by the type of advertising observed for eyeglasses and eye examinations. Markets were further distinguished by the presence or absence of large chain optical firms, which offer eye examinations. Whether or not commercial optometry is expressly banned or prohibited, stringent restrictions upon advertising appear to discourage entry by large chain optical firms. The following five major markets were observed:

(1) Markets where essentially no mass media advertising of eyeglasses or eye examinations was found; no large chain firms found; (2) Markets where only nonprice advertising on eyeglasses found; no large chain firms found; (3) Markets where only nonprice advertising on eyeglasses; large chain firms found; (4) Markets where both eyeglasses and eye examinations were advertised, but where the advertisements did not refer to price; large chain firms found; (5) Markets where eyeglasses were price advertised, but advertising of eye examinations was limited to nonprice forms;[1] large chain firms found.

Selecting Markets for the Survey

It was decided that the survey should be conducted in markets representative of as large a population as possible. Major Standard Metropolitan Statistical Areas (SMSAs) within each state that could be classified as Markets 1 - 4 were identified. Initial attention was focused upon SMSAs with a population of 200,000 or greater (as of July 1, 1974) because 200,000 was believed to be the approximate size from which a satisfactory sample of optometrists could be drawn. Based on the use of the Yellow Pages, SMSAs covering 103 cities in 33 states were selected for an initial screening.

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[1] This limitation is more the result of actual practice than experimental design. In the entire study, in any city, at any time, only one advertisement containing an advertised price for an eye examination was found.

The Yellow Pages for major cities and suburbs within an SMSA were used to define the survey markets and to ascertain the following information:

(1) The number of optometrists in the market area.

(2) The presence or absence of large chain firms.

(3) The presence or absence of advertising optometrists other than those working with large chain firms.

Some SMSAs were rejected as potential survey candidates because of their limited number of optometrists. For example, 24 of the SMSAs had fewer than 20 optometrists, making it difficult to conduct a sizable survey in these markets.

Based upon the above criteria, if an SMSA appeared to be a likely candidate for inclusion in the survey, newspapers were scanned to obtain additional information on the types of advertising permitted on eyeglasses and eye examinations. The 1977 Ayer Directory of Publications was used to identify major daily newspapers in 53 cities in 25 states. The newspapers were scanned over a period of several months for indications of price and nonprice advertising on eyeglasses and eye examinations. The newspaper searches generally began in May 1977 and continued through December 3, 1977. Newspaper scanning within a particular SMSA was discontinued if several advertisements did not indicate one of the four markets required for the survey. Through a process of elimination, 12 SMSA markets were selected.

The identification and classification of SMSAs can be found in Table 2-1. The most restrictive category contains the SMSAs (of Knoxville, Little Rock, and Providence) where no media advertising or large chain optical firms were found. The next most restrictive category is similar to the first except nonprice advertising of eyeglasses was observed in newspapers or Yellow Pages in Columbia, SC and Milwaukee, WI. At the other extreme, the least restrictive categories contain SMSAs where nonprice and price advertising of glasses, nonprice advertising of eye examinations, and large chain firms were found. Within these least restrictive categories, data were collected on four types of optometric practices: (1) Nonadvertising optometrists (2) window-advertising optometrists; (3) small, mass media advertising optometrists; and (4) large chain optical firms employing optometrists. The other SMSAs with chain firms are similar to the least restrictive categories except for differences in the type of advertising observed in the media in those SMSAs.

Classification and Sampling

Three sampling lists of optometrists were developed for each SMSA. The lists consisted of (1) practitioners in large chain advertising firms; (2) other advertising practitioners; and (3) all other practitioners, a category

TABLE 2-1

Classification of SMSAs Where Data Were Collected by Type of Advertising Observed on Eyeglasses and Eye Examinations and by the Presence or Absence of Large Chain Optical Firms

SMSAs	Type of Advertising Observed on		Chain Firms Observed
	Eyeglasses	Eye Examination	
Knoxville, TN	None	None	No
Little Rock, AR	None	None	No
Providence, RI	None	None	No
Columbia, SC	Nonprice	None	No
Greensboro-Highpoint-Winston Salem, NC	Nonprice	None	No
Milwaukee, WI	Nonprice	None	Yes
Columbus, OH	Nonprice	Nonprice	Yes
Portland, OR	Nonprice	Nonprice	Yes
Baltimore, MD	Price	Nonprice	Yes
Minneapolis-St. Paul, MN	Price	Nonprice	Yes
Seattle, WA	Price	Nonprice	Yes
Washington, DC	Price	Nonprice	Yes

Source: Bureau of Economics, FTC.

that would include nonadvertisers as well as on-site advertisers.[1] On-site advertising practitioners could not be identified from the Yellow Pages, and subjects were given instructions on how to distinguish an on-site advertising practitioner from a nonadvertising practitioner in the field.[2]

Some practitioners associated with large chain optical firms were identified from the Yellow Pages; others were identified by placing telephone calls to the various offices of large chain optical firms listed in the Yellow Pages.[3] If the firm did not offer eye examinations, it was not included in the sample. Using the Yellow Pages, other advertising optometrists were identified based on the remaining optometrists who advertised eyeglasses or eye examinations in boldface type or display advertisements. Some of these optometrists were affiliated with local optical firms that advertised. The addresses and telephone numbers of the local optical firms advertising eye examinations were crosschecked with the addresses and telephone numbers of listed optometrists. (Moreover, local optical firms that did not advertise eye examinations in the Yellow Pages were similarly crosschecked.) If the name of the optometrist could not be identified by using the Yellow Pages, a telephone call was placed to the local optical firm, and the name of the optometrist was ascertained.

All other practitioners were identified using the Yellow Pages. These practitioners included those optometrists who gave, in roman type, only such information as required to make an appointment: name of optometrist, address (of practice), and telephone number. Mention of "eye examination" and perfunctory directions was also considered acceptable.

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[1] In fact, a few optometrists did have either large signs or window displays; these optometrists were classified as on-site advertisers. Such optometrists were treated as a separate group throughout the analysis.

[2] Subsequent to the data collection, nonadvertising optometrists were also classified by whether or not they were members of the American Academy of Optometry, a selective and prestigious professional organization. Academy members constitute about 10 percent of all optometrists in the United States, and it was anticipated that they might offer examinations of significantly higher quality than other optometrists. Accordingly, there was concern that Academy members be properly represented in the sample. The data reveal that Academy members were slightly over and underrepresented in various cities. Corrections to ensure appropriate representation did not alter the overall results significantly.

[3] Large chain firms were identified by using a list of major retail optical firms supplied to the Federal Trade Commission (FTC) by a trade association.

To be certain that there were enough observations to make reliable estimates of average price and quality for each type of optometrist's eye examinations and eyeglasses, random samples for each SMSA were drawn from the three sampling lists described above rather than from a single list including all practitioners. The procedure was necessary because practitioners in large chain optical firms and practitioners in local optical firms were generally a small percentage of all practitioners. Hence, a simple random sample of all practitioners would have generated very few observations for advertisers.[1]

Subject Selection

Picking subjects who were representative of the population as a whole was considered ideal but not feasible for two reasons. First, the use of dissimilar subjects would have increased substantially the expected variation in the price and quality of eye examinations and eyeglasses. Uneconomically large samples would then have been required to determine if, on average, differences between advertisers and nonadvertisers exist. Second, it was impractical to use subjects with visual pathologies. Most individuals with active pathologies would already have been under treatment. Even if individuals with untreated active pathologies could have been found, such individuals could not have been asked to forego treatment until after the study was completed. Therefore, it was decided that groups of subjects of different ages and with different, but relatively routine, optometric needs would be utilized.

The Institute for Survey Research (ISR), a survey firm affiliated with Temple University, Philadelphia, Pa., screened over 100 trained and experienced survey interviewers for possible work on the FTC survey. Of this number, 24 were selected for further screening by FTC staff. The latter screening consisted of an interview with each candidate to ascertain related experience, any predisposition with respect to advertising, and indications of alertness and ability to recall. Next, each candidate was examined for eye pathologies by optometrists on the staff of the New York State University, College of Optometry (SUNY). On the basis of visual status and age, three groups were created: (1) Blurred, (2) 20/20, and (3) Binocular.

The Blurred group consisted of twelve visually healthy but myopic subjects, aged forty to fifty-one. Subjects went to appointments without wearing their glasses; hence the name "Blurred." The purpose of this approach was (1) to avoid giving the optometrist the correct prescription in the form of present glasses; (2) to test the optometrist's ability to derive the correct prescription; and (3) to measure the thoroughness of other parts of the eye examination.

The 20/20 group consisted of five subjects, aged twenty-six to thirty-six, who went to appointments with appropriate corrective lenses (i.e., eyeglasses that were appropriate for their visual acuity); hence the name "20/20."

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[1] Market-wide averages presented in Part I were calculated by weighting the various types of optometrists by their frequency in the population.

The purpose of this part of the experiment was to determine the extent of unnecessary prescribing of eyeglasses, although information on the thoroughness of examinations was obtained as well.

The Binocular group consisted of two subjects who presented a somewhat more difficult problem for fitting corrective lenses. They went to appointments wearing glasses that did not correct for their binocularity (double vision because of eye muscular problems); hence the name Binocular. These individuals tested different optometrists for their ability to detect and prescribe for binocularity, which is not uncommon but does require more attention than either the Blurred or the 20/20 subjects' problems. The Binocular group also collected information on the thoroughness of other parts of the examination.

Subject Training

Training for subjects took place on the campus of the State University of New York (SUNY), College of Optometry, New York, New York, from November 7-10, 1977. Reviewing and testing took place on November 11 at the Pennsylvania College of Optometry (PCO) in Philadelphia, Pennsylvania. The training was provided both to the subjects and to the Federal Trade Commission (FTC) staff members who served as field supervisors. The training, which lasted for four days, was designed by SUNY to teach subjects how to identify the components of an eye examination. Subjects were also trained to complete the debriefing sheets, nine-page questionnaires on which subjects recorded their observations following each eye examination in the field. Training focused upon the procedures and equipment used for tests included in complete eye examinations. The tests were grouped into the following four categories: (1) case history, (2) eye health examination, (3) vision test, and (4) case diagnosis.

On the first day of training at SUNY, subjects were acquainted with the eye examination--its purpose, its components (Categories 1-3 above), and many of the tests and procedures that might be performed. This was followed by a lecture on the history of the optometry profession and the significance of the FTC project. The second and third days were devoted to familiarizing the subjects with the various tests, procedures, and types of equipment used. This was done through lectures, slides, demonstration of examining equipment, and manuals that summarized each of the tests and procedures as well as including photographs of all known available examining equipment. On the fourth and final day of training, subjects were reviewed and tested for their ability to accurately observe, identify, recall, and record on sample debriefing sheets, each of the various tests and procedures. The debriefing sheets were graded by optometry staff at SUNY for omissions, inaccuracies, and errors due to either poor memory or to a lack of understanding of the test or procedure. This process served not only to identify those tests and procedures with which subjects seemed to have difficulty, but also to familiarize subjects with the content and location of items on the debriefing sheets.

The fifth day of training took place on the PCO campus. PCO's role in the training process was twofold. First, staff at PCO gave complete eye examinations to each of the subjects. This procedure was followed so that there would be two independent opinions regarding the corrective lenses each subject required for proper vision. Second, staff at PCO retested each of the subjects for their ability to observe and record the various tests and procedures. After testing at both SUNY and PCO, FTC staff were informed of the findings with regard to each subject. Both SUNY and PCO staff members indicated that they believed the interviewers were equipped to obtain eye examinations and to accurately record the tests, procedures, and equipment employed by an examining optometrist.

Field Procedures

A training manual prepared by FTC staff outlined, for each of the three groups of subjects, the purpose of the project and the role of each group of subjects in the study. The manual also contained instructions on (1) the style of frames to purchase; (2) interacting with optometrists in the field; (3) completing the debriefing sheets; (4) purchasing and picking up eyeglasses; (5) obtaining a copy of the prescription; (6) mailing glasses to the FTC; and (7) reacting to the use of drops for glaucoma testing and diagnostic drugs.[1]

Field procedures for the Blurred group differed slightly from those for the 20/20 and Binocular groups. As a result, field procedures will be discussed separately for the Blurred group and for the 20/20 and Binocular groups.

The Blurred Group: The Blurred group, in teams of two, three, or four subjects, went to survey cities with a list of randomly selected optometrists for each city. Upon arrival, subjects called the optometrists on their lists in an effort to get quick appointments. Since these subjects were to go to their examinations without eyeglasses, they told the optometrists that they had somehow misplaced their eyeglasses and needed an appointment within 2 or 3 days. The subjects added that since it had been about 5 years since their last examination, they wanted to have a complete eye examination and requested an appointment for one. If subjects were successful in making appointments within a 3-day period, they gave their name and listed their hotels as their addresses. If subjects were unable to obtain an appointment with the optometrist, they called the next optometrist on their list.[2] The lists were

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[1] Subjects were advised not to submit to the use of diagnostic drugs that dilate the pupils or to the use of flourescein dye used in some tests for glaucoma. The use of such drugs would have been detectable during subsequent examinations. If optometrists attempted to test for glaucoma using the flourescein dye, subjects were instructed to object stating that they were allergic to the dye. The debriefing sheet was then marked as if tonometry had actually been performed.

[2] An early 1977 telephone survey of optometrists had already revealed that an overwhelming percentage of optometrists could be seen within 3 days. Statistical tests in Chapter 3 controlled for potential nonresponse bias.

sufficiently large in all cases so as to insure each subject a specific number of examinations.

During the course of each examination, the Blurred subjects were instructed to do the following:

(1) Again request a complete eye examination because it had been 5 years since the last one;

(2) Answer all case history questions to indicate no medical or eye health problems to assure obtaining a routine eye examination;

(3) Casually volunteer a symptom of loss of peripheral vision after the test for vision was completed: "I don't know whether it's related to vision, but I have noticed that I tend to bump into things a lot." The purpose of this part of the experiment was to offer the optometrist a symptom of something truly wrong, such as glaucoma, and to see how the optometrist would explore the problem. This part of the experiment failed (the scoring was correspondingly altered) because of the variation in the timing and manner with which subjects volunteered the symptom. Subjects thought the responses to this part of the experiment were unreliable because they had no way of knowing if the optometrist was reviewing (possibly mentally) their records for indications of related symptoms or if, from tests already performed, the optometrist could judge that no further tests were required.

(4) Purchase a particular unisex metal frame, if possible, in order to assure comparability of the resulting eyeglasses and to minimize cost variation.

(5) Request glass, as opposed to plastic, lenses;

(6) Request a bill that itemized examination, lenses, and frame;

(7) Subsequently call each optometrist whose eyeglasses could not be ready in three days, and explain that they (the subjects) had been called home and, therefore, could not pick up the glasses. Ask that the eyeglasses be mailed to their home addresses (which all subjects agreed to use).

(8) Upon receipt of eyeglasses, repackage and mail eyeglasses to the FTC.

The 20/20 and Binocular Groups: Appointments for subjects in the 20/20 and Binocular groups were made in the subjects' names 2 or 3 weeks in advance of the arrival of FTC personnel. The appointments were made requesting a routine eye examination with no symptoms or complaints with present lenses.

Subjects were informed that a crucial part of the 20/20 experiment was to determine the optometrist's recommendation concerning new lenses and that at the conclusion of the examination, some of them might be told they needed new eyeglasses. If the optometrist offered ambiguous comments on a new prescription, subjects were instructed to prod the optometrist for his or her professional recommendation as to whether or not the new lenses would make a real difference in vision. Subjects were made aware that prescribing is not an exact science; they were to note that the optometrist recommended new glasses only if the optometrist said the new prescription would make a real difference. The 20/20 subjects requested a copy of the prescription but were instructed not to purchase eyeglasses, saying that they would take care of the prescription later.

The Binocular subjects volunteered a symptom related to their binocularity, and the practitioners' recommendations for treatment (corrective lenses, eye exercises) were recorded on the debriefing sheets. Debriefing sheets were collected at the end of each day in the field by FTC supervisors and reviewed for completeness and consistency. Field work commenced immediately after training and continued from November 13, 1977 to December 9, 1977. Nineteen subjects of different ages and with different problems purchased 436 eye examinations and 231 pairs of eyeglasses in 12 SMSAs throughout the United States.[1]

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[1] See Appendix C for details concerning the sample size.

CHAPTER 3

Data Analysis

The data collected in this study reveal a complex and many-faceted picture of the consequences of advertising and commercial practice for optometric services; various positions commonly held on this issue have been clarified, modified, or disputed. The data analysis begins with the issue that has often comprised the entire content of such studies: the effect of advertising and commercial practice on price. While the conclusion apparently corroborates previous findings, the subsequent section on quality demonstrates an important relation between advertising and commercial practice and at least one dimension of the "quality" of the optometric service. These findings on the relation to quality, on the one hand and advertising and commercial practice on the other, suggest that the usual price analysis is too simplistic; attention must, instead, be paid to the joint price-quality effect.

It will be useful at this time to indicate the general framework for analysis of the data. Variations are used for particular questions, but price and quality data are generally arrayed into the matrix shown in Table 3-1. This arrangement permits testing for three separate causal factors previously discussed as central to the study:

(1) The kind of advertising existing in the SMSA. Price, nonprice, and no advertising are distinguished, as well as whether such advertising occurs for eyeglasses or eye examinations.

(2) The presence or absence of large chain optical firms that also provide eye examinations.

(3) The type of optometrist. Here nonadvertisers, on-site advertisers, advertising optometrists, and large chain firms are distinguished.

Full interactions between these factors lead to 16 cells from which observations were taken. As shown in Table 3-1 these are determined by four kinds of advertising, two possibilities with respect to chain firms (i.e., their presence or absence), and up to four types of optometrists. In addition to the foregoing, variables to control for additional influences are included in most of the statistical work that follows. For convenience of later exposition, these are listed in Table 3-2.

A. PRICE

Two sets of price data are analyzed--the total price of the examination and eyeglasses and the examination price separately. Each set has its own distinctive features (discussed below), but one common problem deserves immediate comment. Prices from different SMSAs reflect, in part, differences in the cost-of-living; this has nothing to do with the particular price patterns under study in this experiment. In order to control for this effect, some deflator is required to adjust the prices encountered in the twelve SMSAs

TABLE 3-1

Cells Where Observations Were Taken

Type of Advertising Observed		SMSA's without Chain Firms		SMSA's with Chain Firms			
		Type of Optometrist		Type of Optometrist			
						Media Advertisers	
Eyeglass Advertising	Eye Examination Advertising	Non-Advertisers	On-Site Advertisers	Non-Advertisers	On-Site Advertisers	Small Firms	Chain Firms
None	None	X	X	—	—	—	—
Nonprice	None	X	X	X	X	X	X
Nonprice	Nonprice	—	—	X	X	X	X
Price and Nonprice	Nonprice	—	—	X	X	X	X

Source: Bureau of Economics, FTC.

NOTE: "X" denotes cells where observations were taken.

TABLE 3-2

Definition of Independent Variables

ADS1:	no advertising of eyeglasses or examination; absence of large chain firms in market
ADS2:	nonprice advertising of eyeglasses; no advertising of examinations; absence of large chain firms
FIRMADS2:	nonprice advertising of glasses; no advertising of examinations; large chain firms in market
FIRMADS3:	nonprice advertising of both eyeglasses and examinations; large chain firms in market
FIRMADS4:	price advertising of eyeglasses; nonprice advertising of examinations; large chain firms in market
NONADV:	nonadvertisers; no large chain firms
ONSITE:	on-site advertisers; no large chain firms
NONADV(F):	nonadvertisers in markets with large chain firms
ONSITE(F):	on-site advertisers in markets with large chain firms
SMALL(F):	advertising optometrists (small local firms or sole advertisers)
CHAIN(F):	practitioners in large chain firms
YPC:	adjusted income per capita in the SMSA
CITODPC:	optometrists per capita in the SMSA
STODPC:	optometrists per capita in the state
CHPOP:	change in population in the SMSA
BI01-BI02:	dummy variables distinguishing subjects in the Binocular group (n=2)
TW01-TW05:	dummy variables distinguishing subjects in the 20/20 group (n=5)
BL01-BL12:	dummy variables distinguishing subjects in the Blurred group (n=12)

visited. Appendix A describes the procedures used to generate such deflators, and all subsequent references to "prices" mean adjusted prices.[1]

1. Total Price of Examination and Eyeglasses

Data on the total price of a package consisting of an eye examination and eyeglasses exist for 280 observations, excluding those where, for various reasons, eyeglasses were not obtained. The data are distributed among 16 cells depicted in Table 3-1. Not all 16 cells are separately identified in any of the statistical analyses which follow, however. The only cells distinguished are those that plausible a priori hypotheses predict may be different. In practice, this criterion implies the following:

(1) The type of optometrist is distinguished. One fundamental hypothesis is that nonadvertisers may behave differently with respect to price and quality than do chain firm practitioners. In addition, nonadvertisers who compete with chain firms are predicted to behave differently from nonadvertisers who do not compete with chain firms. The hypothesized difference is the result of pressures put on the entire market by large mass-media advertisers. So that the foregoing differences could be observed, six kinds of practitioners are distinguished in this study (see Table 3-2): nonadvertisers not competing with chain firms (NONADV) and competing with chain firms (NONADV(F)); on-site advertisers not competing with chain firms (ONSITE) and competing with chain firms (ONSITE(F)); small advertisers (SMALL(F)); and chain firm optometrists (CHAIN(F)). The latter two exist only in the presence of chain firms themselves. Because of the hypothesized complete interaction with types of optometrists, the chain firm variable becomes embedded in the present definitions and is not separately included. In the regression analysis that follows, all these variables are included as zero-one dummies except for NONADV, the omitted category.

(2) The type of advertising in the market is also distinguished, as shown by the four different categories in Table 3-1. These levels interact with the chain firm variable because the presence or absence of chain firms (with their hypothesized cost and advertising advantages) may alter the market outcome for a given level of advertising. In the present survey, for reasons already explained, there is only one advertising category in which markets both without and with chain firms were observed, namely, nonprice eyeglass advertising and no examination advertising. Those markets are denoted ADS2 and FIRMADS2, respectively. The markets without any advertising whatsoever are denoted ADS1, while those with greater amounts of advertising (and which also happen to have chain firms) are labeled FIRMADS3 and FIRMADS4.

Two additional points need to be made. First, among the dummy variables representing types of markets, one is redundant in regression analysis; ADSI

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[1] The price adjustment procedure is to divide raw prices by the calculated deflator. A number of parallel regressions were run to determine the difference due to this adjustment. In no instance did the qualitative results change at all, and the quantitative effect was minimal.

was therefore omitted. In addition, the chain firm variable has again been used interactively (this time with the level of advertising in the market). In a model specification with the six kinds of practitioners (which also include the above firms variable), one additional variable becomes redundant. For expository purposes, we generally omit FIRMADS4 and therefore the NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F) variables should be interpreted as those practitioners in the least restrictive market. This facilitates comparison of those with nonadvertisers in the most restrictive markets, the omitted category ADS1.

Second, the type of advertising and market is introduced only as an additive or shift variable in the relationships that follow. Complete interaction of market type with practitioner type is not specified since the basic hypothesis is that presence of advertising alters the behavior of all parts of the market symmetrically. Only if advertising changes nonadvertisers' price or quality in a way different from that of chain firms would such complete interaction be required.

Additional variables used throughout this analysis of price are as follows:

(1) The number of optometrists per capita in the SMSA. CITODPC is intended to measure the strength of price competition in the relevant market.

(2) Adjusted income per capita (YPC). The adjustment is identical to that used to deflate prices, and YPC should capture different demand conditions and resulting market prices in the twelve SMSAs.

(3) Subject dummies. Dummy variables to distinguish individual subjects were created to purge the data of any effects due to (1) the group to which the subject belonged, and hence possibly test procedures employed, and (2) any other influences specific to the individual, such as costliness of filling prescription. BI02, BL01 . . . BL12 are therefore included in this analysis without further comment or explanation, but merely to control for such possible effects.[1]

The results of the regression on total price appear in Table 3-3. The intercept term represents a particular subject (BI01) at a nonadvertising optometrist (NONADV) in nonadvertising SMSAs (ADS1).[2] All estimated coefficients are, therefore, comparisons to that set of conditions, and some other comparisons can be made only by summing two or more estimates. Thus the question of whether nonadvertisers charge less in the presence of price advertising and firms is answered by the large, negative, and significant

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1 As previously described, the 20/20 subjects did not purchase eyeglasses, and therefore their observations are not part of this particular data set.

2 The intercept term, however, does not represent the price to that individual in those circumstances since by itself it excludes the effect of the continuous variables.

TABLE 3-3

Regressions on Total Price
(standard errors in parentheses)

53.67		
1.95	(4.73)	ADS2
13.06	(4.20)	FIRMADS2
16.16	(3.02)	FIRMADS3
-4.00	(5.19)	ONSITE
-21.20	(4.19)	NONADV(F)
-15.79	(6.93)	ONSITE(F)
-31.07	(4.32)	SMALL(F)
-33.07	(4.56)	CHAIN(F)
-0.31	(0.06)	CITODPC
0.013	(0.003)	YPC
-5.38	(3.63)	BI02
1.69	(4.20)	BL01
8.13	(4.35)	BL02
3.77	(5.28)	BL03
-0.92	(5.81)	BL04
3.93	(4.28)	BL05
-18.51	(4.47)	BL06
-2.68	(4.09)	BL07
-16.14	(4.60)	BL08
6.73	(3.92)	BL09
2.35	(4.73)	BL10
-12.12	(4.39)	BL11
6.36	(3.89)	BL12

$R^2 = .52$
$F(23,256)=11.88$

NOTE: See text and Table 3-2 (p. 50) for definition of variables.

coefficient on NONADV(F), which reveals a price about $20 less than nonadvertisers in ADS1. The insignificant estimated coefficient on ADS2 can be interpreted to mean that no additional effect emerges for nonadvertisers merely from nonprice advertising of eyeglasses. Prices for nonadvertisers in FIRMADS2, however, must be calculated as the sum of the FIRMADS2 coefficient and the NONADV(F) coefficient since both are required to characterize those practitioners. Similarly, FIRMADS3 nonadvertisers are the simple sum of that coefficient and the NONADV(F) coefficient. While both are negative, statistical significance is achieved only under the FIRMADS2 conditions.[1] Nonadvertisers' prices are lowest, however, in the FIRMADS4 environment.

Whether the chain firms charge lower prices is also relevant possibly because of cost advantages.[2] The coefficient on CHAIN(F) demonstrates that chain firms actually charge $33 less than nonadvertisers in ADS1, but an additional hypothesis is that advertising and chain firms pull all prices, including those of nonadvertisers, down to the same level in markets where they operate. This can be tested by examining whether the coefficients on NONADV(F) and CHAIN(F) are identical. The appropriate t-test has a value of 4.75, indicating substantial significance to the difference between the two. While firms and price advertising do affect all prices, nonadvertisers' prices do not decline to the same low level.

Summary measures of market-wide price require combining the prices for each type of practitioner in proportion to their number in the market. Thus in the market denoted ADS1, on-site and nonadvertisers' prices, from the regression in Table 3-3, are weighted according to their presence in that market type,[3] yielding an average price of $94.46. A similar calculation over four types of optometrists in markets termed FIRMADS4 gives an average price for examination and eyeglasses of $70.72. Since ADS1 prices are significantly higher than each separate component of the FIRMADS4 average, ADS1 prices are also significantly higher than the combined (average) market price for FIRMADS4.

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1 The t-test for a significant difference from zero for the sum of the estimated coefficients on FIRMADS2 and NONADV(F) is 1.69; on FIRMADS3 and NONADV(F), t=1.21.

2 These cost advantages may stem from different inputs mixes (use of paraprofessionals), different technologies, or different costs for such things as eyeglasses. Volume discounts on eyeglass purchases at wholesale are readily apparent from price lists available to the trade. For example, the American Optical Liner frame sought in this study could be purchased at wholesale at $15.65 singly, $9.40 each if the buyer did the distributing. In addition a 10 percent discount was offered for orders of 200 or more and a 15 percent discount was offered for orders of 500 or more (December 1976).

3 The proportions were obtained from inspection of Yellow Page listings of optometrists, categorized by type of practice.

One final observation is in order. The optometrists-per-capita and income-per-capita variables are both significant and bear the expected signs. The less the density of practitioners and the higher is average income, the higher is the market-wide price. These variables help control for additional market influences and help insure that the effects of variables of primary interest in this study (for example, advertising) are properly distinguished.

2. Examination Prices

Examination prices were obtained under two different circumstances—when only an examination was purchased, as was the case for all the 20/20 group and many in the Binocular group, and when both an examination and eyeglasses were obtained and the separate prices were itemized, as with most in the Blurred group and the remaining subjects in the Binocular group. In the former case, the validity of the prices charged is not subject to dispute. In the latter, however, it is only the total price of the examination and eyeglasses package that is relevant to the optometrist; hence the itemization of charges is potentially quite arbitrary. Therefore, before these "apparent" examination prices (broken out of a total package price) can be used, an F-test[1] must be performed to determine if they differ systematically from the valid prices obtained for examinations only.

The model specification for examination prices differs slightly from that employed for total price. Specifically, ADS1 and ADS2 are not now distinguished since optometrists are not engaged in advertising in either place; both categories are therefore represented by the intercept term. Observe, however, that the FIRMADS2 variable is included since the employment of optometrists by firms that advertise eyeglasses may affect examination prices through commercial efforts to generate volume purchases of eyeglasses. In all other respects the regression specification follows that for total price. The results for all examination prices appear in column (a) of Table 3-4, for "apparent" examination prices in column (b), and for "real" examination prices in column (c). The F test on the reduction in error sum of squares in regressions (b) plus (c) versus that in regression (a) is $F(11,299)=2.34$, significant at over the .95 level. This result indicates that the examination prices noted on an itemized bill for eyeglasses and an examination differ from those charged when only an examination is purchased, and hence these data cannot be pooled.[2] The remaining discussion is, therefore, based on the regression in column (c), on prices known to constitute valid data.

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[1] The appropriate F-test is due to G. C. Chow, "Tests of Equality Between Subsets of Coefficients in Two Linear Regressions," Econometrica 28 (1960), pp. 591-605; and in a somewhat more general form, F. M. Fisher, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions: An Expository Note," Econometrica 38 (1970), pp. 361-66.

[2] Further regressions suggest that "real" examination prices are lower than those on itemized bills for the package. This result is consistent with the view that eyeglass prices—which are usually advertised—may be artifically lower when provided at the same time as examinations.

TABLE 3-4

Regressions on Examination Price
(standard errors in parentheses)

(a) All Prices		(b) "Apparent" Prices		(c) "Real" Prices	
29.79		26.32		29.75	
4.82 (1.98)	FIRMADS2	9.37 (2.66)	FIRMADS2	-2.57 (1.36)	NONADV(F)
5.86 (1.55)	FIRMADS3	9.47 (2.00)	FIRMADS3	-7.43 (2.46)	ONSITE(F)
-4.56 (5.58)	ONSITE	-2.43 (6.49)	ONSITE	-11.22 (1.50)	SMALL(F)
-7.81 (1.25)	NONADV(F)	-13.09 (2.03)	NONADV(F)	-12.06 (1.44)	CHAIN(F)
-5.81 (5.74)	ONSITE(F)	-12.63 (6.88)	ONSITE(F)	-0.10 (0.02)	CITODPC
-16.69 (1.34)	SMALL(F)	-21.90 (2.10)	SMALL(F)	0.07 (0.08)	YPC
-17.27 (1.35)	CHAIN(F)	-22.84 (2.21)	CHAIN(F)	-0.90 (2.53)	BI02
-0.16 (0.02)	CITODPC	-0.24 (0.03)	CITODPC	-0.82 (1.20)	TW01
0.24 (0.08)	YPC	0.50 (0.17)	YPC	-1.32 (1.29)	TW02
0.55 (1.64)	BI02	0.30 (2.28)	BI02	-0.42 (1.21)	TW03
-1.78 (1.29)	TW01	-2.94 (2.21)	BL01	0.50 (1.31)	TW04
-2.29 (1.44)	TW02	-5.18 (2.44)	BL02	-0.77 (1.48)	TW05
-1.33 (1.33)	TW03	-1.46 (2.52)	BL03	0.75 (4.19)	BL03
-0.96 (1.45)	TW04	-1.52 (3.27)	BL04	8.99 (4.19)	BL05
-2.11 (1.69)	TW05	1.61 (2.50)	BL05	-1.36 (4.17)	BL08
-0.49 (1.62)	BL01	-4.77 (3.39)	BL06		
-3.04 (1.86)	BL02	1.47 (2.32)	BL07		
-0.31 (1.93)	BL03	-5.09 (2.81)	BL08		
-1.04 (2.62)	BL04	5.97 (2.45)	BL09		
2.28 (1.92)	BL05	-2.45 (2.53)	BL10		
-2.36 (2.80)	BL06	-5.93 (2.54)	BL11		
1.70 (2.70)	BL07	4.46 (2.03)	BL12		
-3.31 (2.11)	BL08				
5.53 (1.91)	BL09				
-0.93 (2.01)	BL10				
-3.26 (2.00)	BL11				
3.69 (1.45)	BL12				
R^2 = .52		R^2= .54		R^2 = .58	
F(27,310) = 12.61		F(22,161) = 8.42		F(15,138) = 12.79	

NOTE: See text and Table 3-2 (p. 50) for definition of variables.

The limited number of observations on examinations-only and the restricted variety of places that were obtained yield a narrower set of conclusions than generated when examining total price data. Yet some of the same patterns emerge. All four kinds of practitioners charge significantly less for examinations in the least restrictive cell (indicated by the coefficients on NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F)). In addition, by comparing the coefficient estimates of large chain firms, CHAIN(F) and NONADV(F), respectively, it can be established that they charge less than nonadvertisers in the same market. The t-value derived from this comparison, 9.63, demonstrates that the $12.06 price difference for large firms is significantly different from the $2.57 difference found for nonadvertisers. The absence of observations in other kinds of markets precludes additional inferences, and the apparently artificial nature of packaged examination prices further precludes study of the other component of the package, namely, eyeglass prices.

3. Summary of Price Effects

The conventional predictions concerning the effects of advertising on price have been partially borne out in the analysis thus far. Total price and examination price appear to be lower, generally, in markets where large advertising firms compete and lower yet when the service is purchased from the advertisers themselves. Since these data represent classes of practitioners, the market-wide price effects will depend on the relative market shares of, for example, large chain firms and nonadvertisers. That is, if the former account for a relatively large fraction of total optometric examinations, the average prices in those markets will be considerably lower than where they are prohibited. A noteworthy result, however, is that the price declines are most evident in those markets represented by the FIRMADS4 variable, with price advertising of eyeglasses and nonprice advertising of examinations in the presence of large chain firms. SMSAs with various slightly weaker forms of advertising show substantially smaller impacts on price with sometimes lower levels of statistical significance. The possibly greater effect of price advertising raises interesting economic questions concerning the information content of nonprice advertising and is reflected in the distinction many states draw in regulating price and nonprice advertising of optometric goods and services.

Finally, these results reveal that prices of nonadvertisers' examinations in advertising markets (while lower than in other markets) remain above the larger chain firms' prices. Neither the presence of considerable advertising nor the commercial practices employed by the chain firms drive these prices to equality. Several explanations can be inferred, but one that will be explored is the possibly nonhomogeneous nature of the services provided by different types of optometrists.

B. QUALITY

The intrinsic nature of most professional services makes quality definitions and assessments very difficult. An eye examination performed by an optometrist typically begins with a medical and visual case history, proceeds to an examination of the health of the eye, a battery of vision performance tests and procedures (and a determination of any refractive errors), and concludes with the issuance of a prescription and, when needed, a new pair of

eyeglasses. While some aspects of this complete process—notably, the eyeglasses and the written prescription—are tangible, assessable commodities, the thoroughness of the eye examination clearly is not; the debate over the quality impact of advertising and commercial practice has often centered on this "pure-service" component. The present analysis will deal with all areas of a typical eye examination: (1) thoroughness of the eye examination; (2) accuracy of the prescriptions; (3) accuracy and workmanship of the eyeglasses; and (4) extent of unnecessary prescribing.

1. Thoroughness of the Eye Examination

The initial, and in many ways the most complex, part of an eye examination is the evaluation of the patient's general visual and ocular health status. This is performed through a battery of tests, questions, and procedures, ranging from well-known and easily-recognized tests, such as subjective refraction, to some more obscure tests, such as horizontal and vertical ductions. The purposes of these procedures are twofold: (1) to determine the reasons and required therapy for visual problems, and (2) to detect, at the earliest possible stage, signs of eye disease or injury or other systemic problems that might require medical attention. If a possible ocular disease or injury is detected in the course of an eye examination, the patient is ordinarily referred to an ophthalmologist for exact diagnosis and possible treatment.

In this experiment, subjects were thoroughly trained in the components of an optometric examination and filled out check-lists of the procedures performed in each examination they took. It should be noted that this measure of the thoroughness of the optometric examination does not preclude the possibility that some procedures, while apparently performed, were in fact not performed correctly. In one important instance—ophthalmoscopy—the subjects were instructed to record the time spent in the procedure, and not merely whether or not it was undertaken, in order to more nearly determine thoroughness. But in most instances, no additional information about the validity of the procedure could be obtained. Hence our definition of thoroughness measures apparent completeness of inputs (procedures) employed, and not directly the output, the ability of the practitioner to discover all relevant facts about the patient's eye condition.

The large number and variety of such procedures produced a nine-page debriefing sheet requiring over 90 responses of some kind from the subjects. The debriefing sheets were all read by FTC staff and by the study advisor, Dr. Kenneth Myers, Ph.D., O.D., Director of the Optometric Service, Department of Medicine and Surgery, U.S. Veterans Administration. Dr. Myers checked the debriefing sheets for completeness and accuracy, especially where the subjects had evidenced confusion. Only those additions and changes that were unambiguously indicated and agreed to by all parties were made. The raw data are unwieldly and cannot be analyzed separately here; therefore, the approach taken has been to synthesize the information from each observation in a fashion reflecting the varying importance of the numerous procedures and tests. The development of one of the indexes of overall thoroughness, the FTC Index, was coordinated by Dr. Myers, in consultation with the two professional

schools of optometry that aided in the study, namely, the School of Optometry of the State University of New York (SUNY) and the Pennsylvania College of Optometry (PCO). A second index was developed by the National Association of Optometrists and Opticians (NAOO), a group which is comprised of a high proportion of so-called "commercial practitioners." Three other groups, the American Optometric Association, the National Optometric Association, and the Association of Schools and Colleges of Optometry were also invited to submit scoring systems, but declined to do so. The two that were obtained were nevertheless believed to represent sufficiently distinct points of view[1] that the results of analyzing both indexes would be less subject to bias.

Both indexes were constructed in the same manner. Each test or procedure on the debriefing sheet was given a value (using a point system) proportional to its importance in the examination, in the consultants' view. For some tests or procedures, the values were made relative to the other tests or procedures that had been done, to reflect the complex, interactive nature of the optometric examination. In addition, for some responses, the point system differed between subjects in the Blurred group, the 20/20 group, and the Binocular group because some of the questions differed and because the relative importance of the questions might differ with different types of eye patients.[2] The final product of this point system was a single summary score, ranging from zero to 100, to be interpreted as the percentage of total possible points each practitioner received in giving the examination.[3] The score does not represent, however, the percentage of total tests performed since each test has been weighted by its relative importance in the judgments of the consultants. Nor is there a "passing score"; the numbers are designed only to illuminate differences between the thoroughness of practice, not absolute quality. It is interesting to observe that, despite some differences of opinion between the NAOO and the FTC consultants as to relative importance, in practice their two measures are highly correlated. In the experimental data base with over 400 observations, the two calculated measures of thoroughness have a simple correlation coefficient of .891, so large as to imply a strong convergence of opinion as to what constitutes a thorough eye examination.

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1 For example, the NAOO chose to exclude from the scoring that part of the debriefing sheet dealing with "Subject's Evaluation of Care" and to focus on the "more objective" portions.

2 Some minor adjustments in the point system became necessary as errors or misinterpretations were discovered. Every effort was made to remain faithful to the original intent of the design of the indexes. The questions and weights assigned on the debriefing sheets are listed in Appendix B.

3 Where subjects could not recall a specific procedure, they were instructed to record "Don't remember," and the points attached to that procedure were excluded from both the actual and maximum possible score.

The FTC Index and the NAOO Index are distributed among all 16 subcells in Table 3-1. For purposes of statistical analysis, the following factors should be noted: Since optometrists do not advertise in the market-type denoted ADS2, there are no distinctions between those observations and others in ADS1 which are relevant to the question of medical thoroughness. Thus, only FIRMADS2, FIRMADS3, and FIRMADS4 are distinguished, the last by specifying types of optometrists in the presence of chain optical firms (that is, NONADV(F), ONSITE(F), SMALL(F), CHAIN(F)). In addition, the regressions include dummy variables for each subject but one (see p. 51) and two other variables to control for additional influences. The number of optometrists per capita in the state (STODPC) is included as a crude measure of the stringency of state licensing standards; the hypothesized sign for STODPC against thoroughness is therefore negative. The change in population of the city (CHPOP) from 1970 to 1976 is employed to capture the probably different credentials of optometrists in growing versus declining SMSAs. More recently schooled and hence better trained optometrists would be attracted to the former; these optometrists would be likely to give more thorough examinations than optometrists in cities that had experienced little growth. STODPC and CHPOP, as well as the variables noted above as representing predicted causal factors, are designed to capture meaningful economic distinctions between the SMSAs in the experiment.

The results of the regression analysis on the FTC Index of thoroughness appear in column (a) of Table 3-5, the results for the NAOO's Index of thoroughness appear in column (b). One conclusion, which is immediately apparent, is that the results, overall and in detail, are very much alike. Despite possibly different professional perspectives and some real differences in weights assigned, the two indexes yield very similar conclusions when applied to actual examinations. On the variables of primary interest, it should be noted that the thoroughness of examinations by nonadvertisers in the least restrictive cities (the NONADV(F) variable) is substantially and significantly higher than that by nonadvertisers in the most restrictive SMSAs. By contrast, optometric examinations by small and large media advertisers all appear less thorough than nonadvertisers classified by ADS1 (the intercept term). Advertising optometrists (SMALL(F)) are also less thorough in one-tail significance tests in excess of 95 percent, while large chain firms' thoroughness is less at significance levels below 90 percent. Nonetheless, their coefficient estimates are not significantly different from each other; the t-test for equality in the FTC Index regression is 1.26, and in the NAOO Index regression, t=.90. These results suggest that large chain firms and local firms offer examinations of similar thoroughness. Other tests reveal, however, that these two kinds of firms behave differently from nonadvertisers in the same market; a test of the equality of the estimated coefficients on NONADV(F) and CHAIN(F) yields t=6.24 for the FTC Index and t=6.77 for the NAOO Index, with yet higher values from comparisons with SMALL(F). These results indicate substantial significant differences, a finding that will be discussed further below.

Intermediate levels of advertising are represented by the FIRMADS2 and FIRMADS3 variables in these regressions. Tests on the sum of the estimated

TABLE 3-5

Regressions on Thoroughness Indexes
(standard errors in parentheses)

a FTC Index			b NAOO Index			c FTC Index			d NAOO Index	
-62.59			-54.36			-19.49			- 4.17	
- .95	(5.60)	FIRMADS2	- .42	(5.01)	FIRMADS2	- 7.61	(7.90)	ONSITE	-12.75	(7.09) ONSITE
- 8.18	(5.52)	FIRMADS3	- 9.44	(4.94)	FIRMADS3	11.24	(2.70)	NONADV(F)	10.52	(2.42) NONADV(F)
- 7.21	(7.90)	ONSITE	-12.27	(7.07)	ONSITE	5.47	(8.47)	ONSITE(F)	7.29	(7.59) ONSITE(F)
14.18	(3.65)	NONADV(F)	13.79	(3.26)	NONADV(F)	-11.37	(2.97)	SMALL(F)	-10.20	(2.66) SMALL(F)
8.13	(8.78)	ONSITE(F)	10.22	(7.86)	ONSITE(F)	- 7.13	(3.13)	CHAIN(F)	- 7.33	(2.80) CHAIN(F)
- 8.06	(3.97)	SMALL(F)	- 6.49	(3.55)	SMALL(F)	0.04	(0.04)	STODPC	0.05	(0.03) STODPC
- 4.11	(4.01)	CHAIN(F)	- 3.96	(3.59)	CHAIN(F)	74.84	(37.05)	CHPOP	56.74	(33.22) CHPOP
0.09	(0.06)	STODPC	0.11	(0.05)	STODPC	- 3.98	(4.62)	BI02	2.29	(4.15) BI02
110.03	(43.32)	CHPOP	98.02	(38.75)	CHPOP	- 0.66	(4.38)	TW01	10.38	(3.93) TW01
- 3.98	(4.62)	BI02	2.29	(4.14)	BI02	- 8.93	(4.89)	TW02	- 5.34	(4.38) TW02
- .74	(4.38)	TW01	10.31	(3.92)	TW01	-10.11	(4.48)	TW03	- 5.24	(4.02) TW03
- 9.08	(4.88)	TW02	- 5.50	(4.37)	TW02	- 2.23	(4.90)	TW04	15.37	(4.40) TW04
-10.20	(4.48)	TW03	- 5.33	(4.01)	TW03	- 2.73	(5.74)	TW05	3.52	(5.15) TW05
- 2.26	(4.90)	TW04	15.33	(4.38)	TW04	1.18	(5.35)	BL01	8.60	(4.80) BL01
- 2.49	(5.74)	TW05	3.79	(5.14)	TW05	8.23	(5.56)	BL02	9.22	(4.98) BL02
1.42	(5.38)	BL01	8.81	(4.81)	BL01	- 1.91	(6.28)	BL03	5.51	(5.63) BL03
8.52	(5.59)	BL02	9.49	(5.00)	BL02	-15.03	(8.19)	BL04	-16.79	(7.35) BL04
.84	(6.59)	BL03	8.63	(5.89)	BL03	-10.78	(4.96)	BL05	6.24	(4.45) BL05
-14.62	(8.20)	BL04	-16.34	(7.33)	BL04	- 2.91	(5.12)	BL06	0.72	(4.59) BL06
- 8.74	(5.13)	BL05	8.62	(4.59)	BL05	5.92	(5.16)	BL07	3.61	(4.63) BL07
- 1.89	(5.63)	BL06	1.64	(5.03)	BL06	- 2.78	(5.39)	BL08	1.08	(4.84) BL08
5.49	(5.18)	BL07	3.16	(4.63)	BL07	- 7.24	(4.94)	BL09	- 0.55	(4.43) BL09
- 1.74	(5.72)	BL08	2.08	(5.12)	BL08	- 3.43	(5.37)	BL10	2.77	(4.82) BL10
- 7.01	(4.97)	BL09	- 0.22	(4.45)	BL09	-10.37	(5.19)	BL11	- 0.49	(4.65) BL11
- 1.61	(5.89)	BL10	4.65	(5.27)	BL10	- 3.79	(4.85)	BL12	- 1.51	(4.35) BL12
- 9.43	(5.54)	BL11	0.39	(4.96)	BL11					
- 3.49	(4.89)	BL12	- 1.07	(4.38)	BL12					
R^2=.24			R^2=.29			R^2=.24			R^2=.29	
F(27,406)=4.80			F(27,406)=6.29			F(25,408)=5.07			F(25,408)=6.58	

Note: See text and Table 3-2 (p. 50) for definition of variables.

coefficients on those variables plus NONADV(F) suggest that nonadvertisers in FIRMADS2 markets offer significantly more thorough eye examinations than non-advertisers in ADS1 and ADS2 (t=2.66 and t=3.01 for the FTC and NAOO Indexes, respectively) but that nonadvertisers' examinations in FIRMADS3 markets are more thorough only at lower significance levels (t=1.40 and t=1.13, respectively). This pattern is sufficient to reject the theoretical hypothesis that thoroughness in FIRMADS2 and FIRMADS3 markets is less than in ADS1 and ADS2 markets. These results are consistent with those previously noted for non-advertisers in the least restrictive cities; the results raise a question as to whether FIRMADS2, FIRMADS3, and FIRMADS4 markets are essentially the same in this respect. In columns (c) and (d) of Table 3-5, alternative regressions that pool observations for all those markets are reported. The four types of optometrists denoted by "(F)" now represent those practicing in all cities with large chain firms. A Chow test on the difference in regression sum of squares yields an F(2,406)=1.24 for the FTC Index regressions and F(2,406)=2.18 for the NAOO Index regressions. Since asymptotic F(2,N)=3.00 at 95 percent, we can conclude that only insignificant explanatory power is lost by not distinguishing FIRMADS2 and FIRMADS3 from FIRMADS4.[1]

As is evident, the same qualitative conclusions with respect to advertising and advertisers emerge in the regressions in columns (c) and (d). Among the other variables in all these results, STODPC fails to emerge as an important negative effect on thoroughness, a weak result but perhaps indicating the absence of general effects from state licensing stringency. And finally, CHPOP is significant and carries the expected positive sign in these regressions.

The finding that the presence of large chain firms is associated with more thorough examinations by nonadvertisers refutes the allegation by many optometrists that the presence of chain firms necessarily drives down the quality of service offered by all optometrists. The actual increase in quality of service, however, is a somewhat unexpected result requiring further explanation. Most likely, the non-advertisers in ADS1 and ADS2 markets are not the same kind of optometrists as those identified as nonadvertisers in FIRMADS2, FIRMADS3, and FIRMADS4. The difference in advertising permitted in the two cities, ADS1 and ADS2, forces all practitioners in these cities to refrain from advertising, but it does not prevent those who would give less thorough medical examinationss from doing just that. By contrast, in FIRMADS2, FIRMADS3, and FIRMADS4 markets, optometrists can not only select the degree of thoroughness they will provide, but also the form of their practice--nonadvertising, on-site advertising, affiliation with small, local firms or large chain firms. Particularly for those inclined to limit thoroughness, advertising (or affiliating with advertisers) has monetary advantages since it attracts customers. Hence some self-selection and some shifting occur in the SMSAs in FIRMADS2, FIRMADS3, and FIRMADS4 markets, but

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[1] Subsequent statistical work does not, in all cases, reveal the clear insignificance of these differences. But no pattern to, or rationale for, the few exceptional cases is evident, and this general conclusion is assumed to hold.

the distribution of thoroughness of practice (i.e., on the supply side) is not substantially different from that found in ADS1 and ADS2 markets.

This conclusion can be demonstrated by creating frequency distributions of the thoroughness of practice in selected aggregations of cells. For this purpose, ADS1 and ADS2 markets (already pooled in the regression) are contrasted to FIRMADS2, FIRMADS3, and FIRMADS4 taken jointly. First, the distribution by type of optometrist is obtained from the pooled sample. See Figures 3-1 and 3-2, for the FTC Index and the NAOO Index, respectively. Then, within the "restrictive" and "nonrestrictive" markets, the thoroughness scores of the types of optometrists are combined in proportion to their presence in those markets.[1] This procedure yields an overall distribution in each class of the market. Figures 3-3 and 3-4 display the market-wide distributions in restrictive and nonrestrictive SMSAs, for each of the two indexes. Clearly, the degree of restrictiveness does not radically alter the shape or position of the distribution of thoroughness of practice. The mean FTC Index in restrictive markets is 58.5 and is actually slightly higher, 61.6, in nonrestrictive markets. For the NAOO Index, the restrictive market mean is 61.0, compared to 63.7 in nonrestrictive markets. In both instances the argument that advertising and chain firms lower market quality can be rejected.

The above argument implies that the characterization of both NONADV and NONADV(F) as "nonadvertisers" misses some important, but unobservable, differences in the motivations and hence the thoroughness of these practitioners. Advertising or advertisers do not "drive out" good practice, as measured by examination thoroughness, but rather advertising seems to be a means by which practitioners differentiate themselves and signal the quality of the examination they are likely to offer.[2] This conclusion must be tempered by the fact that

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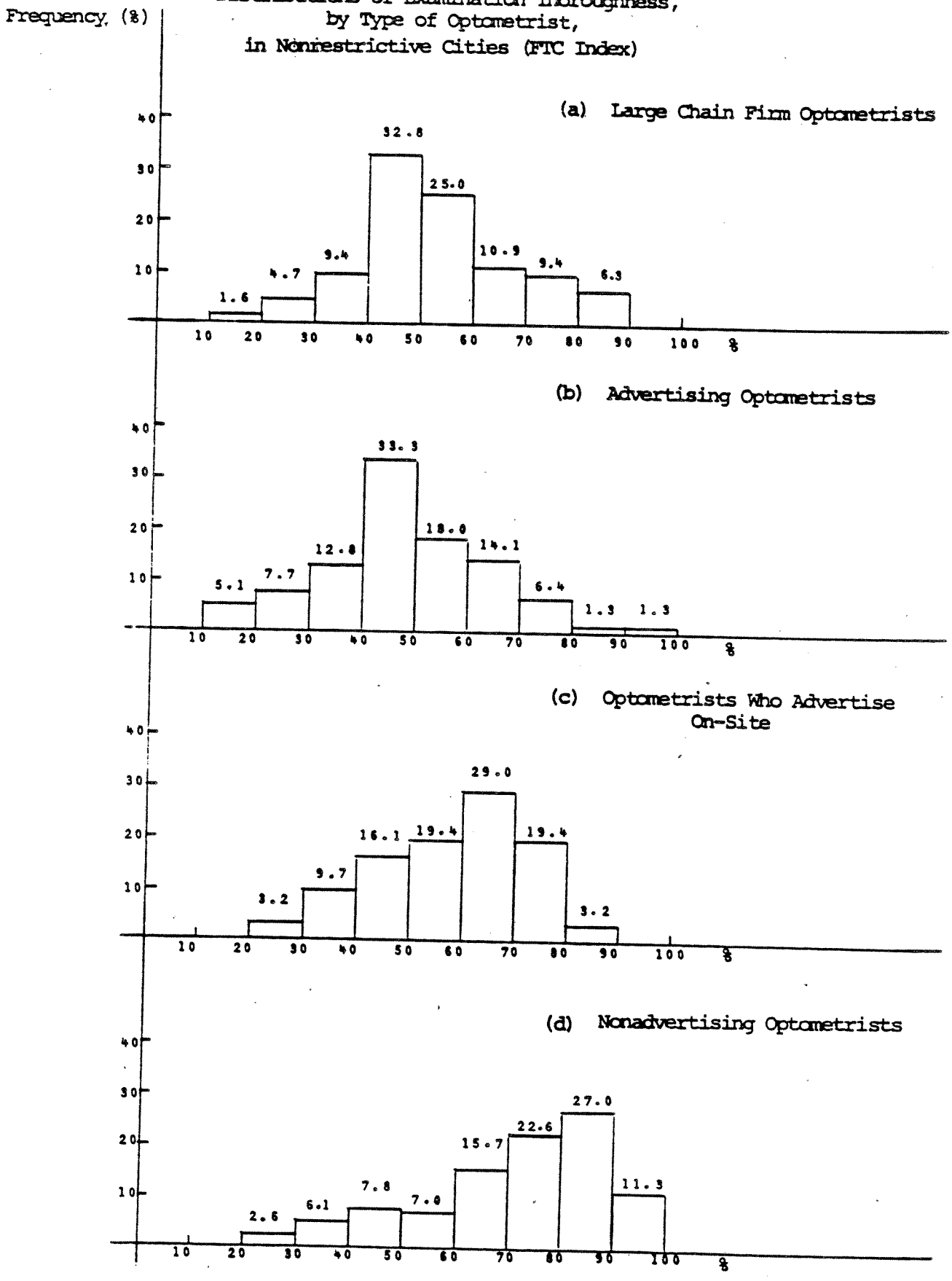
1 As in the case of price, these proportions are taken from Yellow Page listings of optometrists, categorized by type of practice.

2 The signaling here referred to resembles, but may not be identical with, that advanced by Michael Spence (Market Signaling: Information Transfer in Hiring and Related Processes, Cambridge, 1973). In Spence's view, a signal is an activity or device that has lower marginal cost to high quality providers and, hence, is an efficient information-transmitting mechanism. In the present case, "nonadvertising" appears to signal higher quality, but it is not clearly a lower cost form of practice to nonrestrictive optometrists.

An additional quality signal appears to be membership in the American Academy of Optometry. Tests performed to insure adequate representation of Academy members in the sample were extended to include an examination of the thoroughness of examinations given by Academy members versus other nonadvertisers (and various categories of advertisers). Academy members' examinations were significantly more thorough.

Figure 3-1

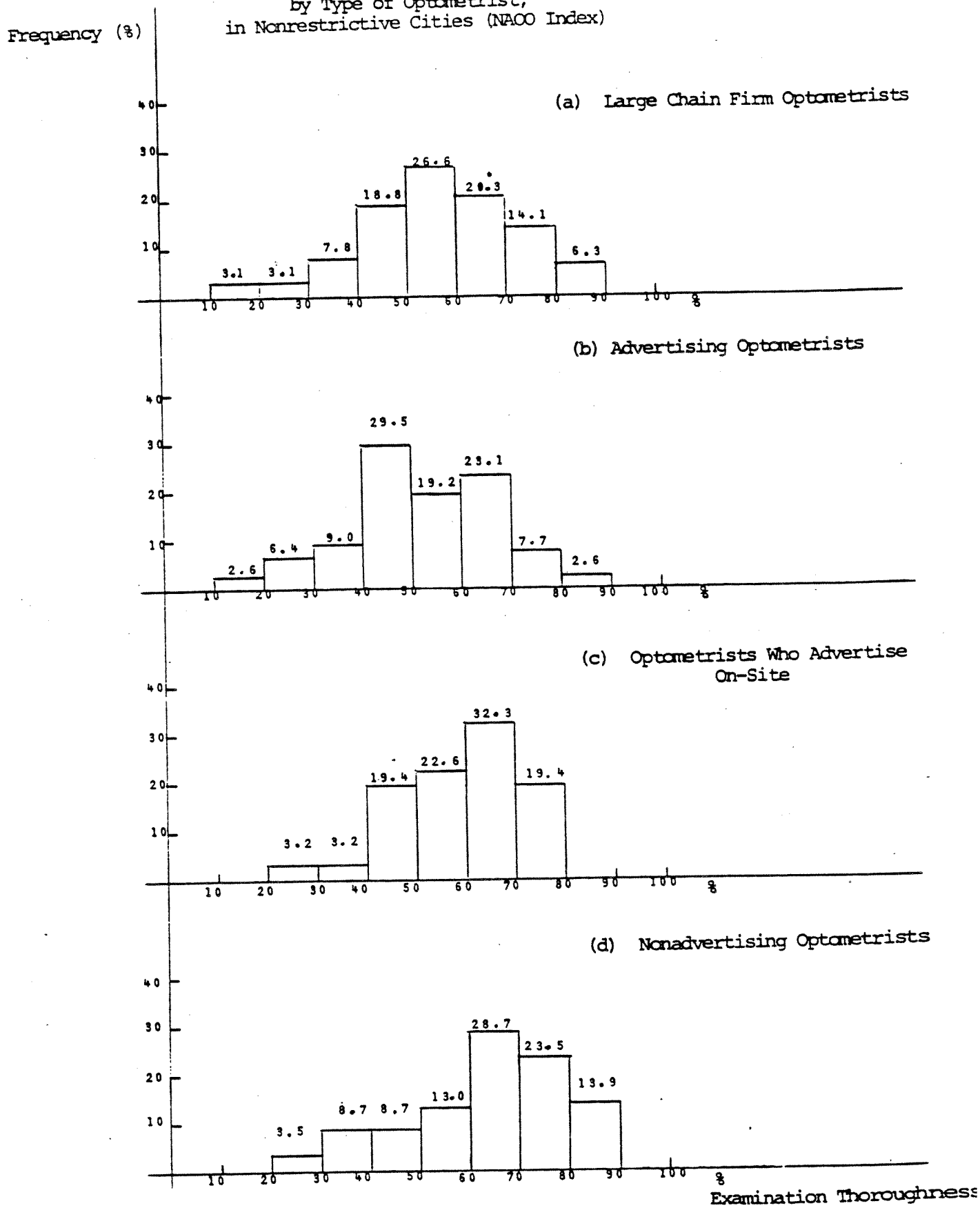
Distributions of Examination Thoroughness, by Type of Optometrist, in Nonrestrictive Cities (FTC Index)



Source: Bureau of Economics, FTC

Figure 3-2

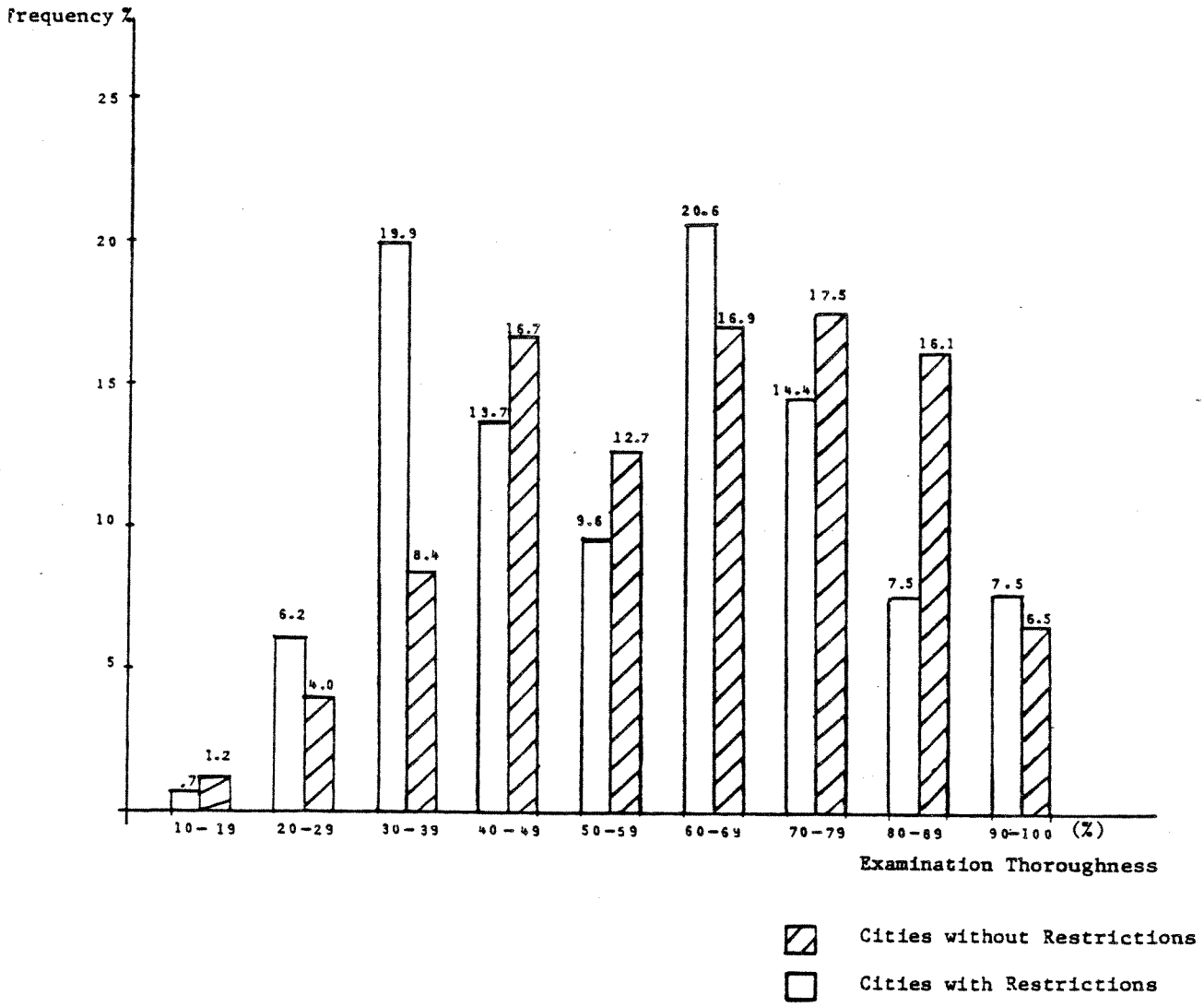
Distributions of Examination Thoroughness,
by Type of Optometrist,
in Nonrestrictive Cities (NAOO Index)



Source: Bureau of Economics, FTC

Figure 3-3

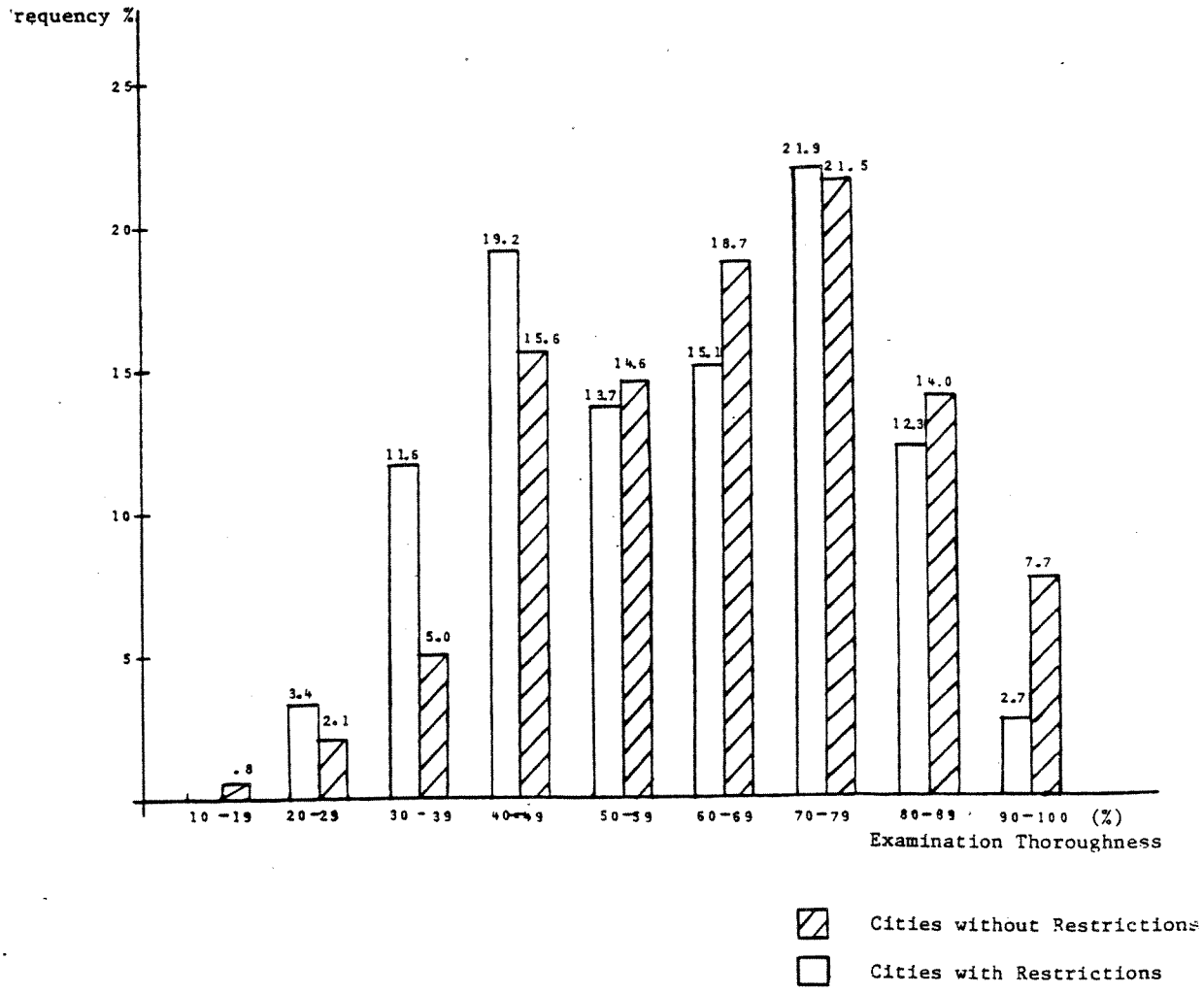
Distributions of Examination Thoroughness,
in Cities with and without Restrictions
(FTC Index)



Source: Bureau of Economics, FTC.

Figure 3-4

Distributions of Examination Thoroughness,
in Cities with and without Restrictions
(NAOO Index)



Source: Bureau of Economics, FTC.

substantial variation persists in all cells, so that thorough examinations can be obtained from chain firms, and very incomplete examinations can be found among nonadvertisers in FIRMADS4 markets.

One additional question concerning model specification must now be addressed. One part of the experiment was designed to present a sample of optometrists with a somewhat more difficult, but not altogether unusual, visual condition, namely a lack of binocular coordination between the eyes, tending to cause double vision. This problem can be corrected optically when properly diagnosed by means of a group of visual performance tests. A partly different debriefing sheet was prepared for the two subjects in the Binocular group; potentially, their thoroughness measures reflect optometrists' perfor-mances with respect to a somewhat more complex eye problem. Whether optometrists did perform differently can be tested by segregating the two Binocular subjects into a separate data set and, using an F test, determining if signi-ficantly greater explanatory power is achieved by splitting the sample. The decrease in error sum of squares from segregating the Binoculars yields $F(6,400)=.71$ for the FTC Index and $F(6,400)=.39$ for the NAOO Index. Since asymptotic $F(6,n)=2.10$ at 95 percent confidence level, it can be concluded that the relationship for the Binocular subjects is not very different from that for the other subjects.[1]

An alternative approach to the question of examination thoroughness is to analyze the most important components of an eye examination. The three major components are case history, the eye health examination, and the vision test, each of which comprises a section of the debriefing sheet used in the experiment. Measures of their thoroughness can therefore be calculated as continuous variables representing the percentage of total points (under either the FTC or NAOO scoring system) that each optometrist obtained. Then regression analysis is used to relate these scores to market and provider characteristics, as in previous sections. Further information can be obtained by examining specific important procedures. Under the eye health portion of the examination fall the following: (1) an internal examination of the eye with an ophthalmoscope; (2) test for glaucoma with a tonometer; and (3) examination of the cornea with the slit lamp. The vision test consists, primarily, of retinoscopy and subjective refraction. Variables constructed to represent whether or not the slit lamp, tonometer, or retinoscope instruments had been used during the examination were subjected to statistical analysis. Probit analysis was used for these dichotomous dependent variables.[2] Since

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[1] Some questions arose concerning the similarity of the two Binocular subjects' conditions and indeed whether one was a true Binocular. Analogous tests were performed separating out subjects who had a definite Binocular condition. Tests for a different empirical relation with these subjects still failed to find any, $F(6,400)=1.35$ for the FTC Index and $F(6,400)=.56$ for the NAOO Index, and the conclusion concerning Binocular subjects remains valid.

[2] See J. Tobin, "Estimation of Relationships for Limited Dependent Variables," Econometrica 26 (1958), pp. 24-36.

the subjective refraction was performed in every examination, no analysis of this variable was required. The ophthalmoscopy examination is represented by two variables: (1) a dichotomous dependent variable measuring whether or not the optometrist used the ophthalmoscope and held it sufficiently close to the eye and (2) a continuous variable derived by measuring the average time the optometrist spent examining the eye when holding the ophthalmoscope sufficiently close.

The results of the analysis displayed in Table 3-6 present a pattern similar to that observed in the analyses of the thoroughness indexes in Table 3-5.[1] For the major components of the examination, nonadvertising optometrists in nonrestrictive cities performed at significantly higher levels than all other optometrists, including nonadvertisers in restrictive cities. This is evidenced by the positive and significant coefficients on NONADV(F) in columns (a), (b) and (g) in Table 3-6. With regard to use of specific instruments, nonadvertisers in markets with large chain firms were more likely to examine the cornea with the slit lamp and spend more time examining the interior of the eye with the ophthalmoscope than nonadvertisers in restrictive cities or advertisers with local firms and large chain firms. Again, the coefficients on NONADV(F) in columns (d) and (e), Table 3-6, are positive and significant. The use of the tonometer, the retinoscope, and the performance of the subjective vision test, however, follow a different pattern. The percentage of optometrists using the tonometer does vary slightly by type of optometrist but none of the variation is statistically significant. Optometrists of all types in nonrestrictive markets performed retinoscopy with about the same frequency and significantly more frequently than nonadvertising optometrists in restrictive markets. The coefficient on NONADV(F) in column (h), Table 3-6, is positive and significant. The subjective refraction was given by all optometrists and hence there is no variation.

The probit estimates fail to convey the absolute magnitude of the frequencies involved. Slit lamp frequencies were low with 19 percent for NONADV, practitioners becoming 39 percent for NONADV(F) and only 9 percent for CHAIN(F) in FIRMADS4 markets. Retinoscopy was performed in 78 percent of NONADV examinations, but in over 90 percent of all cases in nonrestrictive markets, while tonometry ranged from 55 percent to 64 percent without any real pattern. As noted previously, subjective refraction was performed in all cases.[2]

In sum, nonadvertising optometrists in cities where advertising and large chain firms exist performed equally to or better than all other types of optometrists, including optometrists in cities where advertising and large chain firms did not exist. The results are similar to the findings with respect to the FTC and NAOO Indexes, for the entire examination.

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[1] These results are for the FTC Index version of scores on case history, eye health, and vision testing. NAOO scores gave essentially identical results and are not reported here.

[2] See Table 3, p. 12, for further detail on the frequencies with which these tests were performed.

TABLE 3-6

Regressions and Probit Analysis of Eye Examination Components
(standard errors in parentheses)

(a) Case History	(b) Eye Health	(c) Use of Ophthalmoscope When Close	(d) Average Time Ophthalmoscope When Close
- .912	- .541	-.194	-92.347
- .123 (.115) ONSITE	- .059 (.117) ONSITE	.106 (.715) ONSITE	- 7.430 (10.109) ONSITE
.058 (.039) NONADV(F)	.132 (.040) NONADV(F)	.458 (.245) NONADV(F)	7.540 (3.436) NONADV(F)
- .044 (.123) ONSITE(F)	.019 (.126) ONSITE(F)	-.319 (.756) ONSITE(F)	7.603 (10.815) ONSITE(F)
- .185 (.043) SMALL(F)	- .139 (.044) SMALL(F)	-.311 (.239) SMALL(F)	-5.192 (3.947) SMALL(F)
- .102 (.045) CHAIN(F)	- .085 (.046) CHAIN(F)	-.233 (.252) CHAIN(F)	-2.836 (4.224) CHAIN(F)
.000 (.001) STODPC	.000 (.001) STODPC	-.001 (.003) STODPC	.106 (.051) STODPC
1.324 (.537) CHPOP	1.066 (.549) CHPOP	1.448 (3.183) CHPOP	107.342 (47.121) CHPOP
.176 (.067) BI02	- .106 (.069) BI02	-.165 (.401) BI02	- 11.143 (5.828) BI02
.169 (.063) TW01	- .067 (.065) TW01	-.105 (.393) TW01	- 9.752 (5.411) TW01
- .034 (.071) TW02	- .224 (.072) TW02	-.618 (.400) TW02	-12.474 (6.401) TW02
.012 (.065) TW03	- .201 (.066) TW03	-.455 (.385) TW03	- 6.679 (5.690) TW03
.125 (.071) TW04	- .051 (.073) TW04	-.319 (.432) TW04	- 4.566 (6.109) TW04
.063 (.083) TW05	- .147 (.085) TW05	.352 (.598) TW05	-10.315 (6.919) TW05
.027 (.078) BL01	- .001 (.079) BL01	-.292 (.471) BL01	3.315 (6.630) BL01
.178 (.081) BL02	.182 (.082) BL02	.334 (.597) BL02	19.077 (6.689) BL02
.080 (.091) BL03	.003 (.093) BL03	.144 (.619) BL03	- 8.253 (7.832) BL03
- .204 (.119) BL04	- .182 (.121) BL04	-.999 (.630) BL04	- 4.991 (11.299) BL04
- .106 (.072) BL05	- .171 (.074) BL05	.105 (.467) BL05	-16.882 (6.084) BL05
.073 (.077) BL06	- .040 (.076) BL06	-.135 (.452) BL06	- 8.016 (6.323) BL06
- .005 (.075) BL07	.190 (.077) BL07	.612 (.555) BL07	19.283 (6.374) BL07
- .011 (.078) BL08	- .083 (.080) BL08	-.807 (.454) BL08	- 3.667 (7.502) BL08
- .074 (.072) BL09	- .077 (.073) BL09	-.583 (.404) BL09	-7.081 (6.655) BL09
- .058 (.078) BL10	.052 (.080) BL10	-.002 (.496) BL10	-1.781 (6.587) BL10
.007 (.075) BL11	- .133 (.077) BL11	-.664 (.419) BL11	3.800 (6.907) BL11
- .080 (.070) BL12	- .008 (.072) BL12	-.267 (.424) BL12	-7.739 (6.186) BL12
R^2 = .24	R^2 = .25		R^2 = .23
F(25,406) = 5.12	F(25,408) = 5.30	N = 431	F(25,328) = 3.83

NOTE: See text and table 3-2 (p. 50) for definition of variables.

TABLE 3-6 (continued)

(e) Slit Lamp	(f) Tonometry	(g) Vision Testing	(h) Retinoscopy
-4.150	.225	.229	6.448
- .121 (.686) ONSITE	-.887 (.559) ONSITE	-.167 (.070) ONSITE	- .707 (.645) ONSITE
.336 (.219) NONADV(F)	.151 (.191) NONADV(F)	.128 (.024) NONADV(F)	.625 (.256) NONADV(F)
- .211 (.746) ONSITE(F)	.918 (.605) ONSITE(F)	.171 (.075) ONSITE(F)	1.383 (.759) ONSITE(F)
-1.051 (.332) SMALL(F)	-.100 (.208) SMALL(F)	-.045 (.026) SMALL(F)	.464 (.273) SMALL(F)
- .734 (.330) CHAIN(F)	.254 (.224) CHAIN(F)	-.026 (.028) CHAIN(F)	.260 (.275) CHAIN(F)
.004 (.004) STODPC	-.007 (.003) STODPC	.001 (.000) STODPC	- .005 (.004) STODPC
2.601 (3.074) CHPOP	.516 (2.615) CHPOP	.361 (.330) CHPOP	-5.279(3.642) CHPOP
.164 (.428) BI02	-.498 (.326) BI02	.008 (.041) BI02	.558 (.422) BI02
.077 (.405) TW01	.070 (.309) TW01	-.016 (.039) TW01	.524 (.385) TW01
- .141 (.497) TW02	-.443 (.344) TW02	-.080 (.043) TW02	.028 (.398) TW02
.211 (.398) TW03	-.336 (.314) TW03	-.110 (.040) TW03	.060 (.359) TW03
- .242 (.491) TW04	-.112 (.346) TW04	.102 (.044) TW04	.887 (.564) TW04
.387 (.529) TW05	-.907 (.411) TW05	-.109 (.051) TW05	- .688 (.432) TW05
1.311 (.430) BL01	.257 (.377) BL01	.161 (.048) BL01	1.201 (.579) BL01
.888 (.444) BL02	.602 (.420) BL02	.041 (.049) BL02	.042 (.447) BL02
.345 (.536) BL03	.095 (.441) BL03	.027 (.056) BL03	.964 (.665) BL03
.797 (.658) BL04	-.431 (.572) BL04	-.172 (.073) BL04	- .247 (.680) BL04
.728 (.421) BL05	.136 (.347) BL05	.143 (.044) BL05	.591 (.449) BL05
.811 (.429) BL06	-.045 (.358) BL06	.047 (.046) BL06	.384 (.462) BL06
- .276 (.554) BL07	.975 (.415) BL07	.027 (.046) BL07	1.050 (.570) BL07
- .394 (.580) BL08	.397 (.395) BL08	.029 (.048) BL08	.087 (.470) BL08
.299 (.459) BL09	.299 (.345) BL09	.053 (.044) BL09	1.275 (.572) BL09
.509 (.459) BL10	.450 (.391) BL10	.027 (.048) BL10	1.024 (.567) BL10
.047 (.517) BL11	-.643 (.367) BL11	-.045 (.046) BL11	- .320 (.412) BL11
- .176 (.466) BL12	.602 (.354) BL12	-.008 (.043) BL12	.374 (.421) BL12
N = 432	N = 434	R^2 = .30 F(25,408) = 6.94	N = 426

2. Accuracy of the Prescriptions

During the course of the field examinations, subjects were instructed to obtain written prescriptions from the optometrists, whether or not new eyeglasses were recommended. Of the 434 total examinations, prescriptions were secured in all but 15 cases. For the purposes of this part of the analysis, 19 additional observations were deleted since they were obtained by two subjects who wore contact lenses. Prescriptions written for contact lens wearers are subject to substantial variation because of corneal adjustment; they are judged to be unreliable measures of optometric practice. The remaining data set consists of 400 observations for which usable prescriptions were obtained.

The written prescriptions were evaluated separately by SUNY and PCO. Each school compared the base line data (prepared for each subject during the training program) with these written prescriptions; prescriptions were then evaluated for the adequacy with which subjects' visual needs were met. Initially, it was hoped that some "objective" standard could be applied, i.e., that some acceptable margin around the base line prescription originally found most appropriate by the schools, could be identified. This methodology was abandoned when it became apparent that the mechanical application of the American National Standards Institute (ANSI) manufacturing standard (See p. 16), or any other such standard, could not be used to determine if a particular prescription was appropriate for an individual. This realization led to a consensus in favor of clinical judgment as to the appropriateness of the prescriptions.

Consultants at SUNY considered a prescription appropriate if it afforded a patient reasonable visual "clarity and comfort."[1] Of the 400 total observations, the schools' judgments coincided in 364 cases. In the remaining 36 instances, PCO approved 16 prescriptions that SUNY rejected, and SUNY approved 20 that PCO rejected. Reasons for failures were specifically noted, and discrepancies between the schools were examined. The latter resulted from two primary causes: (1) slightly different original assessments of the appropriate prescriptions by the two schools, in a few instances, and (2) clinical judgment itself, which necessarily yields occasionally different conclusions. Reconciliation of these differences was not judged likely to be feasible nor was it thought appropriate for experimental purposes; hence the separate views of the two schools have been preserved in the subsequent analysis.

Ultimately four variables were created to measure the accuracy of the prescription: whether or not the prescription (Rx) was approved by (a) PCO, (b) SUNY, (c) either school, or (d) both schools. These variables were related to the various hypothesized causal and control variables, a process again requiring probit analysis. The model employed here and throughout subsequent probits is one in which only two regulatory environments are distinguished. As before (see p. 60 above), ADS1 and ADS2 are taken together

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[1] Comfort had to be judged without consulting the patients themselves.

because optometrists do not advertise examinations in either market; the constant term therefore represents all markets without large chain firms. FIRMADS2, FIRMADS3, and FIRMADS4, in principle, can be distinguished by the varying kinds of advertising optometrists use; however, tests generally show that the effects of advertising differences are statistically indistinguishable.[1] Hence, the three types of markets with chain firms are pooled in this and all other probit analyses. As a practical matter, these latter markets are all represented by the set of practitioner variables interacted with "firms," i.e., NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F). The following other independent variables are also included: (1) NONADV (omitted and hence in the constant term) and ONSITE; (2) optometrists per capita in the state (STODPC) and change in population in the state (CHPOP); and (3) the subjects, in the set of dummy variables. These last variables should control for subject and group differences in the degree of difficulty in determining an appropriate prescription; thus, if the 20/20s or Binoculars presented special problems, the subject dummies will insure that the results on the other variables of interest are not confounded.

The econometric results appear in Table 3-7. The four columns represent probit analyses of RXPCO, RXSUNY, RXEITH, and RXBOTH, following (a)-(d) above. The results for all four measures show overwhelming consistency and are readily summarized. All practitioners in the presence of chain firms appear to offer improved accuracy of prescriptions (judging from the positive coefficients on NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F)), but none of the differences is statistically significant at conventional levels. The nature of the advertising-firm environment does not therefore cause lower frequencies of appropriate prescriptions for all optometrists, or even for those practicing in chain firms themselves. The percentage for RXEITH are representative:[2] 82 percent of prescriptions by NONADV (nonadvertisers in ADS1 and ADS2, i.e., without chain firms) were appropriate, while 88 percent of NONADV(F), 90 percent of SMALL(F), and 86 percent of CHAIN(F) practitioners' prescriptions were similarly appropriate. As previously noted, these differences are not statistically significant. The overall average was 85 percent. In addition, the absence of systematic and significant coefficient patterns for the Binocular or 20/20 subjects provides no support for the possibility that prescription accuracy might be lower for Binoculars, who had more difficult ocular needs, or higher for 20/20s, who went to their examinations with correct lenses.

3. Accuracy and Workmanship of the Eyeglasses

In most instances, the subjects obtained new eyeglasses in the course of their optometric examinations. All of the Blurred group were supposed to

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[1] See discussion and footnote, p. 62.

[2] These percentages and others reported below are obtained by predicting the corrected value of the probability for each type of practitioner or market. The corrections are for the "average" subject and average value of STODPC and CHPOP.

TABLE 3-7

Probit Analysis of Prescriptions
(standard errors in parentheses)

(a) RXPCO (N=400)		(b) RXSUNY (N=400)		(c) RXEITH (N=400)		(d) RXBOTH (N=400)	
-5.586		1.203		-2.708		-1.400	
-.237	(.64) ONSITE	-.383	(.64) ONSITE	-.530	(.64) ONSITE	-.125	(.64) ONSITE
.337	(.24) NONADV(F)	.346	(.23) NONADV(F)	.293	(.25) NONADV(F)	.374	(.22) NONADV(F)
.933	(.71) ONSITE(F)	.575	(.70) ONSITE(F)	.889	(.71) ONSITE(F)	.629	(.70) ONSITE(F)
.402	(.26) SMALL(F)	.389	(.26) SMALL(F)	.431	(.29) SMALL(F)	.368	(.25) SMALL(F)
.403	(.28) CHAIN(F)	.235	(.27) CHAIN(F)	.149	(.29) CHAIN(F)	.439	(.26) CHAIN(F)
.007	(.00) STODPC	.0003	(.00) STODPC	.003	(.00) STODPC	.004	(.00) STODPC
6.091	(3.52) CHPOP	.116	(3.25) CHPOP	3.674	(3.74) CHPOP	2.286	(3.08) CHPOP
-.595	(.46) BI02	-.333	(.47) BI02	-.363	(.48) BI02	-.562	(.46) BI02
-.876	(.42) TW01	-.759	(.42) TW01	-.784	(.42) TW01	-.855	(.42) TW01
-.179	(.51) TW02	-.153	(.51) TW02	.193	(.58) TW02	-.403	(.48) TW02
-.939	(.42) TW03	-.381	(.45) TW03	-.019	(.49) TW03	-1.103	(.41) TW03
-.312	(.52) TW04	-.343	(.52) TW04	-.362	(.52) TW04	-.297	(.52) TW04
-.719	(.51) TW05	-.531	(.54) TW05	-.478	(.54) TW05	-.767	(.51) TW05
-.600	(.51) BL01	-.466	(.51) BL01	-.601	(.51) BL01	-.475	(.50) BL01
-.343	(.54) BL02	-.253	(.53) BL02	.031	(.61) BL02	-.519	(.50) BL02
-.373	(.52) BL05	-.407	(.50) BL05	.022	(.59) BL05	-.687	(.48) BL05
-.881	(.47) BL06	-1.025	(.46) BL06	-.802	(.47) BL06	-1.093	(.46) BL06
-.937	(.48) BL07	-.770	(.48) BL07	-.809	(.48) BL07	-.891	(.47) BL07
-1.555	(.46) BL08	-1.421	(.46) BL08	-1.068	(.47) BL08	-1.922	(.47) BL08
-.256	(.53) BL09	.271	(.59) BL09	.208	(.60) BL09	-.204	(.52) BL09
-1.438	(.47) BL10	-1.520	(.46) BL10	-1.372	(.47) BL10	-1.579	(.46) BL10
-.617	(.48) BL11	-.525	(.49) BL11	-.492	(.49) BL11	-.659	(.48) BL11
-.797	(.46) BL12	-1.236	(.44) BL12	-.738	(.46) BL12	-1.319	(.44) BL12

Note: See text and Table 3-2 (p. 50) for definition of variables.

purchase eyeglasses, as were those Binoculars for whome new glasses were recommended. Seven observations were omitted because eyeglasses were lost in mailing or the optometrists referred subjects elsewhere for the filling of the prescriptions. In addition, the usable data on eyeglass accuracy exclude all observations in two SMSAs, where the experiment was discovered during or immediately after field work, plus a few in a third SMSA where one subject's activities may have been discovered. Since the eyeglasses were being prepared when discovery was made, fear of contaminating the data led to exclusion of these observations on eyeglasses in those cases. The resulting data base consists of 217 observations for accuracy and 224 for workmanship.[1]

The eyeglasses were evaluated against the written prescriptions (regardless of whether the prescriptions were appropriate or not for the subject) in two different ways: (1) The first was performed only by PCO and involved use of an automatic lensometer and mechanical application of the ANSI standards of tolerance. The former is a sophisticated instrument that automatically prints out the sphere, cylinder, axis, and prism of each lens of a pair of eyeglasses set into the machine. No repetition of this routine process was judged necessary. In each case, the print-outs were compared with the intended prescriptions, using the generally accepted tolerances for filling eyeglass prescriptions stated in the ANSI guidelines. The ANSI Z80.1 standards require spherical power to be within $\pm$.12 D for 0.00 D to 6.00 D spheres, $\pm$2 percent for 6.00 D to 12.00 D spheres, and $\pm$.25 D for spheres above 12.00 D; and axis to be within 5° for 0.12 D to 0.37 D cylinder power, 3° for cylinders of 0.50 D to 1.00 D, and 2° for cylinders of 1.12 D and up. In addition, for the eyeglasses to be judged accurate, decentration had to be within limits specified in the ANSI standards. Decentration measures the displacement of the optical centers of the eyeglasses, it should approximate the pupillary distance (distance between the subject's pupils) for correct vision.

Eyeglasses were considered accurate if they passed all these standards; otherwise, they were rejected. Only one measure exists since this particular evaluation involved no subjective judgment by the consultants. As before, the variable is dichotomous and requires probit analysis in order to determine the effects of the following variables: (1) advertising-firm environment, with ADS1 and ADS2 pooled in the constant term, and FIRMADS3 and FIRMADS4 pooled, as discussed above;[2] (2) the types of practitioners, ONSITE, NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F); (3) STODPC and CHPOP (4) subject dummies, in case there are subject or group characteristics which influence the accuracy of the prescription.

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[1] The difference arises because accuracy requires comparisons with the written prescriptions (as discussed below), which were not obtained in seven additional instances.

[2] See page 62 for discussion of pooling the markets with chain firms. In the data set the sole FIRMADS2 market had to be deleted because of the possibility of data contamination.

The results appear in Table 3-8. Again, the results fail to confirm that the presence of chain firms and advertising causes inaccurate filling of prescriptions. Indeed, the relevant coefficients, on NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F), are all positive, with some achieving or nearly achieving apparent statistical significance. Given no hypothesis that advertisers perform better, however, the results on SMALL(F) and CHAIN(F) are best interpreted as refuting the hypothesis that those practitioners provide inferior service. With respect to NONADV(F), the apparent better filling of prescriptions could be interpreted to mean that such nonadvertisers, in the presence of large chain firms, simply differ from all nonadvertisers in restrictive markets, much as in the case of thoroughness. However, the coefficient on NONADV(F) does fall short of conventional significance levels. It is also interesting to note that the absolute frequencies are not overwhelmingly high in any case. Nonadvertisers in ADS1 and ADS2 markets filled prescriptions accurately by the ANSI standards 50 percent of the time. In the presence of chain firms, nonadvertisers did so in 64 percent of the cases, small advertisers in 70 percent, and chain firms in 52 percent. The overall average was 57 percent.

(2) The second way in which the eyeglasses were evaluated was that PCO and SUNY each provided a clinical evaluation of accuracy. Both schools were asked to compare the written prescription to the lensometer reading for each pair of eyeglasses and to determine if the eyeglasses would be adequate for the patient. Four measures were obtained: GLASPCO representing PCO's judgment to pass the glasses: GLASSUNY representing SUNY's judgment; GLASEITH for eyeglasses judged accurate by either PCO or SUNY; and GLASBOTH for eyeglasses judged accurate by both PCO and SUNY.

Again, probit analysis was performed on all four measures of accuracy. The results are presented in Table 3-9. None of the variables of primary interest achieve statistical significance; this implies that there is no significant difference between restrictive and nonrestrictive SMSAs or between various kinds of optometrists in each SMSA concerning the frequency with which they accurately fill prescriptions. The results of the clinical analysis indicate that approximately 86 percent of the eyeglasses are judged adequate by either PCO or SUNY, in contrast to the 57 percent passing rate using the ANSI standards.

In addition to the accuracy of the lenses, eyeglasses may differ in the quality of the workmanship that is present in the product delivered to the customer. Eyeglasses were subjected to scrutiny by PCO and SUNY for various specific attributes defined as eyeglass workmanship. In particular, for workmanship to be acceptable, the lenses had to be free of significant imperfections, well-edged, and well-mounted in frames; the frames had to be free of significant imperfections as well.[1] While many or most of these possible

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[1] Although the subjects made every effort to obtain the same frame with each purchase, they were not always able to do so. Consequently, some degree of variation was introduced into the methodology.

TABLE 3-8

Probit Analysis of Eyeglasses Accuracy
(standard errors in parentheses)

N=217

-6.82		
-.236	(.64)	ONSITE
.436	(.29)	NONADV(F)
.658	(.71)	ONSITE(F)
.595	(.30)	SMALL(F)
.044	(.33)	CHAIN(F)
.002	(.004)	STODPC
5.822	(3.15)	CHPOP
1.624	(.54)	BI02
.495	(.52)	BL01
.527	(.54)	BL02
-.576	(.55)	BL03
.187	(.63)	BL04
.617	(.46)	BL05
.185	(.65)	BL06
1.243	(.48)	BL07
1.858	(.63)	BL08
.969	(.47)	BL09
.185	(.52)	BL10
.277	(.49)	BL11
.572	(.45)	BL12

NOTE: See text and Table 3-2 (p. 50) for definition of variables.

TABLE 3-9

Probit Analysis on Clinical Evaluation of Eyeglasses Accuracy
(standard errors in parentheses)

(a) ACGLASP		(b) ACGLASS		(c) ACGLASE		(d) ACGLASB	
-3.262		-8.408		-4.302		-7.597	
2.412	(8.147) ONSITE	2.034	(4.706) ONSITE	2.158	(8.576) ONSITE	2.562	(7.280) ONSITE
.099	(.396) NONADV(F)	.353	(.362) NONADV(F)	.124	(.398) NONADV(F)	.321	(.360) NONADV(F)
-2.426	(8.157) ONSITE(F)	-1.471	(4.729) ONSITE(F)	-1.918	(8.587) ONSITE(F)	-2.274	(7.292) ONSITE(F)
.279	(.440) SMALL(F)	.430	(.393) SMALL(F)	.502	(.464) SMALL(F)	.267	(.381) SMALL(F)
-.173	(.454) CHAIN(F)	.043	(.420) CHAIN(F)	-.156	(.462) CHAIN(F)	.028	(.414) CHAIN(F)
-.0006	(.006) STODPC	.001	(.006) STODPC	.003	(.006) STODPC	-.001	(.005) STODPC
3.541	(5.011) CHPOP	7.782	(4.354) CHPOP	4.204	(5.166) CHPOP	7.262	(4.263) CHPOP
3.554	(4.801) BI02	3.618	(2.699) BI02	3.581	(4.948) BI02	3.924	(4.243) BI02
3.315	(5.570) BL01	.842	(.580) BL01	3.360	(5.767) BL01	.828	(.582) BL01
.014	(.577) BL02	.400	(.562) BL02	.038	(.579) BL02	.374	(.561) BL02
.057	(.609) BL03	.306	(.583) BL03	-.00004	(.612) BL03	.338	(.583) BL03
3.299	(7.863) BL04	3.358	(4.465) BL04	3.414	(8.108) BL04	3.577	(6.996) BL04
3.405	(3.903) BL05	1.644	(.605) BL05	3.374	(4.004) BL05	1.687	(.601) BL05
.262	(.696) BL06	.548	(.662) BL06	.382	(.701) BL06	.444	(.659) BL06
.985	(.552) BL07	1.770	(.634) BL07	1.276	(.618) BL07	1.454	(.559) BL07
3.369	(5.444) BL08	3.610	(3.085) BL08	3.486	(5.622) BL08	3.811	(4.823) BL08
1.448	(.631) BL09	1.789	(.609) BL09	1.296	(.633) BL09	1.895	(.607) BL09
.409	(.634) BL10	- .072	(.553) BL10	.382	(.642) BL10	-.049	(.552) BL10
- .569	(.507) BL11	.260	(.502) BL11	-.148	(.512) BL11	-.147	(.496) BL11
.778	(.506) BL12	.795	(.479) BL12	.687	(.511) BL12	.858	(.477) BL12

Note: See text and Table 3-2 (p. 50) for definition of variables.

problems may not be caused by the dispensing optometrist, but rather by the laboratory from which the optometrist often purchases, it is generally agreed that the optometrist's responsibility extends to checking for such problems and rejecting eyeglasses with poor workmanship as well as inaccurate filling of the prescription.[1]

The judgment of the two schools with respect to workmanship coincided in 152 of 230 cases. In the remaining 78, PCO recommended approval in 18 cases that SUNY rejected, and SUNY approved 60 glasses that PCO would fail. Thus four criteria were developed--WORKPCO, WORKSUNY, WORKEITH, and WORKBOTH--to reflect the alternative views. As dichotomous variables, these required probit analysis to determine the effect of the same set of independent variables as previously described on page 52. The results appear in Table 3-10 for each of these alternatives. The absence of systematic negative signs on the coefficients on SMALL(F) or CHAIN(F) lead to rejection of the hypothesis that chain firms and advertising result in poorer workmanship. However, in two of the four probits, NONADV(F) has a positive and significant coefficient, as in the case of GLASANSI and thoroughness, suggesting that nonadvertisers in nonrestrictive markets may be different from nonadvertisers in restrictive markets. But once again, the remainder of the distribution does not emerge in the SMALL(F) and CHAIN(F) variables, and in two of the probits NONADV(F) fails to achieve statistical significance anyway.

The conclusion from this analysis is that, generally, no clear significant differences in the workmanship of eyeglasses can be found related to the degree of restrictiveness on advertising and commercial practice or the type of optometrist. This is reflected in the absolute percentages of eyeglasses judged adequate in workmanship. For nonadvertisers in ADS1 and ADS2, 81 percent were judged adquate. For NONADV(F), this was 94 percent (hence the possible statistical significance just discussed); for SMALL(F), 85 percent; and for CHAIN(F), 87 percent.

As a further check on these results, a continuous measure of accuracy and workmanship of the eyeglasses was constructed by Dr. Myers. This involved assigning weights to the constituent parts of the accuracy and workmanship variables, namely, sphere-cylinder-axis accuracy, decentration accuracy, adequacy of lenses, adequacy of edging and mounting, and adequacy of frames. Ordinary least squares regressions on the same independent variables confirm the insignificance of variables representing the type of optometrist and the restrictiveness of advertising and commercial practice.

4. Extent of Unnecessary Prescribing

An important ancillary issue concerns the frequency of unnecessary prescribing of eyeglasses by optometrists, as might occur because of their

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[1] It should also be noted that one other component of proper practice, fitting the glasses to the purchaser's face, could not be measured since the study methodology required mailing the glasses rather than in-person pick-ups.

TABLE 3-10

Probit Analysis of Eyeglasses Workmanship
(standard errors in parentheses)

(a) WRKGIASP		(b) WRKGIASS		(c) WRKGIASE		(d) WRKGIASB	
2.370		-1.588		.419		.513	
.455	(.665) ONSITE	2.480	(2.933) ONSITE	2.529	(5.552) ONSITE	.735	(.666) ONSITE
.533	(.252) NONADV(F)	.250	(.275) NONADV(F)	.706	(.345) NONADV(F)	.334	(.243) NONADV(F)
-.072	(.704) ONSITE(F)	-1.700	(2.952) ONSITE(F)	.246	(6.083) ONSITE(F)	-.422	(.702) ONSITE(F)
.187	(.251) SMALL(F)	.090	(.274) SMALL(F)	.165	(.304) SMALL(F)	.155	(.246) SMALL(F)
-.035	(.279) CHAIN(F)	.061	(.305) CHAIN(F)	.252	(.348) CHAIN(F)	-.137	(.278) CHAIN(F)
.004	(.003) STODPC	.002	(.003) STODPC	.005	(.004) STODPC	.003	(.003) STODPC
-2.553	(2.425) CHPOP	2.036	(2.669) CHPOP	-.020	(3.004) CHPOP	-.765	(2.370) CHPOP

Note: See text and Table 3-2 (p. 50) for definition of variables.

"agency" relationship to consumers,[1] that is, they not only diagnose but also act on behalf of the consumer, given the diagnosis, and hence have a possible economic incentive to provide biased initial information as to the consumer's needs. While most optometrists also sell eyeglasses, it is alleged that those affiliated with large chain optical firms are more likely to over-prescribe than those in traditional practice. The design of the 20/20 group of the experiment was to send subjects with correct lenses to various practitioners and to have them elicit the practitioners' recommendations with regard to new eyeglasses.[2] The dependent variable, RECOM, reflects whether the optometrist clearly recommended the purchase of new eyeglasses for improved vision. This variable captures two possible subject responses on the debriefing sheets, namely, if the optometrist recommended eyeglasses without hesitation, or, if on prodding, indicated that they would "make a real difference" and "be worth it." The independent variables in this probit analysis are identical to those employed previously, except the subjects are confined to 20/20s.

Identical probit analyses were conducted on two different data sets. The first consists of all usable observations in the 20/20 group, while the second is confined to those observations for which the written prescriptions are judged acceptable by both SUNY and FCO. The second data set is designed to focus attention on those cases where, by joint clinical judgment, no new eyeglasses were required. If the practitioner recommended eyeglasses in such a case, it would clearly not be because he or she had previously erred in ascertaining the subject's prescription. The first data set, by contrast, reveals the extent of unnecessary prescribing of eyeglasses for either reason--incorrect prescription or faulty recommendation.

The results, in Table 3-11, are essentially the same under either interpretation of unnecessary prescribing. There appears to be no greater probability of unnecessary prescribing in examinations given by chain firms or in the presence of different kinds of advertising. Indeed, the differences that do emerge tend to show lower frequency of over-prescribing by advertising firms, a result which is interpreted as rejecting the hypothesis that such firms unnecessarily prescribe more. The frequencies are 22 percent and 20 percent for all 20/20s and for those with correct prescriptions, respectively, without significant differences between cells.

5. Effects of (1) to (4) on Quality

The various effects of advertising and commercial practice on optometric quality constitute a complex picture. Different dimensions of quality appear to fall, stay constant, or even rise, a result scarcely predicted by

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1 See, for example, S. A. Ross, "The Economic Theory of Agency: The Principal's Problem," American Economic Review, May 1973, pp. 134-39.

2 Observations for one subject in two cities had to be omitted when it became apparent that her original lenses may not have been fully appropriate.

TABLE 3-11

Probit Analysis of Unnecessary Prescribing
(standard errors in parentheses)

(a) All 20/20's (N=123)			(b) Correct Rx's (N=92)		
24.520			32.227		
-1.081	(.906)	NONADV(F)	-1.487	(1.162)	NONADV(F)
-.622	(1.274)	ONSITE(F)	-.982	(1.490)	ONSITE(F)
-.561	(.923)	SMALL(F)	-1.024	(1.132)	SMALL(F)
-.739	(.899)	CHAIN(F)	-1.212	(1.144)	CHAIN(F)
-.021	(.017)	STODPC	-.026	(.021)	STODPC
-21.895	(19.798)	CHPOP	-29.020	(23.754)	CHPOP
-.898	(.441)	TW02	.732	(.552)	TW02
-.152	(.333)	TW03	.003	(.441)	TW03
.253	(.432)	TW04	.999	(.534)	TW04
-3.180	(2.581)	TW05	-2.807	(3.164)	TW05

NOTE: See text and Table 3-2 (p. 50) for definition of variables.

theory or previous empirical work. All optometrists appear to perform similarly with respect to prescription accuracy, accuracy and workmanship of the eyeglasses, and the extent of unnecessary prescribing. These are the more tangible and assessable (by the lay consumer) portions of the eye examinations, and may, in many instances, be basically all the consumer wants from an eye examination. Others want more, however, and in the pure-service area of the optometric examination of the eye, thoroughness clearly differs. The striking result that nonadvertisers in nonrestrictive cities give more thorough examinations than their ostensible counterparts where no advertising is permitted is explained by the argument that they are not analogous individuals. Advertising and commercial practice simply permit certain motives to be visibly signaled, but practitioners of various kinds continue to exist and provide the degree of thoroughness which they have decided upon regardless of the restrictiveness of state regulatory environments.

This scenario would seem to answer a basic question posed in the discussion of price differences, namely: Are there quality differences? The answer is that indeed there are, and hence the usual price comparisons of professional services are misleading. This raises the question of the degree to which these quality differences account for the price differences previously uncovered.

C. PRICE AND QUALITY

The above analysis has demonstrated that while there is substantial variation inome prices across types of optometrists and kind of advertising in different cities, there also exist considerable differences in the quality of at least some components of the eye examination. These facts suggest the possibility of a more fundamental relation between the price and quality of eyeglasses. Indeed, given that the service is heterogeneous, prices can only be meaningfully compared for identical qualities. The form of this relation is explored in the following discussion.

First, the general relation between total price[1] and the thoroughness[2] of the eye examination is explored. In Table 3-12, column (a), the FTC Index of thoroughness is substituted for the market type and practitioner variables, and a significant positive association between quality and price is apparent. The column (b) regression explores the possibility that the price-quality relationship differs in slope or intercept between the various

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[1] Alternatively, examination price could be used as the dependent variable. If other quality dimensions are not related to these variables, however, the regressions will differ only in their intercept terms. The choice of total price will later permit testing of prescription and eyeglass quality; in any event, analogous regressions on only examination prices were performed, with essentially identical results.

[2] Only the FTC Index will be reported, in order to simplify discussion. All substantive conclusions here, as elsewhere, persist when the NAOO Index is used instead.

TABLE 3-12

Regressions on Price and Quality
(standard errors in parentheses)

a		b		c	
73.57		45.60		46.73	
0.20	(0.04) FTCIND	0.19	(0.08) FTCIND	0.18	(0.04) FTCIND
0.09	(0.24) YPC	10.05	(8.45) ADS2	4.43	(4.84) ADS2
-0.09	(0.04) CITODPC	-16.08	(9.95) FIRMADS2	-11.57	(4.80) FIRMADS2
-5.81	(4.30) BI02	-6.46	(8.16) FIRMADS3	-8.57	(4.09) FIRMADS3
6.37	(4.75) BL01	-23.30	(7.39) FIRMADS4	-22.83	(4.20) FIRMADS4
11.68	(4.91) BL02	-0.09	(0.12) A2FTC	-0.29	(0.06) CITODPC
5.56	(5.37) BL03	0.09	(0.15) FS2FTC	0.01	(0.003)YPC
-5.01	(6.83) BL04	-0.04	(0.12) FS3FTC	-5.34	(3.68) BI02
4.59	(4.38) BL05	0.01	(0.10) FS4FTC	1.18	(4.31) BL01
-13.92	(4.54) BL06	-0.28	(0.06) CITODPC	6.15	(4.46) BL02
-12.51	(4.60) BL07	0.01	(0.003)YPC	0.46	(5.41) BL03
-10.22	(4.78) BL08	-5.28	(3.70) BI02	0.87	(5.91) BL04
1.03	(4.35) BL09	1.23	(4.36) BL01	3.43	(4.38) BL05
2.52	(4.76) BL10	6.08	(4.52) BL02	-19.72	(4.54) BL06
-5.01	(4.60) BL11	0.91	(5.46) BL03	-5.34	(4.12) BL07
-0.20	(4.34) BL12	1.07	(5.96) BL04	-16.72	(4.65) BL08
		3.30	(4.43) BL05	6.00	(3.98) BL09
		-20.08	(4.57) BL06	0.35	(4.84) BL10
		-5.55	(4.14) BL07	-10.73	(4.49) BL11
		-17.11	(4.68) BL08	4.96	(3.99) BL12
		6.10	(4.02) BL09		
		-0.02	(4.90) BL10		
		-10.46	(4.54) BL11		
		4.86	(4.01) BL12		
R^2=.29		R^2=.49		R^2=.49	
F(16,263)=6.68		F(24,255)=10.17		F(20,259)=12.23	

Note: See text and Table 3-2 (p. 50) for definitions of variables.

TABLE 3-12 (continued)

d		e		f	
47.55		50.73		36.53	
0.16	(0.06) FTCIND	0.12	(0.04) FTCIND	0.11	(0.05) FTCIND
2.89	(4.68) ADS2	2.89	(4.66) ADS2	-2.78	(2.67) RXEITH
12.25	(4.19) FIRMADS2	11.84	(4.15) FIRMADS2	0.61	(1.94) GLASANSI
15.42	(3.00) FIRMADS3	15.65	(2.97) FIRMADS3	2.55	(2.83) WORKEITH
8.12	(12.85) ONSITE	-2.97	(5.11) ONSITE	7.88	(8.15) ADS2
-21.77	(7.62) NONADV(F)	-20.87	(4.12) NONADV(F)	13.76	(3.66) FIRMADS3
-24.45	(15.33) ONSITE(F)	-15.28	(6.81) ONSITE(F)	-1.99	(5.87) ONSITE
-20.33	(7.16) SMALL(F)	-28.11	(4.35) SMALL(F)	-14.56	(7.93) NONADV(F)
-25.42	(8.28) CHAIN(F)	-30.78	(4.55) CHAIN(F)	-8.07	(10.52) ONSITE(F)
-0.20	(0.22) ONFTC	-0.30	(0.06) CITODPC	-22.19	(8.35) SMALL(F)
0.01	(0.10) NO(F)FTC	0.01	(0.003)YPC	-19.76	(8.70) CHAIN(F)
0.17	(0.25) ON(F)FTC	-5.33	(3.57) BI02	-0.21	(0.10) CITODPC
-0.16	(0.12) SM(F)FTC	0.97	(4.14) BL01	0.01	(0.003)YPC
-0.10	(0.13) CH(F)FTC	6.59	(4.30) BL02	-9.00	(4.59) BI02
-0.29	(0.06) CITODPC	2.04	(5.22) BL03	6.04	(6.03) BL01
0.01	(0.003)YPC	-0.26	(5.71) BL04	10.62	(6.02) BL02
-5.01	(3.59) BI02	3.95	(4.21) BL05	4.99	(4.69) BL05
1.12	(4.20) BL01	-18.49	(4.39) BL06	-19.51	(6.61) BL06
6.42	(4.34) BL02	-4.45	(4.05) BL07	-4.19	(4.60) BL07
2.03	(5.24) BL03	-16.06	(4.52) BL08	-14.03	(5.28) BL08
-0.44	(5.77) BL04	6.50	(3.85) BL09	6.96	(4.29) BL09
4.51	(4.26) BL05	1.48	(4.65) BL10	5.76	(5.73) BL10
-17.76	(4.44) BL06	-11.12	(4.32) BL11	-8.99	(4.99) BL11
-3.73	(4.23) BL07	5.65	(3.82) BL12	6.22	(4.22) BL12
-15.58	(4.59) BL08				
6.81	(3.88) BL09				
1.88	(4.68) BL10				
-10.99	(4.35) BL11				
6.20	(3.90) BL12				
R^2=.54		R^2=.53		R^2=.46	
F(29,250)=10.15		F(24,255)=12.22		F(24,174)=6.24	

market types in the advertising-firm matrix of Table 1.[1] None of the slope dummies on the cell variables (A2FTC, FA2FTC, FA3FTC, FA4FTC) approaches conventional significance levels, and the dummies are subsequently excluded. The market type variables, by contrast, appear to be capturing differences in the position of the price-quality relationship, an effect which emerges more clearly in the cleaner specification of column (c). The coefficient on FTCIND reflects the systematic positive relationship between thoroughness and price, while the various market dummies (except for ADS2) reveal that the relationship is shifted downward in the presence of chain firms or extensive advertising.

The regressions reported thus far have pooled all types of optometrists without distinction. Previous work, however, has suggested some significant differences in the practice performed by the various types of optometrists. Therefore it is appropriate to test whether the price-quality relation differs between practitioner-types or whether it is general to the cell advertising-firm characteristics which it reflects. The regression in column (d) of Table 3-12 permits both slope and intercept differences on the variables representing types of optometrists. Again the slope dummies (NO(F)FTC, ON(F)FTC, SM(F)FTC, CH(F)FTC) are wholly insignificant and suggest no differences in the coefficient on FTCIND by type of optometrist. By contrast, the intercept dummies on practitioners appear mostly significant, a result which is clarified in the column (e) regression.

Comparison of column (c) and column (e) regressions yields some important insights. The relation between price and quality operates both at the market-wide level and for different types of practitioners. Thus the large, negative, significant coefficient on FIRMADS4 in column (c) represents the effect on all practitioners, which is reflected in the large, significant, negative coefficients on NONADV(F), ONSITE(F), SMALL(F), and CHAIN(F) in column (e). Yet those intercept dummies for optometrist-types differ among themselves. Most importantly, the coefficient on NONADV(F) is significantly different from that on CHAIN(F) (t=3.83), suggesting a higher position for the price-quality relation among non-advertisers than for large chain firms in nonrestrictive markets. Price does increase with quality, at roughly the same rate everywhere, but for a given quality, price is nearly $10 higher among nonadvertisers than large firms in FIRMADS4 markets.[2]

Among other implications, this finding would seem to support the existence of multiple markets for optometric services. That is, the systematic price differences between different types of practitioners for identical quality examinations can perhaps best be explained as reflecting market segmentation. Different types of optometrists may be seen as different and

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1 Note that ADS2 is included, despite the focus on examination quality since the dependent variable includes eyeglass price. The latter may differ between ADS1 and ADS2 markets, though in these regressions (and previous ones) no such effect emerges.

2 Not all degrees of thoroughness are readily available from all types of practitioners, however.

perhaps behave differently in ways not captured by the measures in this study. These market divisions result in persistent price discrepancies for ostensibly identical services provided by the different practitioners. It must be emphasized, however, that substantial unexplained variation continues to exist in the statistical analysis reported here, variation consistent with the view that other factors, including consumer misinformation, play significant roles in this market.

Furthermore, the regression in column (e) continues to demonstrate a weak or insignificant effect from non-price forms of advertising, though a powerful effect from price advertising. This is evidenced by the fact that nonadvertisers in FIRMADS4 markets, with price advertising of eyeglasses and nonprice advertising of examinations, are estimated to charge over $21 less than nonadvertisers in ADS1, while the corresponding practitioners in FIRMADS3 markets charge only $5.22 less. The latter figure is statistically different from the price in ADS1 (t=1.28), only at much lower levels of significance, but it is very different from FIRMADS4 prices.

The last regression in column (f) of Table 3-12 adds three other quality dimensions to the preceding regression, namely, those reflecting the accuracy of the prescription and the accuracy and workmanship of the glasses. In order not to reject prescriptions or glasses which either SUNY or PCO found acceptable, RXEITH and WORKEITH were selected to represent accuracy of prescription and workmanship of the glasses, respectively. One single measure of eyeglass accuracy, GLASANSI, is taken for the remaining dimension. As is readily apparent, the thoroughness of the eye examination continues to be significantly associated with the total price, while the other dimensions of quality do not contribute significant explanatory power. This result is consistent with the earlier finding that only thoroughness differs significantly by kind of advertising and optometrist.[1]

Finally, this last data set permits an examination of the degree to which the various facets of thoroughness are correlated within the observations here. That is, to what extent do practitioners offering thorough eye examinations also provide the most accurate prescriptions, or the most accurately filled prescriptions, or the best workmanship on the eyeglasses? The simple correlation coefficients between these variables are given in Table 3-13, together with the probabilities that they are due to chance. Thoroughness of the eye examination seems generally unrelated to the quality associated with the prescription and glasses, i.e., generally the "product"

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[1] In an unreported regression on a smaller data set for which the wholesale price of eyeglass frames could be determined, the wholesale price was positively and significantly related to the total price of the eye examination plus glasses. Thoroughness continues to be the only quality variable related to the total price. Since the general form of the relationship is unchanged where frame price is known, it is unlikely that whatever diversity of frames was obtained by the subjects is causing significant sample bias.

TABLE 3-13

Correlation Coefficients among Quality Dimensions
(Probability of Chance in Parentheses)

	RXEITH	GLASANSI	WORKEITH
FTCIND	-.08 (.27)	-.02 (.74)	.08 (.23)
RXEITH		.11 (.11)	.16 (.02)
GLASANSI			.10 (.15)

part of the package. Although the associations within the product part are not everywhere huge, they all are positive (as one might expect) with significance levels no less than 85 percent. Thus, there appears to be some tendency for product attributes to be positively correlated, but for those attributes not to be closely associated with the thoroughness of the optometric service rendered.

D. SUMMARY

This analysis of the data gathered in the survey has produced a rather complex set of facts. At the outset, it appears that the presence of advertising and commercial practice leads to substantial reductions in the price of eye examinations and eyeglasses. The chain firms themselves offer the lowest prices, but even nonadvertising practitioners in the presence of chain firms are forced to lower price somewhat. The ability of optometrists to advertise price, rather than simply availability (that is, non-price advertising), appears to have special force in altering market prices.

Evaluation of the quality of an eye examination is somewhat more complicated, but it yields insights crucial to correct interpretation of the price results. With respect to the thoroughness of the eye examination, the data reveal considerable variation in all markets, but they reveal remarkably similar distributions between practitioners in the least and in the most restrictive markets. In contrast to the argument raised by some professionals against advertising and commercial practice, looser restrictions do not cause the erosion of quality throughout the market. But in contrast to some simplistic models of the effect of advertising and commercial practice, the latter do seem to result in a greater frequency of less-thorough examinations by advertising optometrists. Given the similarity of overall market distributions, this does not imply that the absence of restrictions has caused market quality to erode but rather that it has permitted an alignment of thoroughness with the form of practice. Those who would give less thorough examinations are more likely to practice as advertisers or to affiliate with commercial practice. Those inclined towards thorough examinations maintain traditional forms of practice. Both coexist. In restrictive markets these different practices are not eliminated but simply obscured by the inability to advertise or engage in commercial practice.

Whereas thoroughness of the eye examination does vary across type of optometrist, other dimensions of quality do not. The accuracy of the prescription, the accuracy of the eyeglasses, and the workmanship of the glasses are essentially the same regardless of provider or regulatory environment. In almost all instances, it is likely that at a minimum the consumer wants to be checked for the need for new eyeglasses, and it would appear that this service and the resulting product (eyeglasses) are not substantially different under any circumstances. It is in the area of quality of optometric service that consumer preferences and the thoroughness of practice vary.

Given such differences in both price and at least one dimension of quality, the question of how quality-adjusted price varies across markets needs to be asked. The data reveal that within types of optometrists as well as within markets and across markets, there are strong positive associations between the thoroughness of practice and the price.[1] But even after allowing for this association, price in nonrestrictive markets is clearly less than in restrictive markets. The conclusion drawn is that advertising and commercial practice are powerful devices in lowering market prices without reducing overall market quality. Consumers gain in this manner as well as by being better able to judge the thoroughness of the service to be rendered from the form of optometric practice.

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[1] No associations exist for the other dimensions of quality, as would be expected given that they do not vary systematically with advertising and commercial practice.

APPENDIX A

Cost-of-Living Adjustments to Price Data

To make meaningful comparisons of price data across cities, differences in the cost of living must be taken into account. Price indexes that reflect city to city differences in the cost of living do not exist. The Bureau of Labor Statistics (BLS) does, however, produce annual estimates of family budgets for 39 cities.[1] From these estimates indexes can be derived to compare the cost of the budgets across cities.

For each of the 39 cities, BLS produces a lower, an intermediate, and an upper budget. The intermediate budget was selected as the one most likely to be representative of the average household. Among the 39 cities, only five were also among the SMSAs for which price data had been collected. Price indexes had to be created for seven SMSAs.

To create the needed price deflators, indexes of the published intermediate budgets (the city indexes divided by the urban average) were regressed upon a number of socioeconomic variables. Thirty-eight of the 39 cities for which BLS publishes budgets were used in the analysis. Honolulu was dropped. The actual indexes ranged from .86 to 1.20. The independent variables included 1975 population, 1975 population per square mile, 1974 per capita income, average annual change in per capita income, 1969 to 1974, the percentage of families living below the poverty level in 1970, the unemployment rate in 1977, the percentage of change in population between 1970 and 1975, total local taxes per capita (based upon local government tax data for 1971-1972, and population for 1970), and the 1975 labor force as a percentage of 1975 population. Data on size of labor force and the unemployment rate were from the Bureau of Labor Statistics.[2] All other data were from the Bureau of the Census.[3]

Regression analysis was performed using a step-wise regression program. Variables were entered into the regression so as to maximize the improvement in R^2. The three variables that best explained variation in the city indexes (INDEX) were population per square mile (POP/MI), percent of population living below the poverty level (POV), and local taxes per capita (TX/POP). The equation reads (t values in parentheses):

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1 Bureau of Labor Statistics, U.S. Department of Labor, "Autumn 1977 Urban Family Budgets and Comparative Indexes for Selected Urban Areas," News, April 26, 1978.

2 Bureau of Labor Statistics, U.S. Department of Labor, "Labor Force Unemployment Statistics," printout, June 27, 1978.

3 Bureau of the Census, U.S. Department of Commerce, Statistics for States and Metropolitan Areas, A Preprint from County and City Data Book, 1977.

$$\text{INDEX} = 97.97 + \underset{(2.98)}{0.002387}\ \text{POP/MI} \ \underset{(-4.16)}{-0.1269}\ \text{POV} + \underset{(2.96)}{3.439}\ \text{TX/POP}$$

$R^2 = 0.7114$

The actual and predicted indexes are given in the table below. Price data were deflated by actual indexes, where available, and by estimated indexes where actual indexes were unavailable.[1]

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[1] Although the table presents both actual and estimated indexes only for cities for which the actual indexes exceed 100, the predictions for other cities with lower actual indexes were equally reliable. Among the twenty-one observations having actual indexes less than 100, there were only two cases in which the predicted index deviated by more than 5 percentage points from the actual index.

Cost of Living Indexes
for Sample SMSAs
1977

SMSA	Actual Index	Estimated Index
Knoxville, Tenn.	*	85
Little Rock-North Little Rock, Ark.	*	85
Providence-Warwick-Pawtucket, R.I.	*	97
Greensboro-Winston Salem-Highpoint, N.C.	*	90
Columbia, S.C.	*	84
Milwaukee, Wis.	107	104
Portland, Ore.-Wash.	*	99
Columbus, Oh.	*	97
Baltimore, Md.	101	98
Washington, D.C.-Md.-Va.	105	106
Seattle-Everett, Wash.	101	100
Minneapolis-St. Paul, Minn. Wis.	104	102

* Not available.

APPENDIX B

Debriefing Questionnaire and Weights

Introduction

The FTC Index is the distribution of points and weights for each component of the eye examination as developed by study advisor, Dr. Kenneth Myers, Ph.D., O.D., Director of the Optometric Service, Department of Medicine and Surgery, U.S. Veterans Administration, for the Federal Trade Commission. The index was developed in cooperation with the two consulting schools of optometry, the State University of New York College of Optometry and the Pennsylvania College of Optometry.

The NAOO Index is the distribution of points and weights for each component of the eye examination as developed by the National Association of Optometrists and Opticians (NAOO). NAOO is composed of optometrists and opticians who advertise or are employed by optical firms or optometrists who advertise. The points assigned to each question equal the mean of the points assigned by the NAOO panel of optometrists.

The total number of points awarded by Dr. Myers and NAOO for each component of the examination may differ. NAOO did not award points for sections where they believed that the questions referred to unimportant components of an examination. It should be noted that some questions on the examination debriefing questionnaire do not apply to all three subject groups. In such instance the questions were marked NA for "Not Applicable."

1. CASE HISTORY

Many eye problems can be detected or suspected after a careful case history and one of the six indices of quality is the thoroughness of the case history taken from you. Please check the data that was asked of you by the examiner or was asked and recorded by an assistant or filled out on a sheet of questions given to you at the start of the visit.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
Were you asked:		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. Your age (or date of birth)	Yes	1.0 0.43%	7.0 1.98%	1.0 0.46%	5.7 1.65%	1.0 0.47%	6.8 1.74%
	No	0	0	0	0	0	0
2. Why are you having your eyes examined at this time?	Yes	2.0 0.85	8.9 2.51	2.0 0.93	7.8 2.26	2.0 0.93	8.1 2.07
	No	0	0	0	0	0	0
3. Do you have any visual symptoms, complaints or problems?	Yes	3.0 1.27	10.4 2.94	3.0 1.39	14.0 4.06	3.0 1.40	13.9 3.55
	No	0	0	0	0	0	0
4. About your general health?	Yes	2.0 0.85	6.2 1.75	2.0 0.93	6.9 2.00	2.0 0.93	6.9 1.76
	No	0	0	0	0	0	0
5. Are you under the care of a physician?	Yes	2.0 0.85	6.0 1.69	2.0 0.93	6.0 1.74	2.0 0.93	8.3 2.12
	No	0	0	0	0	0	0

Were you asked:		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
6. Are you taking any medications?	Yes	3.0 1.27%	7.7 2.17%	3.0 1.39%	8.0 2.32%	3.0 1.40%	11.2 2.86%
	No	0	0	0	0	0	0
7. Do you have diabetes or high blood pressure, etc.?	Yes	2.0 0.85	16.0 4.52	2.0 0.93	8.0 2.32	2.0 0.93	8.0 2.04
	No	0	0	0	0	0	0
8. Does anyone in your family have:							
a. eye disease?	Yes	1.0 0.43	3.2 0.90	1.0 0.46	3.5 1.01	1.0 0.47	3.0 0.77
	No	0	0	0	0	0	0
b. glaucoma?	Yes	1.0 0.43	3.2 0.90	1.0 0.46	3.5 1.01	1.0 0.47	3.0 0.77
	No	0	0	0	0	0	0
c. vision problems?	Yes	1.0 0.43	3.2 0.90	1.0 0.46	3.5 1.01	1.0 0.47	3.0 0.77
	No	0	0	0	0	0	0
d. blindness?	Yes	1.0 0.43	3.2 0.90	1.0 0.46	3.5 1.01	1.0 0.47	3.0 0.77
	No	0	0	0	0	0	0
e. diabetics?	Yes	1.0 0.43	3.2 0.90	1,0 0.46	3.5 1.01	1.0 0.47	3.0 0.77
	No	0	0	0	0	0	0

Were you asked:		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
9. Do you have or have you had:							
a. eye disease?	Yes	2.0 0.85%	4.4 1.24%	2.0 0.93%	4.6 1.33%	2.0 0.93%	3.8 0.97%
	No	0	0	0	0	0	0
b. eye surgery?	Yes	2.0 0.85	4.4 1.24	2.0 0.93	4.6 1.33	2.0 0.93	3.8 0.97
	No	0	0	0	0	0	0
c. glaucoma?	Yes	2.0 0.85	4.4 1.24	2.0 0.93	4.6 1.33	2.0 0.93	3.8 0.97
	No	0	0	0	0	0	0
d. eye injuries?	Yes	2.0 0.85	4.4 1.24	2.0 0.93	4.6 1.33	2.0 0.93	3.8 0.97
	No	0	0	0	0	0	0
e. pain in or around the eyes?	Yes	2.0 0.85	4.4 1.24	2.0 0.93	4.6 1.33	2.0 0.93	3.8 0.97
	No	0	0	0	0	0	0
SUBTOTAL CASE HISTORY (Maximum)		30.0 12.71%	100.2 28.28%	30.0 13.89%	96.9 28.05%	30.0 13.95%	97.2 24.84%

2. EYE HEALTH

A key part of any eye exam consists of looking for signs of possible eye disease, injury, or physical deviations from normal. Patients found to have the symptoms (case history) or signs of such conditions should then be so advised and properly managed by the OD and, as necessary, referred to other health care practitioners. Some or all of the following procedures are commonly used by ODs to examine the eyes for possible disease, injury, etc.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. External Exam: External visual examinations of eyes and lids (OD may touch lids, ask patient to look up, down, etc., and may use a light and/or magnifying glass)	Yes	4.0 1.69%	9.2 2.60%	4.0 1.85%	11.6 3.36%	4.0 1.86%	9.4 2.40%
	No	0	0	0	0	0	0
2. Eye movements (follow pen light, etc.)	Yes	2.0 0.85	6.6 1.86	2.0 0.93	8.9 2.58	2.0 0.93	16.0 4.09
	No	0	0	0	0	0	0
3. Cover tests	Yes	3.0 1.27	6.4 1.81	3.0 1.39	9.3 2.69	3.0 1.40	15.2 3.89
	No	0	0	0	0	0	0
4. Pupil reactions to light (accomodation)	Yes	3.0 1.27	8.1 2.29	3.0 1.39	8.8 2.55	3.0 1.40	9.7 2.48
	No	0	0	0	0	0	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
5. Biomicroscope (slit lamp)	Yes	4.0 1.69%	8.2 2.31%	4.0 1.85%	7.4 2.14%	4.0 1.86%	5.3 1.36%
	No	0	0	0	0	0	0
6. Ophthalmoscopy (internal exam of eyes) (Approximate number of seconds for each eye: left_____ right_____	Yes	1/30.0 12.71	28.0 7.90	1/30.0 13.89	33.0 9.56	1/30.0 13.95	27.7 7.09
	No	0	0	0	0	0	0
7. Tonometry (specify method)	Yes	20.0 8.47	19.3 5.45	10.0 4.63	10.4 3.01	10.0 4.65	9.7 2.48
	No	0	0	0	0	0	0

1/ The point score for this portion of the examination depended upon the time spent examining each eye with the ophthalmoscope and whether or not the instrument was positioned close to the eye. The score was determined by giving one point for the average number of seconds each eye was examined. The maximum possible score is 30 points, i.e., 30 seconds or more for each eye. If the instrument was not held close to the eye, 10 points were subtracted from the above score. The minimum score possible is zero (0).

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
8. Confrontation or screening visual fields:	Yes	2.0 0.85%	8.0 2.26%	2.0 0.93%	5.3 1.54%	2.0 0.93%	4.7 1.20%
	No	0	0	0	0	0	0
9. Visual fields	Yes	2/ 4.0 1.69	7.4 2.09	2/ 4.0 1.85	3.6 1.04	2/ 4.0 1.86	3.6 0.92
	No	0	0	0	0	0	0
SUBTOTAL EYE HEALTH		70.0 29.66%	101.2 28.56%	60.0 27.78%	98.3 28.47%	60.0 27.91%	101.3 25.91%

2/ Maximum number of points for testing visual fields equal 4.0. If confrontation (Question #8 was "y") was the only test performed, they received two points. If complete visual fields was performed, they received four points.

3. VISION TESTING

This part of the eye exam measures binocular visual functions, determines the refractive errors of each eye, measures how well the eyes work together and generates a prescription. Only the most common tests are listed; please specify any tests, other than these, that were performed.

			Maximum Points and Percentage of Total Score for Each Question					
			Blurred		20 x 20's		Binoculars	
			FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. Initial visual acuity:	Far	Yes	3.0 1.27%	5.0 1.41%	3.0 1.39%	5.1 1.48%	3.0 1.40%	5.2 1.33%
		No	0	0	0	0	0	0
	Near	Yes	3.0 1.27	5.0 1.41	3.0 1.39	5.1 1.48	3.0 1.40	5.2 1.33
		No	0	0	0	0	0	0
2. Color vision test		Yes	1.0 0.43	3.5 0.99	1.0 0.46	4.0 1.16	1.0 0.47	4.2 1.07
		No	0	0	0	0	0	0
3. Depth perception test:		Yes	1.0 0.43	3.4 0.96	1.0 0.46	4.0 1.16	1.0 0.47	6.7 1.71
		No	0	0	0	0	0	0
DISTANT BINOCULAR VISION								
4. Phorias at distance (aligning double images)	Sideways	Yes	2.0 0.85	3.1 0.87	2.0 0.93	3.7 1.07	2.0 0.93	4.4 1.13
		No	0	0	0	0	0	0
	Up/Down	Yes	2.0 0.85	3.1 0.87	2.0 0.93	3.7 1.07	2.0 0.93	4.4 1.13
		NO	0	0	0	0	0	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
5. Ductions at distance (points of blur, doubling)	Yes Sideways	1.0 0.43%	2.4 0.68%	1.0 0.46%	2.7 0.78%	1.0 0.47%	3.4 0.87%
	No	0	0	0	0	0	0
	Yes Up/Down	1.0 0.43	2.4 0.68	1.0 0.46	2.7 0.78	1.0 0.47	3.4 0.87
	No	0	0	0	0	0	0
NEAR BINOCULAR VISION							
6. Phorias at near (aligning double images)	Yes Sideways	2.0 0.85	2.5 0.71	2.0 0.93	3.6 1.04	2.0 0.93	4.3 1.10
	No	0	0	0	0	0	0
	Yes Up/Down	2.0 0.85	2.5 0.71	2.0 0.93	3.6 1.04	2.0 0.93	4.3 1.10
	No	0	0	0	0	0	0
7. Ductions at near (points of blur, doubling)	Yes Sideways	1.0 0.43	2.0 0.56	1.0 0.93	2.6 0.75	1.0 0.47	3.1 0.79
	No	0	0	0	0	0	0
	Yes Up/Down	1.0 0.43	2.0 0.56	1.0 0.93	2.6 0.75	1.0 0.47	3.1 0.79
	No	0	0	0	0	0	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
DETERMINATION OF REFRACTOR ERROR							
8. Retinoscopy	Yes	8.0 3.39%	11.7 3.30%	8.0 3.70%	11.6 3.36%	8.0 3.72%	9.6 2.46%
	No	0	0	0	0	0	0
9. Subjective Refraction (which is clearer, etc.)	Yes	8.0 3.39	21.1 5.96	8.0 3.70	20.0 5.80	8.0 3.72	15.3 3.92
	No	0	0	0	0	0	0
10. Binocular Balance	Yes	2.0 0.85	7.5 2.12	2.0 0.93	6.6 1.91	2.0 0.93	8.2 2.10
	No	0	0	0	0	0	0
11. Amplitude of Accommodation	Yes	1.0 0.43	9.2 2.60	1.0 0.46	7.3 2.12	1.0 0.47	6.3 1.61
	No	0	0	0	0	0	0
12. Near Point Convergence	Yes	1.0 0.43	5.8 1.64	1.0 0.46	5.7 1.65	1.0 0.47	5.7 1.46
	No	0	0	0	0	0	0
SUBTOTAL VISION TESTING		40.0 16.95%	92.2 26.02%	40.0 18.52%	94.6 27.40%	40.0 18.60%	96.8 24.77%

4. CASE DIAGNOSIS AND MANAGEMENT

This section concerns whether the OD did further testing (or referred to his earlier measurements) after the "symptom" was presented for "blurred," the appropriateness of the written prescription in Section 2, and how well the OD explained his finding to you and answered your question.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. Glaucoma Testing:							
After you gave the sympton of "bumping into things," at the end of Section, which of below occurred:							
(NOTE: This section can best be interpreted as affording the OD an opportunity to give the tonometry test if it wasn't given earlier.							
a. Was tonometry done now or earlier?	Yes	10.0[1] 4.24%	0	N.A.[3]	N.A.	N.A.	N.A.
	No	0	0	N.A.	N.A.	N.A.	N.A.
b. Was a confrontation or visual field test ever done, now or earlier?	Yes	10.0[2] 4.24%	0	N.A.	N.A.	N.A.	N.A.
	No	0	0	N.A.	N.A.	N.A.	N.A.

[1] A total of 30 points was given for tonometry, 20 points in Section 2. "Eye Health" and 10 points here.

[2] A total of 14 points given for visual fields, 4 points in Section 2, "Eye Health," and 10 points here.

[3] Not Applicable.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
When you asked what the examination revealed:							
2. Did the OD then tell you:							
a. what was wrong with your vision? (i.e., that you are near-sighted)	Yes	2.0 0.85%	13.7 3.87%	2.0 0.93%	16.7 4.84%	2.0 0.93%	17.1 4.38%
	No	0	0	0	0	0	0
b. what and why he/she suggests as an Rx?	Yes	2.0 0.85	9.6 2.71	2.0 0.93	15.5 4.49	2.0 0.93	13.3 3.40
	No	0	0	0	0	0	0
c. a reason for or an explanation for your binocular problem.	Yes	N.A.	N.A.	N.A.	N.A.	2.0 0.93	13.3 3.40
	No					0	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
d. whether or not your eyes seemed free of disease or injury?	Yes	7.0[2] 2.97%	9.1 2.57%	7.0[3] 3.24%	13.8 3.99%	7.0[2] 3.26%	10.2 2.61%
	No	5.0 2.12	0	5.0 2.31	0	5.0 2.33	0
e. to go to another clinician for a further study.	Yes	5.0[3] 2.12	6.4 1.81	N.A.	N.A.	N.A.	N.A.
	No	0	0				
f. anything relating to glaucoma or tests for it?	Yes	N.A.	N.A.	9.0[4] 4.17	9.8 2.84	9.0[4] 4.19	8.1 2.07
	No			5.0 2.31	0	5.0 2.33	0

[2] If ophthalmoscopy was performed for 15 seconds or more in each eye, and tonometry had been performed, a "YES" answer here counted for 7.00 points. If OD performed ophthalmoscopy and tonometry but did not inform patient about finding, he still received some credit since he did look for disease. No credit was given if OD did not perform ophthalmoscopy and tonometry but this response was marked "YES."

[3] If the OD referred patient to a physician or another OD and ophthalmoscopy had been performed for 15 or more seconds in each eye and tonometry had been performed, a "YES" answer accounted for 2.00 points. For a "YES" answer and ophthalmoscopy and tonometry not done earlier, this question accounted for 5.00 points.

[4] If ophthalmoscopy was performed for 15 seconds or more in each eye and tonometry had been performed, a "YES" answer received 9.00 points for 20 x 20's and binoculars; a "NO" answer 5.00 points for 20 x 20's and binoculars; and "zero" points otherwise.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
g. What was the reason given for an explanation for binocular problem?	Yes	N.A.	N.A.	N.A.	N.A.	6.0 2.79%	17.6 4.50%
	No					0	0
h. what did OD tell you the glasses would do for your problem?	Yes	N.A.	N.A.	N.A.	N.A.	6.0 2.79	16.4 4.20
	No					0	0
i. A reason for or an explanation of the visual fields symptoms?	Yes	0	6.6 1.86	N.A.	N.A.	N.A.	N.A.
	No	0	0				
j. Anything relating to loss of peripheral vision:	Yes	0	5.2 1.4	N.A.	N.A.	N.A.	N.A.
	No	0	0				
3. Did the OD make any statements that would suggest that he has considered your bumping into things as possibly symptomatic of an eye health problem?	Yes	2.0 0.85	5.6 1.58	N.A.	N.A.	N.A.	N.A.
	No	0	0				

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
4. Did he indicate that his findings show no evidence of an eye health reason for bumping into things?	Yes	7.0[5] 2.97%	4.5 1.27%	N.A.	N.A.	N.A.	N.A.
	No	5.0 2.12	0				
5. This section seeks to determine the optometrist's recommendation concerning your need for new eyeglasses. It is important to illicit his judgment even if it requires pressing him for that judgment. What did the OD recommend regarding eyeglasses?							

[5] If ophthalmoscopy was performed for 15 seconds or more in each eye and tonometry had been performed, a "YES" answer received 7.00 points and a "NO" answer 5.00 points. If ophthalmoscopy and tonometry not performed earlier, "zero" points were given for either a "YES " or "NO" answer to this question.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
a. the OD immediately explained that a new pair of glasses <u>was not</u> needed.	Yes	N.A.	N.A.	20.0[6] 9.26%	0[7]	N.A.	N.A.
	No			0	0		
b. Upon prodding the OD explained that a new pair of glasses <u>would not</u> make a real difference.	Yes	N.A.	N.A.	10.0 4.63	0	N.A.	N.A.
	No			0	0		
c. Upon prodding the OD explained that a new pair of glasses <u>would</u> make a real difference.	Yes	N.A.	N.A.	5.0 2.31	0	N.A.	N.A.
	No			0	0		

6 The maximum points for this section is 20.0.

7 NAOO did not give points for procedures where a "0" is indicated.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
d. The OD refused to make a judgment.	Yes	N.A.	N.A.	7.0 3.24%	0	N.A.	N.A.
	No			0	0		
SUBTOTAL CASE DIAGNOSIS AND MGR.		45.0	60.7	40.0	55.8	34.0	96.0
		19.07%	17.13%	18.52%	16.02%	15.81%	24.56%

5. SUBJECT'S EVALUATION OF CARE

This section enables you to make summary assessments of the eye care you received. For example, two OD's may perform the same number and types of tests but while one does them in a hurried or lackadaisical manner the other may use more care and spend a longer time. As a trained observer your evaluation in this section will be an important consideration.

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. In your opinion:							
a. was an adequate eye health exam performed?	Yes	5.0 2.12%	0	5.0 2.31%	0	5.0 2.33%	0
	No	0	0	0	0	0	0
b. were adequate vision tests made?	Yes	4.0 1.69	0	4.0 1.85	0	4.0 1.86	0
	No	0	0	0	0	0	0
2. Would you send a member of your family or a personal friend to this office for advice or therapy on a more complicated vision problem?	Yes	3.0 1.27	0	3.0 1.39	0	3.0 1.40	0
	No	0		0		0	0
3. Do you have confidence in the overall competency of the OD?	Yes	7.0 2.97	0	7.0 3.24	0	7.0 3.26	0
	No	0	0	0	0	0	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
4. Did OD appear to keep a written record of his findings so that a patient file would be kept?	Yes	1.0 0.43%	0	1.0 0.46%	0	1.0 0.47%	0
	No	0	0	0	0	0	0
5. Length of Examination.							
Less than 15 minutes:		0	0	0	0	0	0
Between 15 but less than 30 minutes:		5.0 2.12	0	5.0 2.31	0	5.0 2.33	0
30 or more minutes:		10.0 4.24	0	10.0 4.63	0	10.0 4.65	0
SUBTOTAL		30.0	0	30.0	0	30.0	0
SUBJECTS EVALUATION		12.71%	0.00 %	13.89%	0.00%	13.95%	0.00%

6. DISPENSING

This section deals with the accuracy and quality of the filled Rx, costs, and whether there was evidence of "selling." You must obtain a copy of the Rx and ask that the Rx be filled. One of the common metal frames shown you during training should be selected and clear glass lenses requested. ("You don't like plastic lenses as they get scratched.")

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. Was a copy of the Rx given you upon your request?	Yes	3.0 1.27%	0	3.0 1.39%	0	3.0 1.40%	0
	No	0	0	0	0	0	0
2. If yes, did you have to sign a disclaimer? pay a fee?	Yes	0	0	0	0	0	0
	No	1.0 0.43	0	1.0 0.46	0	1.0 0.47	0
3. were you "urged" to have:							
1. tinted lenses?	Yes	0	0	0	0	0	0
	No	3.0 1.27	0	3.0 1.39	0	3.0 1.40	0
2. sunglasses?	Yes	0	0	0	0	0	0
	No	3.0 1.27	0	3.0 1.39	0	3.0 1.40	0
3. contact lenses?	Yes	0	0	0	0	0	0
	No	3.0 1.27	0	3.0 1.39	0	3.0 1.40	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
4. Spare pair of eyeglasses?	Yes		0	0	0		0
	No	N.A.	0	3.0 1.39%	0	N.A.	0
4.							
a. were frame prices marked?	Yes	1.0 0.43%	0	N.A.	N.A.	1.0 0.47%	0
	No	0	0			0	0
b. was it suggested you would look more "stylish" in a more expensive frame?	Yes	0	0	N.A.	N.A.	0	0
	No	3.0 1.27	0			3.0 1.40	0
c. Were facial and eye measurements made so correct frame size and decentration would result?	Yes	4.0 1.69	0	N.A.	N.A.	4.0 1.86	0
	No	0	0			0	0
SUBTOTAL DISPENSING		21.0 8.90%	0 0.00%	16.0 7.41%	0 0.00%	21.0 9.77%	0 0.00%
EXAM TOTAL		236.0 100.00%	354.3 100.00%	216.0 100.00%	345.6 100.00%	215.0 100.00%	391.3 100.00%

7. ACCURACY AND QUALITY OF FILLED Rx

Maximum Points and Percentage of Total Score for Each Question

		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
1. Overall, is decentration and the accuracy of the lenses acceptable?	Yes	20.0 7.38%	0	N.A.	N.A.	20.0 8.00%	0
	No	0	0			0	0
2. Are lenses well edged and mounted?							
a. Pennsylvania College of Optometry	Yes	2.5 0.92	0	N.A.	N.A.	2.5 1.00	0
	No	0	0			0	0
b. State University of New York College of Optometry	Yes	2.5 0.92	0	N.A.	N.A.	2.5 1.00	0
	No	0	0			0	0
3. Does either lense have any significant imperfections?							
a. Pennsylvania College of Optometry	Yes	0	0	N.A.	N.A.	0	0
	No	2.5 0.92	0			2.5 1.00	0
b. State University of New York College of Optometry	Yes	0	0	N.A.	N.A.	0	0
	No	2.5 0.92	0			2.5 1.00	0

		Maximum Points and Percentage of Total Score for Each Question					
		Blurred		20 x 20's		Binoculars	
		FTC Index	NAOO Index	FTC Index	NAOO Index	FTC Index	NAOO Index
4. Overall, are the frames of clinically acceptable materials and workmenship?							
a. Pennsylvania College of Optometry	Yes	2.5 0.92	0	N.A.	N.A.	2.5 1.00	0
	No	0	0			0	
b. State University of New York College of Optometry	Yes	2.5 0.92	0	N.A.	N.A.	2.5 1.00	0
	No	0	0			0	
SUBTOTAL--ACCURACY AND QUALITY OF FILLED Rx		35.0 12.92%	0 0.00%	N.A.	N.A.	35.0 14.00%	0 0.00%
EXAM TOTAL		271.0 100.00%	354.3 100.00%	216.0 100.00%	345.6 100.00%	250.0 100.00%	391.3 100.00%

Appendix C

Sample Size, by Type of Market and Type of Optometrist

Data Set	Number of Observations	ADS1		ADS2		FIRMADS2				FIRMADS3				FIRMADS4			
		NONADV	ONSITE	NONADV	ONSITE	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN
1. Price of Eye Exams																	
a. All Prices																	
Blurreds	157	31	1	15	0	7	1	5	5	10	2	10	5	24	12	16	13
20x20's	132	41	0	*	*	*	*	*	*	*	*	*	*	41	4	22	24
Binoculars	49	14	0	*	*	*	*	*	*	*	*	*	*	14	4	6	11
Total:	338	86	1	15	0	7	1	5	5	10	2	10	5	79	20	44	48
b. "Apparent" Prices:																	
Blurreds	154	31	1	15	0	7	1	5	5	8	2	10	5	23	12	16	13
Binoculars	30	7	0	*	*	*	*	*	*	*	*	*	*	7	4	4	8
Total:	184	38	1	15	0	7	1	5	5	8	2	10	5	30	16	20	21
c. "Real" Prices:																	
Blurreds	3	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0
20x20's	132	41	0	*	*	*	*	*	*	*	*	*	*	41	4	22	24
Binoculars	19	7	0	*	*	*	*	*	*	*	*	*	*	7	0	2	3
Total:	154	48	0	0	0	0	0	0	0	2	0	0	0	49	4	24	27

Appendix C--Continued

Sample Size, by Type of Market and Type of Optometrist

Data Set	Number of Observations	ADS1		ADS2		FIRMADS2				FIRMADS3				FIRMADS4			
		NONADV	ONSITE	NONADV	ONSITE	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)
d. Total Adjusted Price of Eyeglasses and Exams																	
Blurreds	235	41	5	36	1	12	1	7	5	12	3	16	9	33	14	26	14
Binoculars	45	15	0	*	*	*	*	*	*	*	*	*	*	7	9	5	9
Total:	280	56	5	36	1	12	1	7	5	12	3	16	9	40	23	31	23
2. Eye Examinations:																	
Blurreds	238	41	5	36	1	12	1	7	5	14	3	16	9	89	27	55	14
20x20's	132	41	0	*	*	*	*	*	*	*	*	*	*	41	4	22	24
Binoculars	64	22	0	*	*	*	*	*	*	*	*	*	*	14	9	7	12
Total:	434	104	5	36	1	12	1	7	5	14	3	16	9	34	14	26	50
3. Prescriptions 1/																	
Blurreds	214	41	5	30	1	12	1	6	5	11	2	12	8	29	14	24	13
20x20's	127	41	0	*	*	*	*	*	*	*	*	*	*	38	4	21	23
Binoculars	59	20	0	*	*	*	*	*	*	*	*	*	*	13	8	6	12
Total:	400	102	5	30	1	12	1	6	5	11	2	12	8	80	26	51	48

Appendix C--Continued

Sample Size, by Type of Market and Type of Optometrist

Data Set	Number of Observations	ADS1		ADS2		FIRMADS2				FIRMADS3				FIRMADS4			
		NONADV	ONSITE	NONADV	ONSITE	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)	NONADV (F)	ONSITE (F)	SMALL (F)	CHAIN (F)
4. Eyeglass Accuracy 2/																	
Blurreds	187	29	4	36	1	*	*	*	*	12	2	15	9	30	14	24	11
Binoculars	30	5	0	*	*	*	*	*	*	*	*	*	*	5	7	4	9
Total:	217	34	4	36	1	*	*	*	*	12	2	15	9	35	21	28	20
5. Workmanship of Eyeglasses																	
Blurreds	191	29	4	36	1	*	*	*	*	12	3	16	9	31	14	24	12
Binoculars	33	6	0	*	*	*	*	*	*	*	*	*	*	6	8	4	9
Total:	224	35	4	36	1	*	*	*	*	12	3	16	9	37	22	28	21
6. Overprescribing																	
a. All observations																	
20x20's	123	37	0	*	*	*	*	*	*	*	*	*	*	37	4	21	24
Total:	123	37	0	*	*	*	*	*	*	*	*	*	*	37	4	21	24
b. When Prescription was correct																	
20x20's	92	25	0	*	*	*	*	*	*	*	*	*	*	28	4	15	20
Total:	92	25	0	*	*	*	*	*	*	*	*	*	*	28	4	15	20

Footnotes

1/ While 434 eye exams were purchased, only 400 prescriptions resulted. In 15 instances the optometrists did not give out a prescription and in 19 instances the prescription was excluded because the examinee wore contact lenses.

2/ Although 280 pairs of eyeglasses had been purchased, 56 pairs of eyeglasses were eliminated because of data contamination in three cities. In addition, of the 15 instances where a prescription was not provided by the optometrist (see footnote 1 above), 7 involved the purchase of eyeglasses by the examinee. Since it was necessary to have a written prescription in order to evaluate the accuracy of the eyeglasses 7 additional observations were eliminated.

*/ Not applicable.

* U. S. GOVERNMENT PRINTING OFFICE : 1980 629-756/6007